CHAPTER 4

RESILIENCE IN EMERGING MARKET AND DEVELOPING ECONOMIES: WILL IT LAST?

Many emerging market and developing economies have done well over the past decade and through the global financial crisis. Will this last? This chapter documents the marked improvement in these economies' resilience over the past 20 years. These economies did so well during the past decade that for the first time, emerging market and developing economies spent more time in expansion and had smaller downturns than advanced economies. Their improved performance is explained by both good policies and a lower incidence of external and domestic shocks: better policies account for about three-fifths of their improved performance, and less-frequent shocks account for the rest. However, should the external environment worsen, these economies will likely end up "recoupling" with advanced economies. Homegrown shocks could also pull down growth. These economies will need to rebuild their buffers to ensure that they are able to respond to potential shocks on the horizon.

During 2003–07 growth in emerging market and developing economies accelerated (Figure 4.1, panel 1), even as growth in advanced economies remained weak. This stimulated a vigorous debate on whether emerging market and developing economies had decoupled from the advanced economies.[1] That debate was silenced temporarily by the global crisis that emanated from the United States and Europe—in fact, more than half of emerging market and developing economies experienced negative growth in 2009 (Figure 4.1, panel 2). But they quickly bounced back, and during 2010–11 many of them grew at or above precrisis rates. As a result, they now account for virtually all of global growth (Figure 4.1, panel 3).

The question on policymakers' minds now is whether this strong performance will last. Beyond

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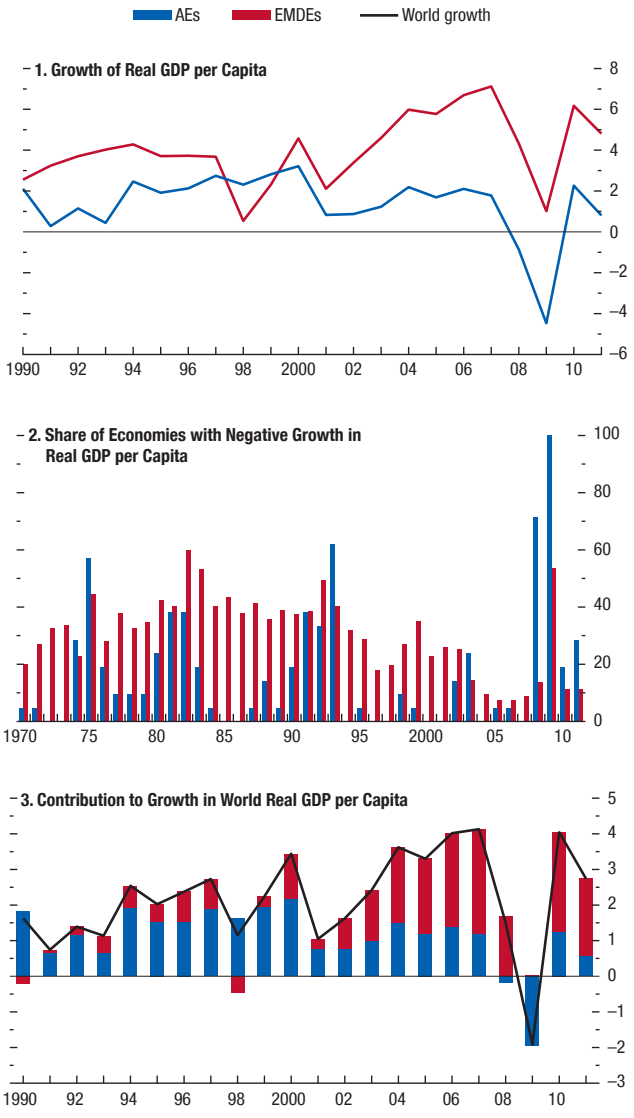
[1]For a summary of this debate, see Kose (2008) and, in the *World Economic Outlook,* Chapter 4 of the April 2007 report and Chapter 1 of the April 2008 report.

Figure 4.1. The Strong Performance of Emerging Market and Developing Economies
(Percent)

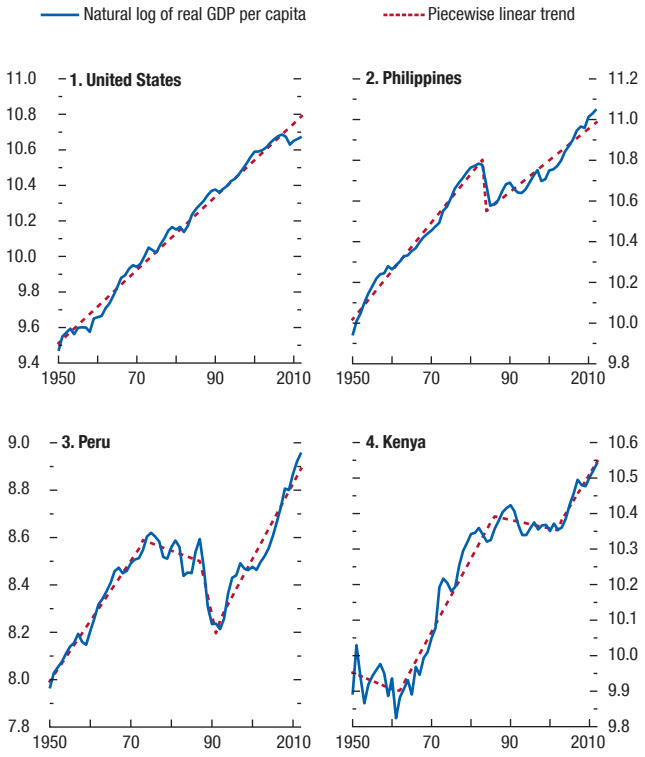
Growth in emerging market and developing economies accelerated in the mid-2000s, leading to talk of their decoupling from advanced economies. Emerging market and developing economies were not spared during the global downturn; most experienced negative growth in 2009. But many have recovered and are growing at or above precrisis rates, despite continued weakness in advanced economies. As a result, they now account for almost all global growth.



Sources: World Economic Outlook database; World Bank World Development Indicators database; Penn World Tables 7.0; and IMF staff calculations.
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. AE = advanced economy; EMDE = emerging market and developing economy.

Figure 4.2. Diverse Paths of Output

Unlike the smooth hills that characterize advanced economies' output paths, output in emerging market and developing economies is marked by mountains, cliffs, plateaus, and plains. Expansions and downturns can last just a few years or stretch over many years.



Sources: World Economic Outlook database; World Bank World Development Indicators database; Penn World Tables 7.0; and IMF staff estimates.

the de facto evidence of their resilience over the past decade and through the largest global shock in the past half-century, optimists can point to their improved policy frameworks and the ample policy space—room to maneuver without undermining sustainability—these improvements have created. These economies have also become more diversified along many dimensions—in their economic structure, trading patterns, and the composition of their capital flows. On the other hand, recent growth in some emerging market and developing economies has been supported by capital inflows, strong credit growth, and for those that export commodities, by the continued strength of commodity prices. These factors are prone to reversal, which suggests that these economies' prospects might not be that robust (Frankel, 2012). Some of the policy space they built over the past decade was used during the global crisis and has not yet been fully rebuilt. And there are now signs that growth in some of these economies is slowing.

This chapter studies the resilience of these economies, defined as their ability to sustain longer and stronger expansions and to experience shorter and shallower downturns and more rapid recoveries.[2] Previous studies have attempted to directly explain the growth of emerging market and developing economies and have had only modest success, in part because the behavior of output in these economies is much more complex and diverse than in advanced economies (see, for example, Easterly, 2001, and Figure 4.2). Easterly and others (1993) found very low persistence in their growth rates across decades, which is hard to reconcile with the high persistence of "fundamentals"—such as investment rates, education levels, trade, financial development, and institutional quality—that typically enter growth regressions. Pritchett (2000) characterized

[2]This is consistent with the general definition of resilience, which encompasses the same two aspects. The *Oxford English Dictionary,* for example, defines resilience as "the quality or fact of being able to recover quickly or easily from, or resist being affected by, a misfortune, shock, or illness." Increased resilience would result in longer and stronger expansions, but the latter could also result from fewer shocks—a possibility we explore in this chapter. Shorter and shallower downturns and more rapid recoveries are fully consistent with the aforementioned definition of resilience, since downturns are the result of negative shocks.

their output paths as being composed of "mountains, plateaus, cliffs, and plains" and documented large and abrupt changes in growth performance at the country level. Some emerging market and developing economies grow at reasonable rates for many years and then, without any obvious change in fundamentals, stagnate for decades, whereas others experience long periods of stagnation interrupted periodically by bursts of fast growth. Severe economic crises are not uncommon and tend to happen more often in these economies. These crises have large output costs because they often represent declines in the trend rather than fluctuations around a trend (Aguiar and Gopinath, 2007; Cerra and Saxena, 2008). As a result, expansions and recoveries in these economies have lasted anywhere from a few years to several decades.

Analyzing the length of expansions and the speed of recoveries could be an intermediate step in investigating the processes underlying growth—shifts in long-term growth or in the volatility of growth will show up in changing duration of expansions and speed of recoveries. Another reason for studying their duration is to help policymakers identify the factors that tend to halt or prolong expansions and hasten recoveries.[3]

This chapter helps shed light on the past, present, and prospective resilience of emerging market and developing economies by addressing the following questions:

- How has the resilience of these economies changed over time? Have expansions become longer and stronger, and have downturns and recoveries become shallower and shorter?
- What factors, both external and domestic, are associated with the duration of expansions and the speed of recoveries in these economies?
- If performance has improved over time, to what extent has it been due to less frequent or less severe shocks, to improved policymaking, and to structural changes such as shifts in these economies' trade and financial linkages?

The chapter examines the evolution of output per capita in more than 100 emerging market and developing economies over the past 60 years.[4] It identifies periods of expansion, downturn, and recovery in their output paths. Using a variety of tools, including event studies, statistical associations, and duration analysis, it analyzes how these durations have changed over time and how they relate to various shocks, policies, and structural characteristics. These are the chapter's main findings:

- The resilience of emerging market and developing economies has increased markedly during the past two decades. They are spending more time in expansion, and downturns and recoveries have become shallower and shorter. The performance of the past decade was particularly good, with emerging Europe being a notable exception. In fact, the past decade was the first time that emerging market and developing economies spent more time in expansion, and had smaller downturns, than advanced economies.
- Various shocks, both external and domestic, are associated with the end of expansions in these economies. Among external shocks, sudden stops in capital flows, advanced economy recessions, spikes in global uncertainty, and terms-of-trade busts all increase the likelihood that an expansion will end. Among domestic shocks, credit booms double and banking crises triple the probability that an expansion will shift into a downturn by the following year.
- Good policies are associated with increased resilience. Specifically, greater policy space (characterized by low inflation and favorable fiscal and external positions) and improved policy frameworks (countercyclical policy, inflation targeting, and flexible exchange rate regimes) are associated with longer expansions and faster recoveries.
- It is more difficult to tease out the effects on resilience of these economies' structural characteristics—such as trade patterns, financial openness and the composition of capital flows, and income

[3]In analyzing the length of expansions and speed of recoveries, we contribute to a growing literature that tries to shed light on growth transitions. Examples include Hausmann, Pritchett, and Rodrik (2005), who investigate growth accelerations; Berg, Ostry, and Zettelmeyer (2012) and Virmani (2012), who study periods of sustained growth; and Rodrik (1999); Becker and Mauro (2006); and Hausmann, Rodriguez, and Wagner (2006), who focus on growth collapses.

[4]Appendix 4.1 outlines the data sources for the analysis.

distribution. Few of these characteristics are robustly associated with the duration of expansions and the speed of recoveries.

- Improvements in policymaking and the buildup of policy space in many of these economies account for the bulk of the increased resilience since 1990. Some shocks, such as spikes in global uncertainty, have become more frequent in the past decade, but other shocks have become less frequent, such as banking crises and credit booms. Overall, the fact that there have been fewer shocks accounts for about two-fifths of the improved performance in emerging market and developing economies. Greater policy space and better policy frameworks account for the remaining three-fifths of the improvement in their performance.

The rest of the chapter is structured as follows. The first section documents how resilience has evolved for various country groupings and regions over time and relates these changes to deeper shifts in steady-state growth rates and the variability of growth. The second section relates the duration of expansions and the speed of recoveries to external and domestic shocks, to policy space and policy frameworks, and to structural characteristics of these economies. It uses standard tools of duration analysis, including both bivariate and multivariate models, to examine these correlates in a comprehensive and integrated manner. It then evaluates whether the nature of these associations has changed over time. The final section synthesizes the chapter with an examination of how these economies' policies and structure, as well as the shocks that buffet them, have changed over time. It then quantifies their relative contributions to the rise in resilience, and concludes with a few words on the prospective resilience of these economies.

How Has Resilience Varied across Countries and over Time?

We begin by establishing some stylized facts about the depth and duration of downturns, recoveries, and expansions for various country groups and how these have changed over the past six decades. For the purposes of this chapter the economies of the world are split into three groups.[5] Following Pritchett (2000), we define advanced economies primarily by membership in the Organization for Economic Cooperation and Development prior to 1990, with the exception of Turkey.[6] All other economies are classified as emerging market and developing economies, which we further subdivide into two groups: low-income countries, which are defined as the 51 economies currently eligible for concessional IMF loans, and the remaining 69 economies, which we classify as emerging markets. Appendix 4.1 lists the countries included in the analysis according to their classifications.

The primary variable of interest is the evolution of real output per capita. We focus on this variable for consistency with most of the literature on development, because it is the relevant measure of output for welfare analysis, and since it accounts for differences in population growth rates across countries. Most of the chapter's findings continue to hold if one uses real output instead (see Appendix 4.4).

To identify expansions, downturns, and recoveries in output per capita, we use the statistical algorithm of Harding and Pagan (2002), which detects turning points in the log level of a time series. The algorithm searches for local maximums (peaks) and minimums (troughs) that meet specified conditions for the length of cycles and phases. Because we are using annual data and some downturns and expansions can be as short as one year, the only condition imposed is on the minimum length of the cycle (a contiguous expansion and downturn), which is specified to be five years.[7] Expansions are defined as

[5]Throughout, we restrict our analysis to economies that have had an average population of at least 1 million inhabitants over the sample period.

[6]This implies that some economies currently classified as advanced by the *World Economic Outlook* are classified as emerging markets in this chapter. We do this because over the past 60 years they were more like emerging markets than advanced economies and because their experience—especially their ability to grow sufficiently to attain advanced economy status—provides valuable lessons.

[7]This is not too restrictive a constraint. In advanced economies, cycles have averaged 8½ years (see Chapter 3 of the April 2002 *World Economic Outlook*). As noted, expansions and downturns in emerging market and developing economies can often be much more protracted. The imposition of a five-year minimum cycle length serves mainly to filter out high-frequency fluctuations in

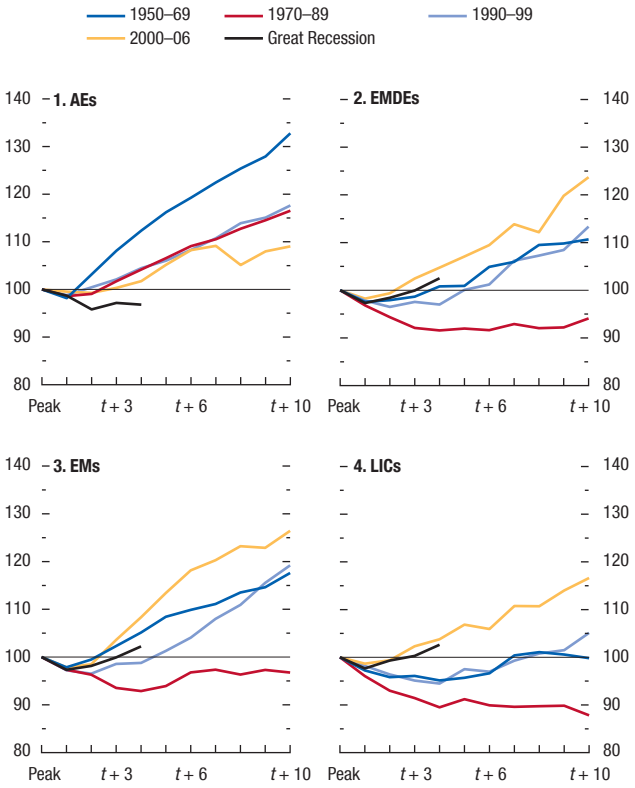
the period from the year after a trough to the year of the peak, inclusive, and downturns are defined as the period from the year after a peak to the year of the trough, inclusive. Recoveries are defined as the period from the year after a trough to the year when output per capita reaches or exceeds the previous peak's level. When output is well behaved, as is the case for most advanced economies, recoveries are a subset of expansions. For emerging market and developing economies, however, an expansion following a deep downturn may not reach the previous peak's output per capita until several cycles are completed, in which case a recovery can span several cycles. Application of the Harding-Pagan methodology identifies 117 expansions and 105 downturns in advanced economies and 576 expansions and 496 downturns in emerging market and developing economies.[8]

How has resilience changed over time? Figures 4.3 and 4.4 plot the dynamics of output per capita during the 10 years following a peak, with peaks grouped by the decades during which they occurred. We begin by looking at output dynamics following peaks in the 1950s and 1960s—the dark blue lines in the figures. These were golden decades for the advanced economies and good decades for emerging market and developing economies—the median downturn for the latter during these decades was shallow, less than 3 percent, and it took four years for median output per capita to regain or surpass its previous peak (Figure 4.3, panel 2).

Emerging market and developing economies took a sharp turn for the worse in the 1970s and 1980s (Figure 4.3, panels 2 to 4, red lines). The median downturn was much deeper and more protracted—even 10 years later median output per capita failed to recover its losses relative to the previous peak. There were substantial variations across regions, however (see Figure 4.4). Emerging and developing Asia was relatively resilient in these decades, with the median downturn and recovery lasting only four years. This was in sharp contrast to Latin America,

Figure 4.3. Dynamics of Output per Capita following Peaks
(Median output per capita; peak = 100; years on x-axis)

The 1950s and 1960s were good decades for emerging market economies—less so for low-income countries. But the 1970s and 1980s were cruel to both—median output per capita remained below predownturn levels 10 years after the peak. The 1990s saw shallower downturns and faster recoveries in emerging market economies, while the improvement in low-income countries was most evident during 2000–06. Both groups did comparatively well during the Great Recession.



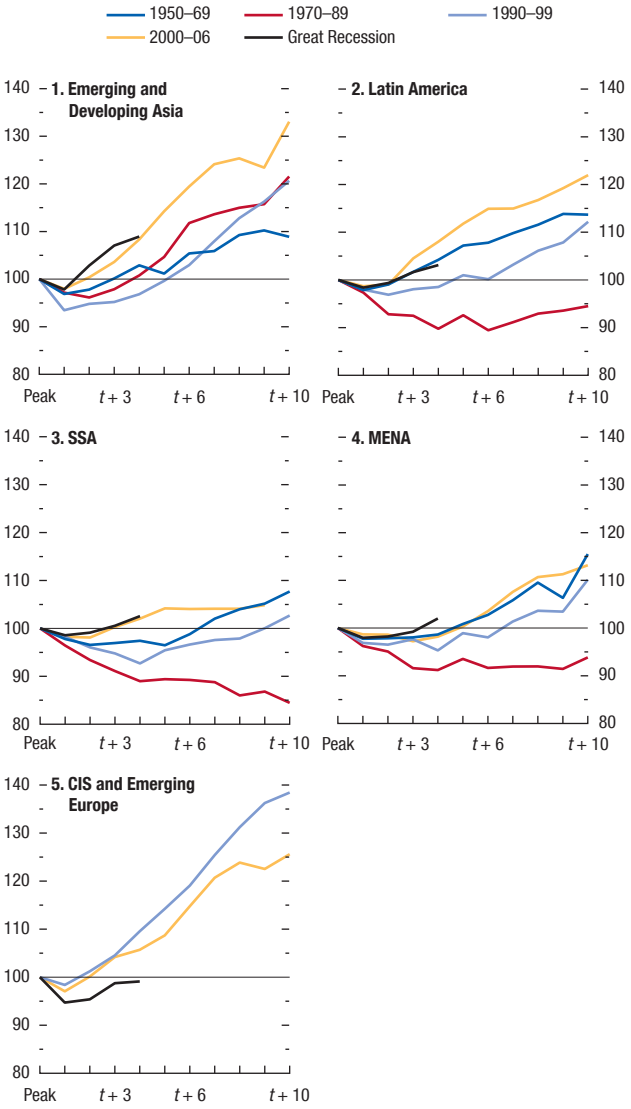
Source: IMF staff calculations.
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. AE = advanced economy; EM = emerging market economy; EMDE = emerging market and developing economy; LIC = low-income country. Peaks in output per capita are identified using the Harding-Pagan algorithm (Harding and Pagan, 2002). Output per capita at the peak (t) is normalized to 100, and the median output per capita is plotted in years (t + 1) through (t + 10) for each group.

emerging market and developing economies' output, which is typically much more volatile than output in advanced economies.

[8]The number of expansions and downturns are not equal due to the presence of incomplete cycles at the start and end of the time series.

Figure 4.4. Emerging Market and Developing Economy Regions: Dynamics of Output per Capita following Peaks
(Median output per capita; peak = 100; years on x-axis)

There were differences in performance across emerging market and developing economy regions over the past decades. The 1970s and 1980s were difficult for most regions (especially sub-Saharan Africa), but emerging and developing Asia fared better. The 1990s were tough for emerging and developing Asia, but the performance of other regions improved. All regions did better in the 2000s, except emerging Europe during the Great Recession.



Source: IMF staff calculations.
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. CIS = Commonwealth of Independent States; MENA = Middle East and North Africa; SSA = sub-Saharan Africa. Peaks in output per capita are identified using the Harding-Pagan algorithm (Harding and Pagan, 2002). Output per capita at the peak (t) is normalized to 100, and the median output per capita is plotted in years (t + 1) through (t + 10) for each region.

where many economies went through wrenching debt crises in the 1980s, and to sub-Saharan Africa and the Middle East and North Africa. In all three of the latter regions, median output per capita 10 years later remained below (in some cases well below) the previous peak.

Things began improving for emerging market and developing economies in the 1990s (Figure 4.3, light blue lines). Median output per capita followed a path closer to that observed in the 1950s and 1960s, although again with some variation across regions (see Figure 4.4). The 1990s were not a great decade for emerging and developing Asia: many economies experienced sharp downturns during the 1997–98 Asian financial crisis. By contrast, many countries in emerging Europe grew rapidly following their transition-related declines in output.

But the strong performance of emerging market and developing economies in the early 2000s and throughout the Great Recession was unprecedented (Figure 4.3, yellow and black lines).[9] The decline in median output per capita during downturns between 2000 and 2006 was smaller than in previous decades, and it only took two years to recover—this was true for both the emerging market and low-income country subgroups. Even through the Great Recession—arguably the largest external shock in the past half-century—both these subgroups performed well, with median output per capita recovering to its pre-crisis peak by the third year. The strong performance in the aftermath of the global crisis is evident in most regions, with the exception of emerging Europe, where median output per capita has yet to recover to its precrisis level (Figure 4.4, black lines). Employment in many emerging market and developing economies has also performed well: unemployment fell below precrisis levels by 2011 (see Box 4.1 for an analysis of the relationship between employment and growth in these economies).

[9]The improved performance of these economies is not driven by a subset of well-performing countries. If emerging market and developing economies are split into commodity exporters—which have benefited greatly in recent years from high commodity prices—and non–commodity exporters, the same pattern of improvement is evident in both groups. Similarly, isolating the largest emerging markets from the rest does not alter the picture materially. These splits are reported in Figure 4.15 in Appendix 4.4.

These economies did so well in the past decade that for the first time, they spent more time in expansion and had smaller downturns than advanced economies (Figure 4.5, panel 1). In the 1970s and 1980s, emerging market and developing economies spent more than a third of their time in downturns. In the 2000s, however, they spent more than 80 percent of their time in expansion. In contrast, the advanced economies have spent less time in expansion over the decades, and in the 2000s they were in downturns more than a fifth of the time. Although emerging market and developing economies have been spending more time in expansion, the median growth rate during expansions has not shown a clear trend over the past decades—median growth during recent expansions is not much different than during the expansions of the 1970s and 1980s (Figure 4.5, panel 2). But their downturns have become much less severe and are now shallower than downturns in the advanced economies (Figure 4.5, panel 3).

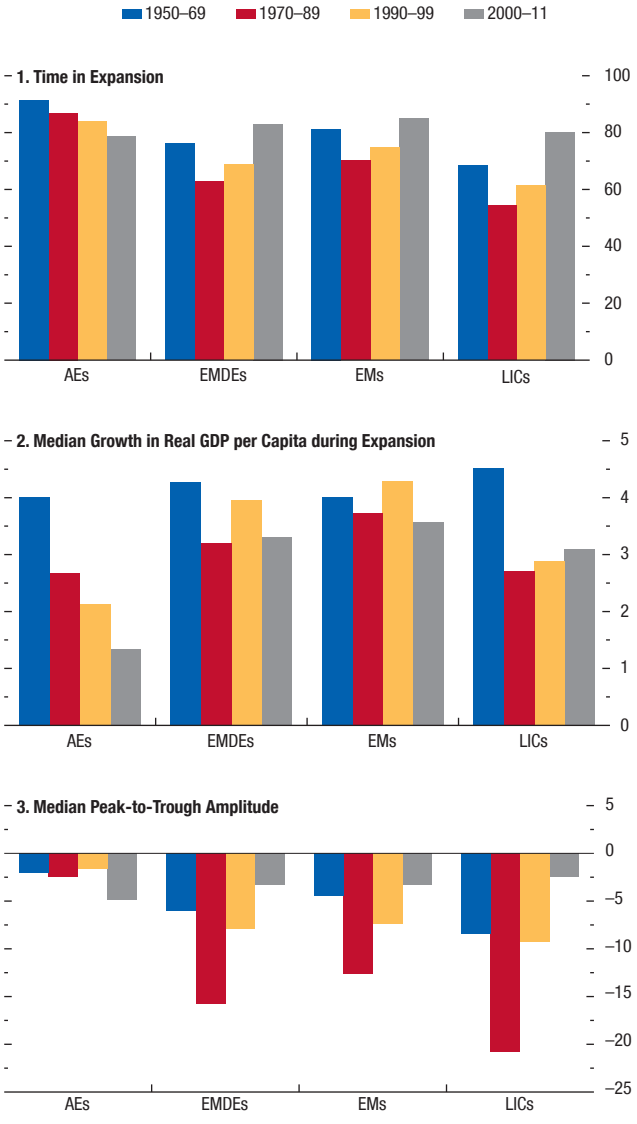
Why Has Resilience Changed? Taking a Look at Steady-State Growth and Variability

Longer expansions and shorter downturns are, in the end, simply manifestations of deeper changes. One possible underlying change is that steady-state or trend growth of emerging market and developing economies has been increasing—a higher rate of trend growth would mean that shocks that would have previously caused a downturn now cause only a slowdown. A second possibility is that the variability of growth has lessened, so that the longer expansions and faster recoveries are the result of fewer large, negative fluctuations.[10] Or both changes could be at work.

[10]A third possibility is that the propagation mechanism has changed—that is, the effect of shocks has become more (or less) persistent over time. But such a change would have ambiguous effects on resilience as defined in this chapter. Greater persistence would mean longer-lasting effects for positive shocks, which would prolong expansion, but it would also mean more protracted effects for negative shocks, which would result in slower recoveries. As it turns out, the estimated autoregressive coefficient (from an AR(1) growth model) for emerging market and developing economies has not changed significantly over the past 40 years. See Appendix 4.2.

Figure 4.5. Along Which Dimensions Has Emerging Market and Developing Economy Growth Improved?
(Percent)

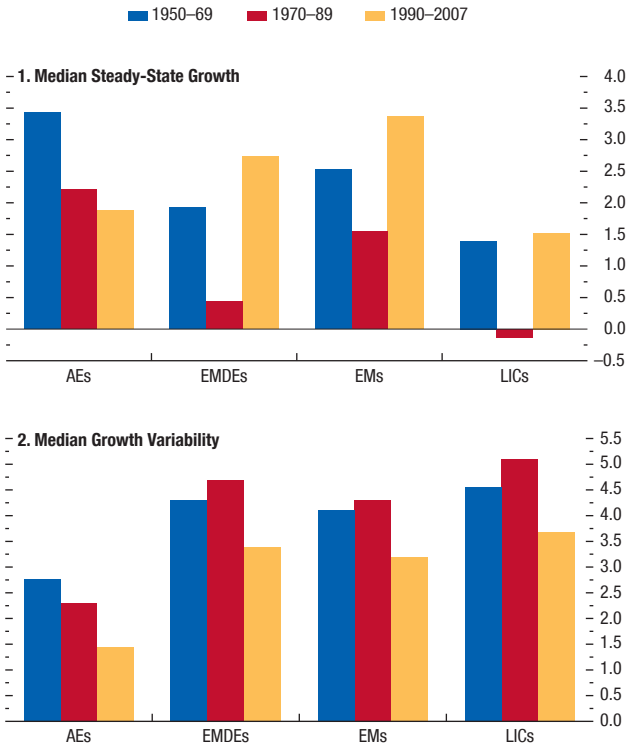
Emerging market and low-income economies have spent more time in expansion during the past two decades relative to the 1970s and 1980s. The 2000s was the first decade during which both groups spent more time than advanced economies in expansion. Median growth in output per capita during expansions has not risen much, but downturns have become shallower.



Source: IMF staff calculations.
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. AE = advanced economy; EM = emerging market economy; EMDE = emerging market and developing economy; LIC = low-income country. Peaks and troughs in output per capita are identified using the Harding-Pagan algorithm (Harding and Pagan, 2002).

Figure 4.6. Why Have Emerging Market and Developing Economies Become More Resilient?
(Percent)

The longer expansions and shorter recoveries observed in these economies during the past two decades are a manifestation of two underlying changes: higher steady-state growth and less variability in growth.



Source: IMF staff calculations.
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. AE = advanced economy; EM = emerging market economy; EMDE = emerging market and developing economy; LIC = low-income country. Growth in output per capita is modeled as an AR(1) process, and the model is estimated for all countries over three subperiods—1950–69, 1970–89, and 1990–2007. See Appendix 4.2 for further details. The results are nearly identical for 1990–2011 and 1990–2007.

Although estimating potential growth is difficult, including for advanced economies, one way to shed light on which of these various possibilities is at work is to follow Blanchard and Simon (2001) by modeling output growth as a simple autoregressive process—that is, by letting the growth rate of output per capita be a function of its lagged value and a constant, plus an innovation term. With such a model, we can calculate measures of steady-state growth and the variability of growth. We estimate such a model for all countries over three subperiods—the 1950s and 1960s, 1970s and 1980s, and 1990s and 2000s—and extract the median estimates for steady-state growth and the variability of growth for each of these periods (see Appendix 4.2).

As Figure 4.6 shows, longer expansions, shallower downturns, and faster recoveries are the result of both higher steady-state growth and lower variability in growth. For emerging markets, median steady-state growth fell from 2½ percent in the 1950s and 1960s to 1½ percent in the 1970s and 1980s; but it more than doubled, to 3½ percent, in the 1990s and 2000s. At the same time, the standard deviation of growth fell to 3¼ percent, from 4¼ percent in the 1970s and 1980s.[11] The same pattern holds true for low-income countries, for which steady-state growth markedly improved since the stagnation of the 1970s and 1980s and growth variability fell. The improvements in emerging market and developing economies along both dimensions differ from what is observed in the advanced economies, where the variability of growth has been falling over time (a phenomenon often referred to as the Great Moderation). On its own, this would be expected to improve resilience, but it has been offset by lower trend growth—median steady-state growth is less than 2 percent, about half of what it was in the 1950s and 1960s.

[11]The changes in steady-state growth and growth variability are both statistically significant for the emerging market and developing economies.

What Factors Are Associated with Resilience?

Having established the stylized facts regarding the changing duration of expansions and speed of recoveries in emerging market and developing economies, we now ask which factors are associated with these durations.[12] Specifically, we explore the following, in turn:

- What kinds of shocks, both external and domestic, tend to derail expansions?
- Do good policies help lengthen expansions and/or hasten recoveries?
- What structural characteristics help strengthen resilience?

What Shocks Tend to End Expansions?

A large number of shocks could potentially derail expansions in emerging market and developing economies. We focus on a subset of economic and financial disturbances, both domestic and external, the risks of which are now heightened in a number of countries:[13]

- *External shocks:* We consider increases in global uncertainty and world interest rates, recessions in advanced economies, sharp declines in an economy's terms of trade, and sudden stops in capital inflows. Sharp increases in world interest rates, which we proxy with the U.S. real interest rate, have triggered crises in the past, as have spikes in global uncertainty and recessions in advanced economies. Similarly, adverse movements in a country's terms of trade or capital flows can be destabilizing.
- *Domestic shocks:* We consider credit booms and banking crises. Although strong credit growth tends to be associated with strong output growth, excessively high credit tends to generate domestic vulnerabilities such as asset price bubbles or consumption and investment booms, and there is often a downturn when they burst. Similarly, banking crises frequently have very negative macroeconomic consequences.[14]

The shocks under consideration differ in one important dimension. Many external shocks, such as a rise in global uncertainty or global interest rates or recession in advanced economies, are clearly exogenous to emerging market and developing economies. Therefore, we examine the contemporaneous effect of these external shocks on the probability that the expansion ends.[15] But domestic shocks, such as a banking crisis, might be triggered by developments in output—for example, financial sector distress may be the result of a downturn rather than its cause. To gauge whether banking crises tend to derail expansions—while minimizing potential reverse causality issues—we examine the likelihood of an expansion ending in the period immediately following a banking crisis. For credit booms, the deleterious effects of which may take time to materialize, we examine the likelihood of an expansion ending in the subsequent period if there has been a credit boom during the previous three years.

The domestic and external shocks under consideration are strongly associated with expansions coming to an end. Figure 4.7 compares the probability of an expansion ending when these shocks occur with the probability of an expansion ending in the absence of such a shock. Among external shocks, spikes in global uncertainty, recessions in advanced economies, sudden stops in capital flows,

[12]It is important to emphasize that it is very difficult to establish causality from factors such as policies and structural characteristics on the one hand to the duration of expansions and recoveries on the other. Many of the variables we explore, including measures of policy space such as low inflation or stronger fiscal balances, are endogenous to the growth process in general. In particular, they could be a function of how long the economy has been in expansion.

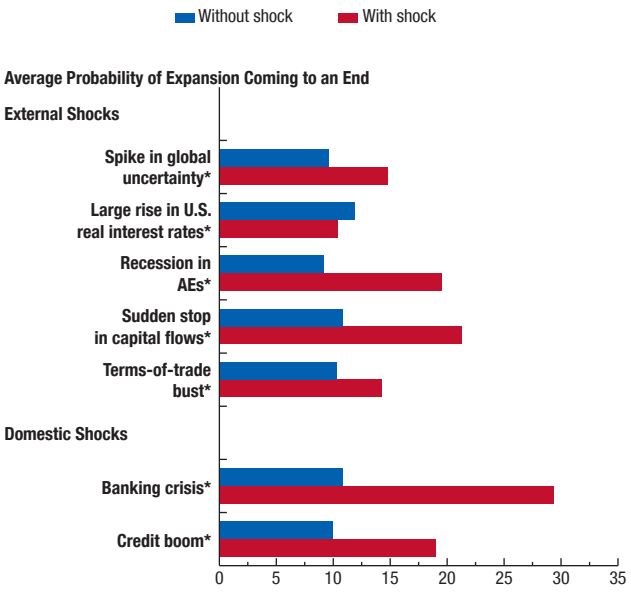
[13]For a related analysis of output drops and shocks, see Becker and Mauro (2006). Adler and Tovar (2012) look specifically at the resilience of emerging markets to global financial shocks. Other shocks, such as political turmoil and civil unrest, have also been important, particularly in low-income countries; see Hausmann, Rodriguez, and Wagner (2006) and Berg, Ostry, and Zettelmeyer (2012).

[14]See Chapter 4 of the October 2009 *World Economic Outlook.*

[15]The case of sudden stops in capital flows is less clear-cut, because a reversal in net capital flows could be driven by changes in domestic conditions. The findings reported here for sudden stops are not sensitive to whether the contemporaneous or lagged values of the sudden stop indicators are used. In addition, Appendix 4.4 reports a robustness test intended to minimize potential endogeneity, in which we focus on the subset of sudden stop episodes referred to in the literature as "systemic sudden stops," which are those that coincide with a sharp rise in global uncertainty. The results hold in this case as well.

Figure 4.7. Emerging Market and Developing Economies: Effects of Various Shocks on the Likelihood that an Expansion Will End
(Percent)

Various shocks, both external and domestic, are associated with expansions coming to an end. Among external shocks, sudden stops in capital flows, spikes in global uncertainty, recessions in advanced economies, and terms-of-trade busts all significantly increase the likelihood that an expansion will end. Among domestic shocks, credit booms double and banking crises triple the likelihood that an expansion will shift to a downturn by the following year.



Source: IMF staff calculations.
Note: AE = advanced economy. The bars show the average probability of exiting an expansion in the absence or presence of various types of external and domestic shocks. For external shocks, which are more likely to be exogenous, the red bars present the contemporaneous effect, that is, the probability that the expansion will end and the downturn will begin in the same year as the shock. For domestic shocks, for which endogeneity is more of a concern, the red bars are the lagged effect, that is, the probability that the expansion will end and the downturn will begin in the year after the shock. The probability of exit conditional on a shock also depends on the length of the expansion at the time the shock occurs; the average probability is used as a summary measure of the distribution of conditional probabilities. Statistically significant differences at the 10 percent level between the underlying distributions are denoted by starred and bolded labels.

and terms-of-trade busts all significantly increase the likelihood that an expansion will end. Sudden stops and advanced economy recessions have the most pronounced effects; they raise the likelihood that an expansion will end by a factor of two. The effect of domestic shocks is just as strong if not stronger—credit booms double the likelihood that an expansion will shift into a downturn by the following year, and banking crises triple the likelihood.

How Are Policies Associated with Resilience?

We now turn to the role of monetary, fiscal, and exchange rate policies. One of the arguments put forward in the literature to explain higher resilience among emerging market and developing economies is these economies' improved policy frameworks and increased policy space (see, for example, Kose and Prasad, 2010). For example, many have adopted inflation targeting and have reduced inflation since the early 1990s (Schmidt-Hebbel, 2009). Similarly, some have graduated from procyclical fiscal policy and now have a greater ability to implement countercyclical fiscal policy than in the late 1990s (Frankel, Végh, and Vuletin, 2011) or have reduced their fiscal deficits and public debt.[16] Finally, many have moved away from hard exchange rate pegs, and their more flexible exchange rates act as a shock absorber and reduce the vulnerability of the public and financial sectors to the sudden and severe currency depreciations characteristic of currency crises (Chang and Velasco, 2004).

We analyze both improved policy frameworks and enhanced policy space for fiscal, monetary, and exchange rate policies as follows:

- *Monetary policy:* We consider whether the central bank has adopted inflation targeting. To measure policy space, we consider whether the economy had an inflation rate above or below 10 percent.[17]

[16]Végh and Vuletin (2012) also find that monetary policy in many emerging market and developing economies has graduated from being procyclical to being more countercyclical.

[17]Our results are robust to choosing a more stringent threshold for low inflation. See Appendix 4.4 for details.

- *Fiscal policy:* We consider whether fiscal policy was countercyclical or procyclical.[18] We also measure policy space—the scope for further increases in public debt without undermining sustainability (Ostry and others, 2010, p. 4). We use two measures: whether the government was running a fiscal surplus or deficit, and whether it had a low or high ratio of public debt to GDP, with the threshold for "high" public debt at 50 percent of GDP.[19]
- *Exchange rate policy:* We consider whether the economy had a pegged exchange rate or not. For policy space, we look at whether the economy had a current account surplus or deficit, a high or low ratio of external debt to GDP (above or below 40 percent), and a high or low ratio of international reserves to GDP (above or below the sample median).[20]

To assess the role of policies, we relate the duration of expansions and the speed of recoveries to the various policy measures using nonparametric duration analysis methods—that is, without imposing any structure or model on the data.[21] Specifically, we use the standard Kaplan-Meier survivor function estimator to gauge whether policy frameworks and the availability of policy space help lengthen expansions and hasten recoveries. As with domestic shocks, we use lagged values of the policy variables to minimize reverse causality, so that policy characteristics in the current year are related to the likelihood that an expansion or recovery will end in the next year.

We find that good policy frameworks have helped emerging market and developing economies prolong their expansions and hasten their recoveries. Figure 4.8 illustrates how their average duration is associated with the various measures of policy frameworks and policy space.[22] With regard to policy frameworks, inflation targeting and a countercyclical fiscal policy significantly increase the length of expansions and hasten recoveries.[23] In addition, not having a pegged exchange rate tends to lengthen expansions, but has no significant effect on the speed of recoveries.

Adequate policy space also appears to provide a cushion. Figure 4.8 shows that having a low inflation rate significantly lengthens expansions and hastens recoveries. Having a fiscal surplus in the previous year leads to significantly longer expansions, but there is no significant impact of this variable on the speed of recoveries. Economies with low levels of public debt tend to recover much faster from downturns, but this variable has no significant effect on the length of expansions. Finally, a strong external position (characterized by current account surpluses, low external debt, and high international reserves) significantly lengthens expansions and hastens recoveries.[24]

[18]The cyclicality of fiscal policy is measured by the correlation between the cyclical component of real government expenditure and the cyclical component of real GDP (Kaminsky, Reinhart, and Végh, 2004) measured over the previous 10 years. A negative correlation reflects a countercyclical fiscal policy; a positive correlation reflects a procyclical fiscal policy.

[19]Mendoza and Ostry (2008) find that fiscal solvency in emerging markets diminishes beyond a public debt threshold of 50 percent of GDP, with fiscal solvency measured by the responsiveness of the primary balance to changes in the debt level. Due to the poor coverage of data on fiscal balances across economies and over time, we proxy the fiscal balance by the change in the ratio of public debt to GDP adjusted by nominal GDP growth. See Appendix 4.1 for details.

[20]Reinhart, Rogoff, and Savastano (2003, p. 10) find that "default in emerging markets can and does occur at ratios of external debt to GDP that would not be considered 'excessive' for the typical advanced economy." About one-fifth of defaults they study in these countries occurred when external debt was less than 40 percent of GDP, and one-third occurred when external debt was between 40 and 60 percent of GDP.

[21]Duration analysis goes by many names, including "survival" or "event history" analysis. Historically, such methods arose in medical research on the determinants of human mortality (the origin of the term "survival analysis"). See Appendix 4.3 for details.

[22]The average recovery duration shown in Figure 4.8 may be somewhat surprising to those used to the much shorter recoveries in advanced economies, but recall from Figure 4.3 that the *median* path of output per capita following peaks in the 1970s and 1980s did not recover to the previous peak's level even 10 years later.

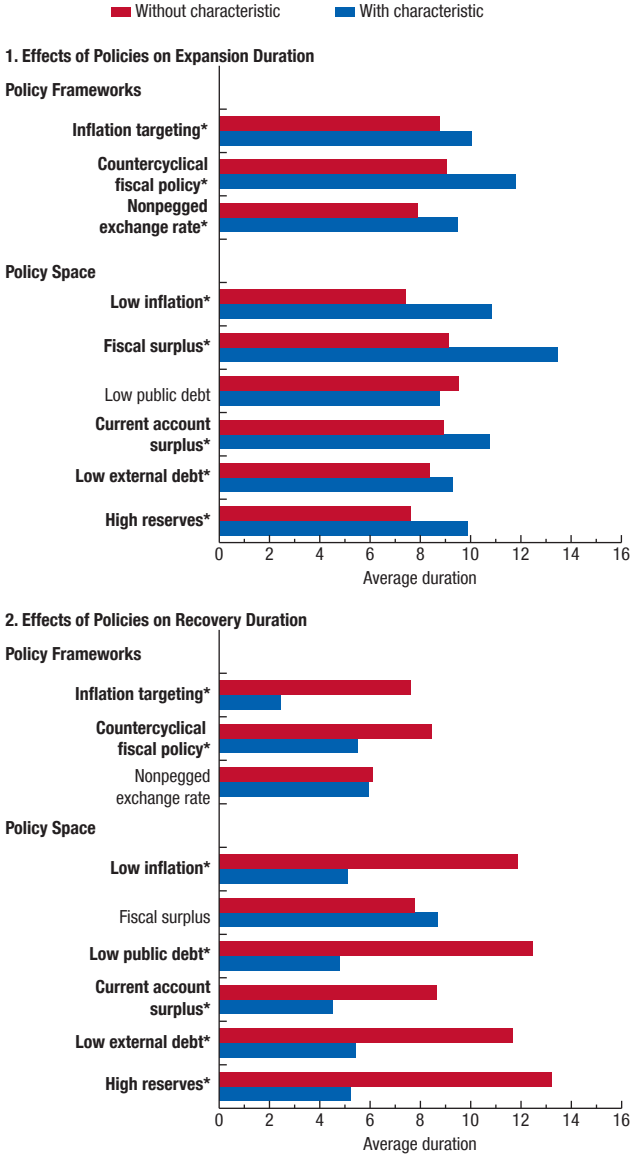
[23]This result is in line with de Carvalho Filho (2011), who documents that inflation-targeting economies fared better during the Great Recession.

[24]Several studies find that the strength of the countries' external position (low levels of foreign-currency-denominated debt, low current account deficits) was an important factor in explaining the cross-country incidence of the Great Recession. See, for example, Blanchard, Faruqee, and Das (2010) and Lane and Milesi-Ferretti (2010). Didier, Hevia, and Schmukler (2012) document the importance of foreign reserves in explaining the speed of recovery in the aftermath of the global crisis.

Figure 4.8. Emerging Market and Developing Economies: Effects of Policies on Expansion Duration and Speed of Recovery

(Years)

Good policies have contributed to emerging market and developing economies' resilience. Specifically, greater policy space (as measured by low inflation and favorable fiscal and external positions) and improved policy frameworks (as measured by countercyclical policy, the adoption of inflation targeting, and more flexible exchange rate regimes) are associated with longer expansions and faster recoveries.



Source: IMF staff calculations.
Note: The bars show the average duration of expansions and recoveries in the absence or presence of the given characteristic. The average duration is used as a summary measure of the underlying duration distribution conditional on the characteristic. Statistically significant differences at the 10 percent level between the underlying distributions are denoted by starred and bolded labels.

How Are Structural Characteristics Associated with Resilience?

In addition to macroeconomic policies, an economy's structural characteristics shape its performance in general and its response to shocks in particular. Various hypotheses have been put forward in recent years that relate changes in the resilience of emerging market and developing economies to shifts in their economic structures. Although many potential characteristics could affect resilience, we focus on the following:

- *Increased trade openness and diversification:* There has been a significant shift in both the trade openness and trading patterns of emerging market and developing economies. Trade openness has increased substantially over time as trade regimes have been liberalized and the costs of transportation and communication have fallen. Greater trade openness helps reduce dependence on domestic demand and vulnerability to domestic shocks, but it may also make economies more vulnerable to slowdowns in external demand. Greater diversification across trading partners would help reduce these economies' vulnerability to slowdowns in specific trading partners. In this regard, the dramatic increase in trade among these economies is thought to have helped them weather the recent advanced economy crisis, although prospectively it may increase their vulnerability to a slowdown in large emerging markets like China (Box 4.2).
- *Increased financial openness and changes in the composition of capital flows:* As with trade, there has been a steady move toward greater financial openness in many regions. Increased capital account openness can facilitate risk sharing, but it can also leave countries more vulnerable to financial shocks or sudden stops in capital flows. For some emerging market and developing economies, susceptibility to the volatility of capital flows has been mitigated by a change in their composition—toward foreign direct investment (FDI), which is thought to be more stable.
- *Income equality:* Rodrik (1999) posits that when social divisions run deep, the effects of external shocks are magnified by the distributional conflicts they trigger. Adjustment to external shocks often has distributional consequences, and in

economies where "latent social conflict" is high—as measured by proxies such as income inequality, ethnic and linguistic fractionalization, and social mistrust—adjustment tends to be inadequate, prolonging the negative effects of the shock. More recent papers such as Berg and Ostry (2011) find that greater income equality enables countries to sustain periods of rapid growth.

Although the effects of shocks and policies on the duration of expansions are apparent and almost always significant, the effects of structural characteristics are less clear-cut (Figure 4.9, panel 1). We use the same techniques as in previous subsections to examine their effects on the duration of expansions and the speed of recoveries, again using lagged values to mitigate reverse causality, so that structural characteristics in the current year are related to the likelihood that an expansion or recovery will end in the following year. Greater trade openness and trade liberalization are not significantly associated with the duration of expansions. Nor are the extent of trade among emerging market and developing economies or greater financial integration. In contrast, greater FDI flows are associated with a small but statistically significant increase in the average duration of expansions. The strongest structural correlate of expansion duration, at least in this bivariate exercise, is income inequality—countries with below-median income inequality have expansions that last about five years longer than those with above-median income inequality.

The effects of structural factors on the speed of recovery are more distinct (Figure 4.9, panel 2). Greater trade openness and diversification, lower financial integration, higher capital account openness, and higher FDI are all significantly associated with faster recoveries. But greater income equality does not have a significant effect on the speed of recovery.

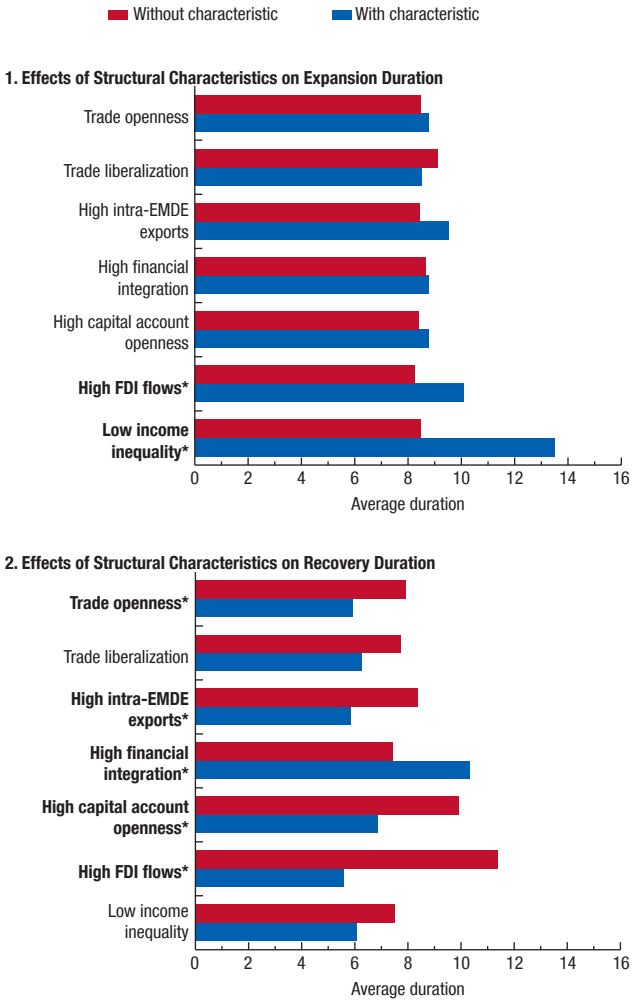
Putting It All Together: Multivariate Analysis

To this point, the chapter has examined individual variables and their association with the resilience of emerging market and developing economies. However, these determinants rarely change in isolation and often move together, and so a proper assessment of

Figure 4.9. Emerging Market and Developing Economies: Effects of Structural Characteristics on Expansion Duration and Speed of Recovery

(Years)

It is more difficult to tease out the effects of economies' structural characteristics—such as trade patterns, composition of capital flows, and the degree of financial integration—on resilience. Among these characteristics, only FDI flows and low income inequality were significantly associated with longer expansion. The effects of structural factors on the speed of recovery are more distinct: greater trade openness and diversification, lower financial integration, higher capital account openness, and higher FDI are all significantly associated with faster recoveries. Income inequality does not have a significant effect on the speed of recovery.



Source: IMF staff calculations.
Note: EMDE = emerging market and developing economy; FDI = foreign direct investment. The bars show the average duration of expansions and recoveries in the absence or presence of the given characteristic. The average duration is used as a summary measure of the underlying duration distribution conditional on the characteristic. Statistically significant differences at the 10 percent level between the underlying distributions are denoted by starred and bolded labels.

each variable's influence requires controlling for movements in the other variables. To do this, we undertake a multivariate analysis of resilience. We do this using the tools of parametric duration analysis, which allow the duration of an expansion or the speed of recovery to be modeled as a function of several variables simultaneously. This analysis provides a sense of how each variable is related to the chances that the episode under study will last—that is, whether the variable tends to increase or decrease the expected length of an episode at a given time. Appendix 4.3 contains details on the duration model used here.

The large number of potential correlates and the poor data availability for some of these necessitate a parsimonious approach to the multivariate analysis. As noted, a wide array of factors have been identified as possible factors in the improved resilience of emerging market and developing economies, but there is only limited historical experience on which to draw to test the simultaneous impact of these various factors. For example, the data are extremely sparse for our measure of the cyclicality of fiscal policy prior to the 1990s. As a result, we focus on a selected subset of the variables explored in the previous section:

- *External shocks:* global uncertainty, the U.S. real interest rate, indicators of terms-of-trade busts, sudden stops in capital inflows, and advanced economy recessions;
- *Domestic shocks:* indicators of credit booms and systemic banking crises;
- *Domestic policies:* indicators of single-digit inflation and public debt levels below 50 percent of GDP, and a measure of international reserves to GDP; and
- *Structural characteristics:* trade openness, financial openness, and income equality.

Apart from the external shocks, the explanatory variables are lagged as in the previous section to mitigate potential endogeneity.

What Ends Expansions?

The first column of Table 4.1 shows how the expected duration of an expansion is associated with these variables. The estimates are based on an accelerated failure time model, which breaks the determinants of duration into two components: a baseline expected duration, which captures how long an episode is likely to last at a particular time, independent of other variables, and a "shifter" that scales this baseline and is a function of a set of explanatory variables. The Weibull shape parameter for the model indicates that an expansion has a greater chance of ending the longer it lasts (the parameter is greater than 1). The effects of the explanatory variables on the baseline are given by the time ratios, which are the numbers shown in the table for each variable. The magnitude of these time ratios denotes the factor by which the expected duration of the expansion is increased relative to the baseline. If the time ratio is greater than 1, the variable tends to lengthen the expansion or slow the recovery relative to the baseline; if it is less than 1, it tends to shorten the expansion or hasten the recovery.

The multivariate duration analysis for expansions mostly confirms the bivariate relationships reported above. External and domestic shocks tend to reduce the length of expansions. For example, a 1 point rise in global uncertainty reduces the expected duration of an expansion by about 5 percent (because the baseline expected duration is multiplied by 0.951). A 1 percentage point rise in the U.S. real interest rate has a similar effect. Sudden stops, advanced economy recessions, credit booms, and banking crises reduce the expected duration of an expansion by about 40 percent. These shocks have statistically significant effects, with the exception of terms-of-trade busts and the U.S. real interest rate.

The policy-related variables tend to increase the length of expansions, although the statistical significance of these effects varies. Low inflation lengthens the expansion by about 47 percent, whereas a 10 percent of GDP increase in international reserves lengthens it by about 9 percent. In the multivariate model, a low public debt level does not have a statistically significant effect on expansion duration.

The structural characteristics tend to have little to no effect. Only higher income inequality and greater financial integration reduce the expected expansion duration in a statistically significant manner, but even then, the magnitudes are small.

Table 4.1. What Ends Expansions and Recoveries?

	Expansions			Recoveries		
Explanatory Variable	All Years	Pre-1990	Post-1989	All Years	Pre-1990	Post-1989
Implied S&P 100 Volatility (VXO)[1]	0.951***	0.981	0.943***	1.054***	1.060**	1.042**
	(–4.179)	(–0.985)	(–4.565)	(2.846)	(2.143)	(2.012)
U.S. Ex Ante Real Interest Rate	0.956	0.993	0.835***	1.085	0.960	1.068
	(–1.461)	(–0.158)	(–3.479)	(1.502)	(–0.397)	(0.748)
Terms-of-Trade Bust Indicator	0.968	0.802	1.134	1.751	1.819	1.726*
	(–0.214)	(–1.034)	(0.740)	(1.582)	(1.065)	(1.944)
Sudden Stop (capital inflows) Indicator	0.590***	0.497*	0.841	0.921	1.208	0.834
	(–2.927)	(–1.885)	(–1.254)	(–0.171)	(0.168)	(–0.452)
Advanced Economy Recession Indicator	0.642***	0.668**	0.680*	1.271	1.006	1.012
	(–4.074)	(–2.420)	(–1.911)	(0.922)	(0.0209)	(0.0372)
Credit Boom during Past Three Years	0.616***	0.591***	0.705***	1.449	1.200	1.546
	(–3.913)	(–2.621)	(–2.610)	(0.875)	(0.300)	(0.867)
Banking Crisis Indicator	0.550***	0.504***	0.538***			
	(–3.376)	(–3.302)	(–2.830)			
Single-Digit Inflation Indicator	1.473***	1.574**	1.276**	0.692	0.788	1.132
	(3.185)	(2.474)	(2.102)	(–1.465)	(–0.674)	(0.457)
Low Public Debt to GDP Indicator	1.009	0.998	1.019	0.550***	0.623	0.472***
	(0.0713)	(–0.0117)	(0.132)	(–2.648)	(–1.308)	(–2.969)
International Reserves to GDP	1.009***	1.006	1.004	0.993	1.001	0.998
	(2.866)	(1.289)	(0.903)	(–0.927)	(0.0636)	(–0.241)
Income Inequality (Gini coefficient)	0.986**	0.976***	0.997			
	(–2.144)	(–2.833)	(–0.459)			
Trade Openness (exports plus imports to GDP)	0.999	1.001	1.000	0.993**	0.987**	1.000
	(–0.451)	(0.373)	(–0.170)	(–2.327)	(–2.324)	(–0.0371)
Financial Openness (external assets plus liabilities to GDP)	0.999***	0.999***	1.000	1.001**	1.004	1.000
	(–3.121)	(–4.840)	(–0.549)	(2.154)	(1.183)	(–0.488)
Observations		1,264			832	
Number of Episodes		188			144	
Number of Exits		126			118	
Number of Economies		75			76	
Weibull Shape Parameter	1.516	1.408	2.277	0.829	0.857	1.024
Z Statistic of Shape Parameter	6.829	3.258	2.928	–3.792	–1.846	1.713
Log Likelihood	–103.0	–88.1		–201.1	–189.1	
Model Chi-Squared *p* Value	0.000	0.000		0.000	0.000	

Source: IMF staff calculations.

Note: Exponentiated coefficients shown are time ratios, which indicate whether the variable tends to shorten (less than 1) or lengthen (greater than 1) the expected time-in-episode. *Z* statistics are given in parentheses underneath the coefficient estimates. A negative *z* statistic indicates that the associated variable tends to shorten an episode; if the *z* statistic is positive, it tends to lengthen an episode. *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

[1]VXO = Chicago Board Options Exchange S&P 100 volatility index.

As seen in the second and third columns of Table 4.1, there is also some evidence that the effects of some variables on the length of expansions have changed over time. To investigate whether the greater resilience observed after 1989 results from changes in the sensitivity of expansions to shocks and policies, we estimate a model in which the effects are allowed to be different before and after 1989.

The sensitivity of expansion duration to shocks has not changed over time. Although the effects of some external shocks is slightly weaker after 1989, only global uncertainty and U.S. real interest rates have statistically significant effects that differ across these subperiods, and both tend to shorten expansions more after 1989. Domestic shocks also tend to have a weaker effect after 1989, but the difference is not statistically significant.

The effects of policy-related variables and structural characteristics are generally similar across the two subperiods, with a couple of notable exceptions. Income inequality and financial openness shorten expansion only before 1989; after 1989, they have no statistically significant effect.

What Hastens Recoveries?

The three right-hand columns of Table 4.1 show how the various factors affect the speed of recovery. Unfortunately, data limitations require that we drop two of the variables—banking crises and income inequality.

The multivariate results broadly confirm the directional effects from the bivariate analyses, but statistical significance is much weaker. Only a few statistically significant variables are associated with the speed of recoveries.

In general, recoveries accompanied by the large shocks considered in this chapter tend to be slower (the time ratio is larger than 1), but only global uncertainty is statistically significant. Greater policy space helps hasten recoveries, but again with less statistical significance than in the bivariate analyses. Low inflation, low public debt, and high reserves tend to hasten recoveries, but only low public debt has a statistically significant effect. Among the structural characteristics, trade openness significantly hastens recoveries and financial openness significantly slows them, but both effects are comparatively small.

The fifth and sixth columns of Table 4.1 show the estimated effects on the speed of recoveries before and after 1989. Among the external shocks, only the effect of global uncertainty is consistently significant, but it does not appear to have changed over time. Terms-of-trade busts slow recoveries, but are statistically significant only after 1989. Low public debt dramatically hastens recoveries after 1989 (roughly halving the expected duration), but it had no significant effect before 1989. Greater trade openness tends to hasten recoveries more before than after 1989. The estimated effects of the other policy-related variables and structural characteristics were not statistically different between the two subperiods.

Wrapping Up: What Has Contributed to Increased Resilience?

What are the key drivers of the increasing resilience that emerging market and developing economies have demonstrated in recent years? There are a number of potential explanations. One is that the shocks that afflicted them in past decades—credit boom-bust cycles, sudden stops, and financial crises, to name just a few—have become less frequent, less severe, or both.[25] A second is that although the shocks themselves have not changed, their effects have decreased over time. But, as shown in the previous section, the effects of shocks on the duration of expansions and the speed of recoveries have not lessened since 1989. A third is that emerging market and developing economies have built bigger cushions—in the form of better policy frameworks and enhanced policy space or more diversified production or trade patterns—that help them better weather shocks. We explore each of these possible explanations.

Homegrown shocks seem to have become less frequent in recent years (Figure 4.10, panels 1 and 2). The share of emerging market and developing economies that had a banking crisis, for example, rose during the 1990s but fell during the 2000s. Even with substantial financial spillovers and a much weaker economic environment as a result of the Great Recession, only four of these economies (Latvia, Mongolia, Nigeria, Ukraine) had a systemic banking crisis during 2008–09, and none had one in the past two years. Similarly, the incidence of credit booms fell between the 1990s and the 2000s.[26] Although the number of credit booms was high during 2008–09, it fell back during 2010–11 as economic and credit conditions worsened and as some of these economies tightened macroeconomic and credit policies to rein in rapid credit growth. In addition, the deviation from trend of real credit per capita during recent credit booms has been lower on average than during booms in previous decades (see Figure 4.10, panel 2, red line).

Some external shocks have become more frequent, others less frequent (Figure 4.10, panels 3 through 7). Sudden stops and spikes in global uncertainty have been more common in the past decade. But terms-of-trade busts and advanced economy reces-

[25]While it may be tempting to attribute fewer or less severe shocks to good luck, it should be kept in mind that many of these so-called shocks are endogenous to policymaking. For example, less frequent credit boom-bust cycles and banking crises can result from tighter regulation and supervision.

[26]Emerging Europe is a notable exception here—the credit boom-bust cycle that several emerging European countries have gone through is one of the causes of the region's weaker performance in the past decade.

sions declined in frequency between the 1980s and 2000–07. External shocks reemerged with a vengeance amid the 2008–09 global crisis but have receded in the past two years. The continued volatility of capital flows and commodity prices and the weak activity in advanced economies suggest taking a cautious view on the likelihood of such shocks in the future—a point discussed further below.

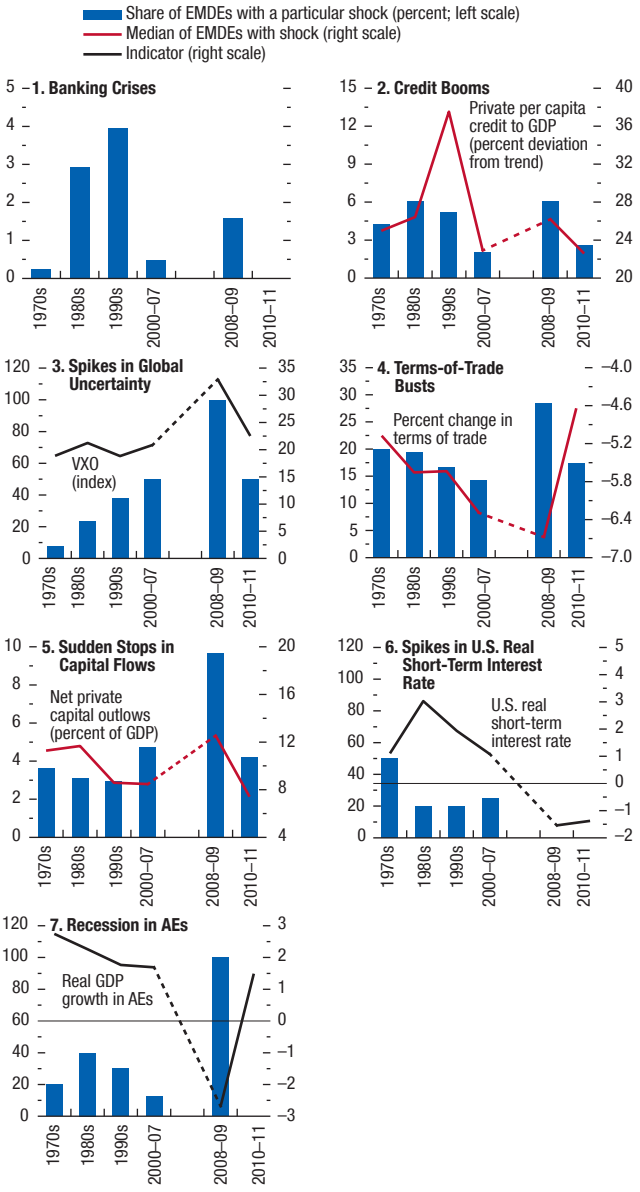
There has been a broad improvement in policy frameworks and policy space over time, and this has increased the resilience of emerging market and developing economies (Figure 4.11). Inflation has fallen in many of these economies: although half of them had double-digit inflation in the 1970s and 1980s, more than 80 percent now have inflation in the single digits. This may partly reflect the fact that more central banks have adopted inflation targeting. Exchange rate regimes have also become more flexible—there are fewer hard pegs than in the 1970s and 1980s.

The external positions of many of these economies are much improved. More are running current account surpluses, and the median external debt level has fallen from close to 60 percent of GDP in the 1990s to less than 35 percent of GDP today. Most of these economies now have external debt levels below 40 percent of GDP, a threshold that Reinhart, Rogoff, and Savastano (2003) flag as a level beyond which "debt intolerance" increases. And increasing reserves have not been limited to the high-profile Asian emerging markets—the median emerging market and developing economy saw its reserves rise from less than 8 percent of GDP on average in the 1990s to 18 percent of GDP during 2010–11. It should be noted, however, that current account surpluses come at the cost of potentially raising global imbalances, and high reserve holdings can entail a substantial opportunity cost.

Fiscal positions and frameworks have also improved, although fiscal balances have not fully recovered from the effects of the Great Recession. Median public debt has fallen from over 65 percent of GDP in the 1990s to less than 40 percent of GDP in the past two years. The number of countries implementing countercyclical fiscal policies is also on the rise. The share of emerging market and developing economies with fiscal surpluses rose

Figure 4.10. Frequency of Various Types of Domestic and External Shocks to Emerging Market and Developing Economies
(Percent unless noted otherwise)

There is no clear downward trend in the frequency of shocks to these economies. Although domestic shocks (banking crises and credit booms) were less frequent in the 2000–07 period compared with the 1980s, the frequency of external shocks has varied. The frequency of global uncertainty spikes and sudden stops in capital inflows increased between the 1980s and 2000–07, while the frequency of terms-of-trade shocks and advanced economy recessions declined over the same period. Many of these shocks reemerged in 2008–09 but have become less common in the past two years.

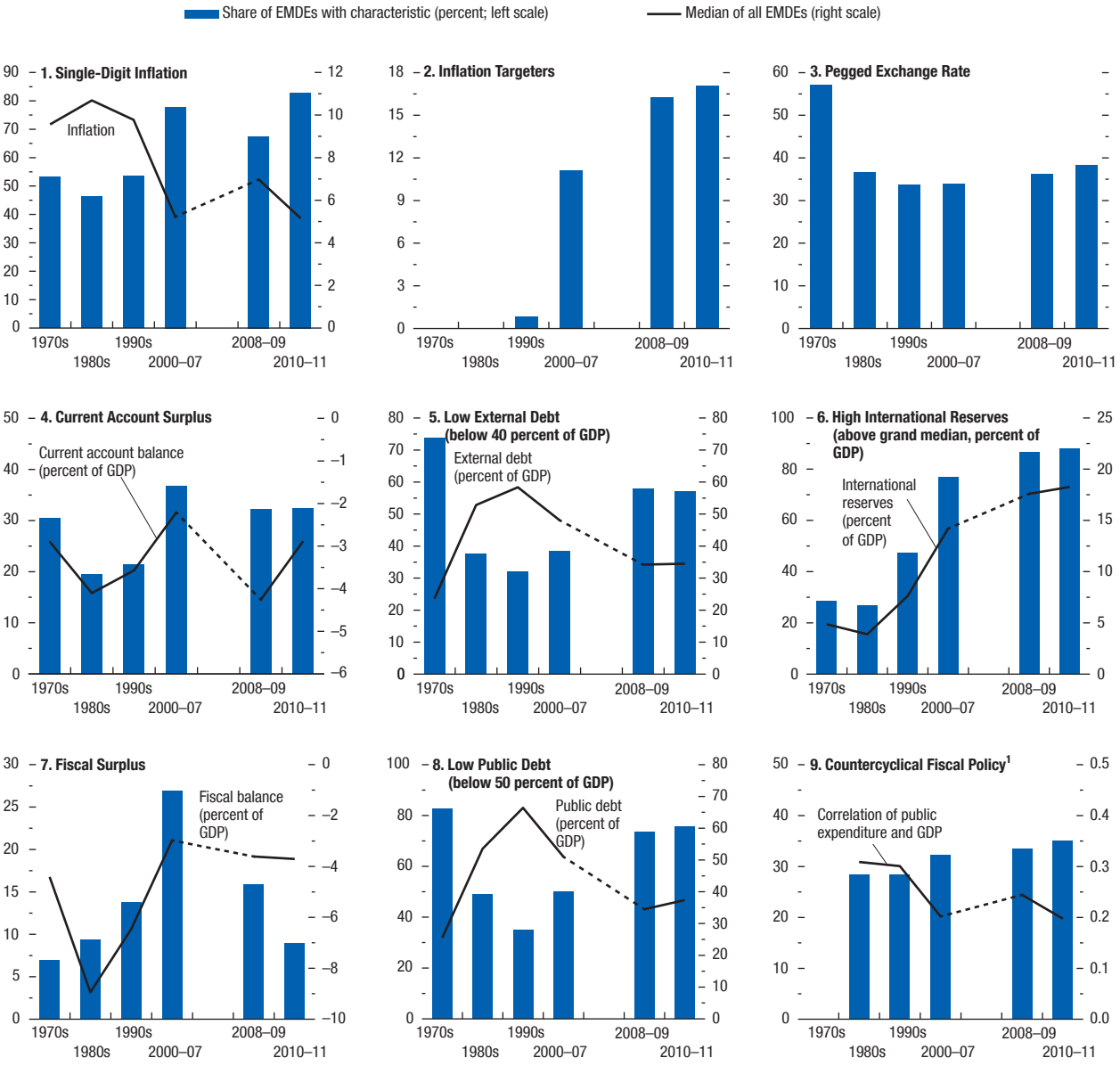


Source: IMF staff calculations.
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. AE = advanced economy; EMDE = emerging market and developing economy; VXO = Chicago Board Options Exchange S&P 100 volatility index. In panels 1, 2, 4, and 5, bars represent the share of EMDEs hit by the shock (banking crises, credit booms, terms-of-trade busts, sudden stops in capital flows) in each subperiod. In panels 3, 6, and 7, bars represent the share of years with shocks (spikes in global uncertainty, spikes in U.S. short-term real interest rate, recessions in AEs) in each subperiod.

Figure 4.11. Policy Frameworks and Policy Space in Emerging Market and Developing Economies

(Percent unless noted otherwise)

Policy frameworks in these economies have improved in the 2000s as more adopted nonpegged exchange rates, inflation targeting, and countercyclical fiscal policy. Policy space also improved: more economies enjoyed single-digit inflation, current account and fiscal surpluses, lower external and public debt, and higher international reserves.



Source: IMF staff calculations.
Note: EMDE = emerging market and developing economy.
[1]The cyclical behavior of fiscal policy is measured as the correlation between the cyclical components of real government expenditure and real GDP (Kaminsky, Reinhart, and Végh, 2004). A negative correlation denotes countercyclical fiscal policy.

steadily from the 1970s to the 1990s. By the early 2000s more than one-quarter had budget surpluses, although that number fell during 2008–09 as many of these economies used this fiscal space to support their economies.

Structural factors—trade openness, financial openness, and income equality—have also mostly moved in the correct direction. The slight downward trend in income inequality—the median Gini coefficient among emerging market and developing economies fell from 42 in the 1990s to less than 40 in 2008–09—may have helped increase expansion duration (Figure 4.12).[27] There has also been a trend toward increased trade among emerging market and developing economies, a greater share of FDI flows, and higher trade and financial integration. But the small and often statistically insignificant effects of these structural characteristics suggest that they are likely not a major factor in explaining these economies' increased resilience.

The Relative Contributions of Shocks, Policies, and Structure to Increased Resilience

The multivariate model from the previous section (see Table 4.1, column 1) can be used to shed light on the relative contributions of these possible explanations to resilience. Such an exercise can only be indicative, because the results will be sensitive to the specific variables that enter the model. Moreover, these contributions should not be given a causal interpretation, because we do not identify the exogenous component of policies (a Herculean task for these economies). Nevertheless, this decomposition can help provide a feel for the importance of the various changes for these economies' performance.

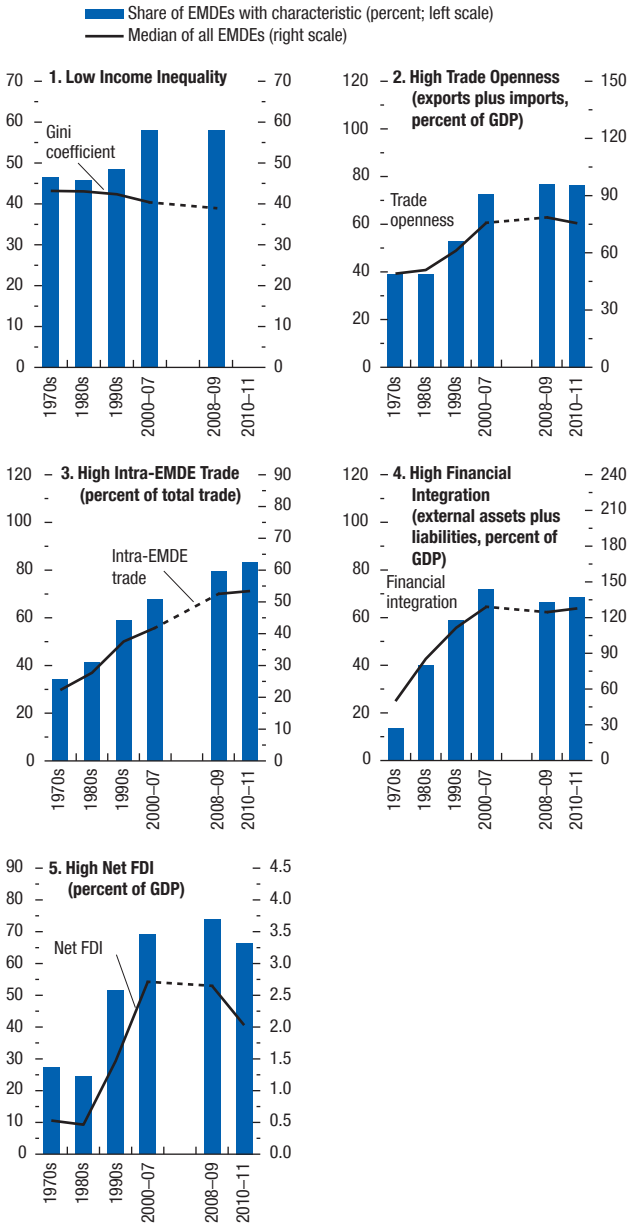
The model suggests that improved policies account for about three-fifths of their increased resilience between the 1980s and 2000–07, and fewer shocks account for the remaining two-fifths; structural characteristics have made a negligible contribution (Figure 4.13, panel 1). As noted above and in Figure 4.10, the frequency of banking crises and credit booms

[27]Country coverage of income inequality data dropped sharply in 2010 and 2011, to fewer than 20 countries, so we exclude it here and in the figure.

Figure 4.12. Structural Characteristics of Emerging Market and Developing Economies

(Percent unless noted otherwise)

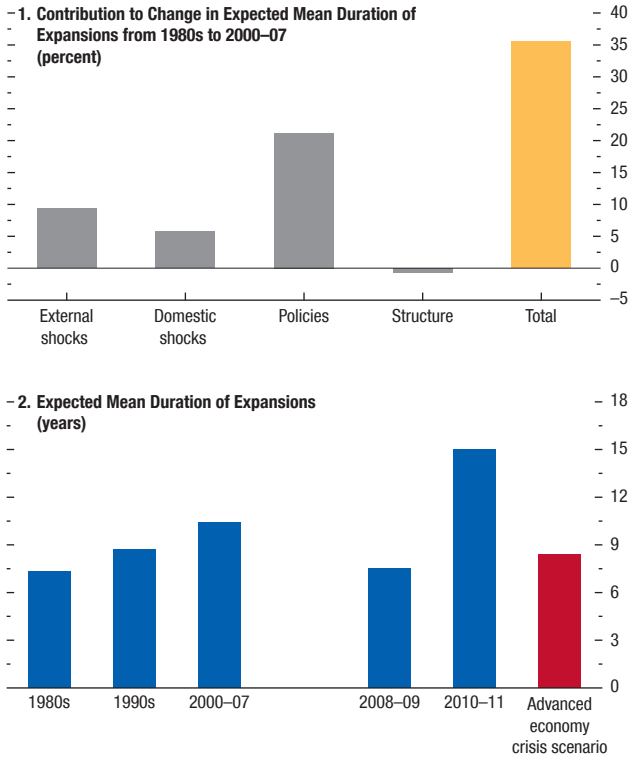
Emerging market and developing economies' structural characteristics have improved in the 2000s. There has been a significant increase in trade openness and diversification across trading partners, with a marked increase in intra-EMDE trade. Financial integration has also increased, with a larger share of cross-border flows taking the form of FDI. Income inequality has also fallen, and fewer economies have a high Gini coefficient.



Source: IMF staff calculations.
Note: EMDE = emerging market and developing economy; FDI = foreign direct investment. Bars represent the share of EMDEs with the indicated characteristics either above (high) or below (low) the grand median of the characteristic in the sample (the median across all economies and years in the sample).

Figure 4.13. Contribution of Shocks, Policies, and Structure to the Length of Expansions in Emerging Market and Developing Economies

The expected mean duration of expansion rose steadily from the 1980s to the early 2000s. This increase reflected mostly greater policy space, with more economies achieving lower inflation and building up their international reserve buffers. But fewer and less intense external and domestic shocks also played a part. The expected mean duration of expansions dropped precipitously over 2008–09, with the spike in external shocks coming from advanced economies during the Great Recession. The lack of external shocks over the past two years has helped raise the expected expansion length. However, a sharp rise in advanced economy stresses could largely wipe out these expected gains, reducing the expected expansion length to the level seen during the Great Recession.



Source: IMF staff calculations.
Note: Expected mean durations for expansions and the contributions of variables are calculated using the duration model estimates from Table 4.1, column 1, and the average values of the explanatory variables for emerging market and developing economies over the corresponding period. The advanced economy crisis scenario in panel 2 assumes that the external shocks reach the levels experienced by emerging market and developing economies during 2008–09.

declined between 1980 and 2000–07. This reduction in frequency and the estimated impact from the duration model imply that the decline in domestic shocks has improved the expected mean duration of expansions by about 5 percent relative to the 1980s. Similarly, the decline in terms-of-trade busts and advanced economy recessions during 2000–07 relative to the 1980s has more than offset the more frequent spikes in global uncertainty and sudden stops in capital inflows. On the whole, the reduced number of external shocks has improved the expected mean duration of expansions by about 10 percent relative to the 1980s. The largest improvement has been in policies, however, as documented in Figure 4.11; the changes in the policy variables between the 1980s and 2000–07, along with the estimated coefficients, suggest that improved policies have increased the expected mean duration of expansions by about 20 percent during the past two decades.[28]

The relative contributions of shocks, improved policies, and structural characteristics to the increase in resilience are similar across geographic regions and across commodity and noncommodity exporters. Resilience has increased even for heavily indebted poor countries (HIPCs), partly thanks to debt relief they are receiving under the HIPC Initiative but also as a result of the reforms and policy improvements that are a precondition for debt relief (see Box 4.3, and Figure 4.16 in Appendix 4.4).

The past two years (2010–11) were even better than 2000–07 with regard to expected mean duration of expansions (Figure 4.13, panel 2), particularly for external shocks. Despite weak growth in many advanced economies, this was not a period of advanced economy recession. World interest rates were low, which supported global growth and credit conditions and fueled capital flows to emerging market and developing economies. And global uncertainty remained elevated but was actually at the same level on average during 2010–11 as during 2000–07. There have also been no banking crises in emerging market and developing economies in the past two

[28]The contribution of policies could be underestimated if the endogenous nature of some of the shocks considered here are taken into account: improved policymaking could lengthen expansions by reducing the incidence of shocks, such as banking crises, credit booms, and sudden stops in capital flows.

years, and policy space has improved. Although fiscal balances declined in the aftermath of the Great Recession, median public debt fell from about 45 percent of GDP during 2000–07 to about 35 percent of GDP during 2010–11, and more of these economies now have low inflation and low public debt. Taken together, these factors have increased the estimated expected mean duration of expansions.

Conclusion

The results of this chapter confirm that emerging market and developing economies are now more resilient than in previous decades. This is not a recent phenomenon—their performance was already noticeably better in the 1990s than during the previous two decades, even with severe downturns such as the Tequila, Asian, and Russian crises. But the recent decade has really been exceptional—for the first time, emerging market and developing economies have performed better than advanced economies as measured by time spent in expansion. The chapter's findings on the explanations for these gains in resilience lend support to an optimistic view that they are not temporary. These economies are doing better now both because the frequency of shocks has fallen and because policymaking has improved. This improvement is evident not only in emerging markets, but also in low-income countries, including countries that are benefiting from the HIPC Initiative.

The caveat, of course, is that the relative calm of the past two years could well be temporary. As highlighted in Chapter 1, there is a significant risk that advanced economies could experience another downturn, as continuing sovereign and banking tensions in Europe and the so-called fiscal cliff in the United States threaten to put the brakes on growth. Terms-of-trade busts in emerging market and developing economies could rise if commodity prices drop. Further spikes in global uncertainty are possible, and sudden stops could emerge once again if greater risk aversion leads to capital outflows. Domestic vulnerabilities could also emerge—as noted in Chapter 1, strong credit growth in some emerging market and developing economies, which likely supported domestic demand, may raise concerns about financial stability.

Should the external environment worsen again, emerging market and developing economies will likely end up recoupling with advanced economies, much as they did during the Great Recession (see Figure 4.13, panel 2, red bar). And even in the absence of an external shock, homegrown shocks could pull down growth further in some key emerging economies, as highlighted in Chapter 1. To guard against such risks, these economies will need to rebuild their buffers to ensure that they have adequate policy space. In response to the global downturn, policy space was rightly used to support activity. These economies will be more resilient to new shocks if recent improvements in their policy frameworks—including greater exchange rate flexibility and more countercyclical macroeconomic policies—are maintained, while policy buffers are being rebuilt.

Appendix 4.1. Data Sources

The primary data sources for this chapter are the IMF's World Economic Outlook (WEO) and International Financial Statistics (IFS) databases and the World Bank's World Development Indicators (WDI) database. All the data sources used in the analysis are listed in Table 4.2. The analytical and regional groupings of economies are presented in Table 4.3.

Data on output per capita at the annual frequency are from the WEO and are extended with series from the WDI and the Penn World Tables 7.0.

External Shocks

Global uncertainty is measured by Bloom's (2009) index of volatility spliced with the Chicago Board Options Exchange S&P 100 volatility index (VXO). Spikes in global uncertainty are periods in which the VXO is above its 75th percentile. *Advanced economy recessions* are defined as in Chapter 1 of the October 2010 issue of the *World Economic Outlook,* with five such recessions during our sample period: 1974–75, 1980–83, 1991–93, 2001, and 2008–09. The *U.S. ex ante real interest rate* is defined as the interest rate on three-month Treasury bills minus projected inflation, which is the percent change in the forecast GDP deflator from the *Survey of Professional*

Table 4.2. Data Sources

Variable	Source
Bank Credit to the Private Sector	International Financial Statistics Database
Banking Crisis Indicators	Laeven and Valencia (2012)
Bilateral Exports	IMF, Direction of Trade Statistics Database
Capital Account Openness	Chinn and Ito (2006), updated to 2010
Consumer Price Inflation	World Economic Outlook Database
Current Account Balance	World Economic Outlook Database
De Facto Exchange Rate Regime	Reinhart and Rogoff (2004); Ilzetzki, Reinhart, and Rogoff (2008), updated to 2010
Export Deflator	World Economic Outlook Database, World Development Indicators Database
Exports of Goods and Services	World Economic Outlook Database, World Development Indicators Database
External Debt to GDP	Lane and Milesi-Ferretti (2007), External Wealth of Nations Mark II Database updated to 2010
Foreign Direct Investment	IMF, Balance of Payments Statistics Database
Foreign Assets	Lane and Milesi-Ferretti (2007), External Wealth of Nations Mark II Database updated to 2010
Foreign Liabilities	Lane and Milesi-Ferretti (2007), External Wealth of Nations Mark II Database updated to 2010
GDP (nominal local currency)	World Economic Outlook Database, World Development Indicators Database
GDP (U.S. dollars)	World Economic Outlook Database, World Development Indicators Database
GDP per Capita (real)	World Economic Outlook Database, World Development Indicators, Penn World Tables 7.0
Gini Coefficient	Solt (2009), Standardized World Income Inequality Database v. 3.1
Global Uncertainty	Bloom (2009) and Chicago Board Options Exchange S&P100 volatility index (VXO)
Government Expenditure	World Economic Outlook Database
Import Deflator	World Economic Outlook Database, World Development Indicators Database
Imports of Goods and Services	World Economic Outlook Database, World Development Indicators Database
Inflation-Targeting Indicator	Roger (2010)
Net Private Capital Flows	IMF, Balance of Payments Statistics Database
Public Debt to GDP	Abbas and others (2010)
Reserves to GDP	Lane and Milesi-Ferretti (2007), External Wealth of Nations Mark II Database updated to 2010
Trade Liberalization Index	Wacziarg and Welch (2008)
U.S. Projected Inflation	*Survey of Professional Forecasters,* Federal Reserve Bank of Philadelphia
U.S. 3-Month Treasury Bill Interest Rate	Global Financial Database

Forecasters. Large increases in the U.S. ex ante real interest rates are those in the top quartile.

Data on net private capital flows are from the IMF Balance of Payments Statistics (BPS) database. Net private capital flows correspond to the sum of net foreign direct investment (FDI) flows (line 4500), net portfolio flows (line 4600), net derivative flows (line 4910), and net other investment flows (line 4700), excluding other investment flows to the general government and monetary authorities. A *sudden stop in capital flows* occurs when the ratio of net private capital flows to GDP falls by at least 5 percentage points from the previous year, and when the level of net private flows is more than 1 standard deviation below its economy-specific mean. The BPS database is also used to obtain the net foreign direct investment flows as a share of GDP.

The trade-weighted terms of trade are constructed using the deflators of exports and imports of goods and services and the series of GDP, exports, and imports of goods and services in nominal terms—all from the WEO and WDI databases. In particular, the terms-of-trade series is calculated as the percent change in the export price deflator times the share of exports in GDP in the previous period minus the percent change in the import price deflator times the share of imports in GDP in the previous period. *Terms-of-trade busts* are defined as a worsening in the terms of trade of at least 3 percent of GDP.

Domestic Shocks

The *banking crisis* indicator is from Laeven and Valencia (2012). Bank credit to the private nonfinancial sector is taken from the IFS database. Breaks in these data are identified using the IFS Country Notes publications, and data are growth-spliced at these points. We follow Mendoza and Terrones (2008) and define *credit booms* as periods in which the cyclical component of log real private credit per capita is at least 1.65 times its standard deviation above its mean.

Table 4.3. Economy Groups

Advanced Economies (AEs)

Australia
Austria
Belgium
Canada
Denmark
Finland
France
Germany
Greece
Ireland
Italy
Japan
Netherlands
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom
United States

Emerging Market and Developing Economies (EMDEs)

Emerging Market Economies (EMs)

Asia
China
Hong Kong SAR
India
Indonesia
Korea
Malaysia
Pakistan
Philippines
Singapore
Sri Lanka
Taiwan Province of China
Thailand

Commonwealth of Independent States (CIS)
Azerbaijan*
Belarus
Kazakhstan*
Russia*
Ukraine

Europe
Albania
Bosnia and Herzegovina
Bulgaria
Croatia
Czech Republic
Estonia
Hungary
Latvia
Lithuania
Macedonia
Poland
Romania
Serbia
Slovak Republic
Slovenia
Turkey

Latin America
Argentina
Brazil
Chile*
Colombia
Costa Rica
Dominican Republic
Ecuador*
El Salvador
Guatemala
Jamaica
Mexico
Panama
Paraguay
Peru*
Trinidad and Tobago*
Uruguay
Venezuela*

Middle East and North Africa (MENA)
Algeria*
Egypt
Iran*
Iraq*
Israel
Jordan
Kuwait*
Lebanon
Libya*
Morocco
Oman*
Saudi Arabia*
Syria
Tunisia
United Arab Emirates*

Sub-Saharan Africa (SSA)
Angola*
Botswana
Namibia
South Africa

Low-Income Countries (LICs)

Asia
Afghanistan
Bangladesh
Cambodia
Lao P.D.R.
Myanmar
Nepal
Papua New Guinea*
Timor-Leste*
Vietnam

Commonwealth of Independent States (CIS)
Armenia
Georgia
Kyrgyz Republic
Moldova
Mongolia*

Latin America
Bolivia*
Haiti
Honduras
Nicaragua

Middle East and North Africa (MENA)
Mauritania*
Sudan*
Yemen*

Sub-Saharan Africa (SSA)
Benin
Burkina Faso*
Burundi*
Cameroon
Central African Republic*
Chad*
Democratic Republic of the Congo*
Republic of Congo*
Côte d'Ivoire
Eritrea
Ethiopia
Ghana
Guinea*
Kenya
Lesotho
Liberia
Madagascar
Malawi*
Mali*
Mozambique*
Niger
Nigeria*
Rwanda
Senegal
Sierra Leone*
Tanzania
Togo
Uganda
Zambia*
Zimbabwe*

Note: * denotes a primary commodity and/or fuel exporter, as classified in the WEO Statistical Appendix. All economies in the analysis have an average population over the sample period of 1 million inhabitants or more. Some economies currently classified as advanced by the WEO are classified as emerging markets in this chapter, because over the past 60 years these economies were more like emerging markets than advanced economies and because their experience—especially their ability to grow sufficiently to attain advanced economy status—provides valuable lessons.

Policy Frameworks and Policy Space

The dates when countries adopted *inflation targeting* are from Roger (2010), and *de facto exchange rate regime* data are from Reinhart and Rogoff (2004) and Ilzetzki, Reinhart, and Rogoff (2008). We measure the *cyclicality of fiscal policy* as the correlation between the cyclical component of real government expenditure from the WEO database and the cyclical component of real GDP (similar to Kaminsky, Reinhart, and Végh, 2004). A negative correlation corresponds to a countercyclical fiscal policy, while a positive correlation corresponds to a procyclical fiscal policy. The fiscal balance is calculated as the change in the ratio of public debt to GDP, corrected for nominal GDP growth. *Fiscal surplus* is an indicator equal to 1 if the fiscal balance is positive. Data on *public debt* are from Abbas and others (2010). The low public debt indicator equals 1 if public debt is less than 50 percent of GDP, the level at which Mendoza and Ostry (2008) find that fiscal solvency in emerging markets diminishes.

The External Wealth of Nations Mark II Database (see Lane and Milesi-Ferretti, 2007) is used to construct the ratios of *external debt to GDP*, *reserves to GDP*, and *financial integration*, which is defined as the sum of foreign assets and foreign liabilities divided by GDP. The low external debt indicator equals 1 if external debt is less than 40 percent of GDP, a threshold that Reinhart, Rogoff, and Savastano (2003) flag as a level beyond which "debt intolerance" increases. The current account balance and consumer price inflation are both taken from the WEO database. The low-inflation indicator equals 1 if inflation is below 10 percent.

Structural Characteristics

Trade openness is measured as the sum of imports and exports of goods and services over GDP. The *trade liberalization* index is from Wacziarg and Welch (2008), and *capital account openness* is from Chinn and Ito (2006). Data on bilateral merchandise imports and exports are from the Direction of Trade Statistics database and are used to construct the *share of exports to emerging market and developing economies*. Finally, *inequality*, as captured in the Gini coefficient of household disposable income, is from Solt (2009).

Appendix 4.2. Characterizing Resilience Using an Autoregressive Process on Growth

To assess the potential drivers of resilience, this appendix characterizes expansions and recoveries for advanced economies and emerging market and developing economies using a first-order autoregressive—AR(1)—process for growth in real GDP per capita, similar to the one used by Blanchard and Simon (2001). In particular, it explores whether an AR(1) model with time-varying coefficients can reproduce the time spent in expansion, median real GDP per capita growth in expansions, and the median amplitude of downturns observed in the data. For that purpose, the following AR(1) process is estimated:

$$g_t = \alpha + \beta g_{t-1} + \varepsilon_t \quad \text{with} \quad \varepsilon_t \sim N(0, \sigma^2), \qquad (4.1)$$

in which g_t is growth in real GDP per capita at time t, α is a constant, β is the first-order autoregressive coefficient, and ε_t is a mean-zero shock at time t. This equation is estimated for each economy over three subperiods: 1950–69, 1970–89, and 1990–2007. Table 4.4 presents the median estimated coefficients, and interquartile ranges, by economy group and subperiod.

The results for the advanced economies show that steady-state growth and growth variability have fallen. In particular, α and σ have both fallen over time, and β has risen. As a result, steady-state growth, given by $\alpha/(1-\beta)$, and growth variability, given by $\sigma/\sqrt{1-\beta^2}$, have fallen. These have countervailing effects on expansion duration: lower steady-state growth implies shorter expansions, whereas lower growth variability implies longer expansions.

The results for emerging market and developing economies show that steady-state growth increased and growth variability fell in 1990–2007 relative to the previous 40 years. In particular, α fell from 1950–69 to 1970–89, but it rose in 1990–2007, while β rose markedly from 1950–69 to 1970–89, remaining constant thereafter. The growth shock's standard deviation σ rose slightly from 1950–69 to 1970–89, but declined during 1990–2007 to levels below that of 1950–69. As a result, steady-state growth rose and growth variability

Table 4.4. AR(1) Median Coefficients and Interquartile Range

		α	β	σ	$\sigma \div ((1-\beta^2)^{0.5})$	$\alpha \div (1-\beta)$
Advanced Economies	1950–69	0.032	0.057	0.028	0.028	0.034
	Interquartile Range	(0.025, 0.037)	(–0.043, 0.107)	(0.017, 0.033)	(0.018, 0.034)	(0.027, 0.040)
	1970–89	0.018	0.181	0.023	0.023	0.022
	Interquartile Range	(0.015, 0.022)	(0.124, 0.274)	(0.020, 0.025)	(0.020, 0.025)	(0.021, 0.026)
	1990–2007	0.010	0.428	0.014	0.014	0.019
	Interquartile Range	(0.009, 0.013)	(0.314, 0.531)	(0.012, 0.016)	(0.013, 0.019)	(0.016, 0.023)
Emerging Market and Developing Economies	1950–69	0.019	–0.069	0.041	0.043	0.019
	Interquartile Range	(0.009, 0.035)	(–0.262, 0.228)	(0.031, 0.061)	(0.032, 0.065)	(0.008, 0.035)
	1970–89	0.003	0.232	0.044	0.047	0.004
	Interquartile Range	(–0.004, 0.014)	(0.076, 0.439)	(0.034, 0.063)	(0.038, 0.069)	(–0.005, 0.020)
	1990–2007	0.018	0.272	0.030	0.034	0.027
	Interquartile Range	(0.008, 0.030)	(–0.002, 0.505)	(0.021, 0.046)	(0.025, 0.051)	(0.012, 0.042)
Emerging Market Economies	1950–69	0.027	–0.067	0.040	0.041	0.025
	Interquartile Range	(0.015, 0.038)	(–0.252, 0.175)	(0.029, 0.057)	(0.032, 0.065)	(0.016, 0.041)
	1970–89	0.009	0.232	0.042	0.043	0.015
	Interquartile Range	(0.001, 0.023)	(0.157, 0.471)	(0.031, 0.061)	(0.033, 0.062)	(0.001, 0.029)
	1990–2007	0.022	0.275	0.030	0.032	0.034
	Interquartile Range	(0.012, 0.034)	(0.106, 0.484)	(0.021, 0.041)	(0.025, 0.046)	(0.020, 0.046)
Low-Income Countries	1950–69	0.010	–0.145	0.043	0.045	0.014
	Interquartile Range	(0.004, 0.029)	(–0.323, 0.242)	(0.032, 0.063)	(0.034, 0.066)	(0.004, 0.025)
	1970–89	–0.001	0.230	0.048	0.051	–0.001
	Interquartile Range	(–0.007, 0.005)	(0.029, 0.314)	(0.039, 0.065)	(0.040, 0.070)	(–0.007, 0.006)
	1990–2007	0.012	0.271	0.033	0.037	0.015
	Interquartile Range	(0.003, 0.026)	(–0.058, 0.550)	(0.020, 0.052)	(0.023, 0.055)	(0.003, 0.033)

Source: IMF staff calculations.

Note: Economy groups are defined in Table 4.3 of Appendix 4.1. Standard errors are in parentheses.

fell, resulting in both longer expansions and faster recoveries.[29]

With these estimations in hand, this appendix explores whether the characteristics of expansions and recoveries seen in the data for emerging market and developing economies can be replicated with simulated data based on the median estimated coefficients in Table 4.4 for 1970–89 and 1990–2007. In particular, we use the median coefficients for the emerging market and developing economies in each subperiod to run 1,000 simulations of the growth processes for 50 years each. The Harding-Pagan algorithm is then applied to identify peaks and troughs in the level of simulated GDP per capita. In addition, each coefficient is changed one at a time to assess its impact on resilience. Figure 4.14 presents the results.

The AR(1) model for real GDP growth per capita suggests that the improvement in resilience observed in emerging market and developing economies during the past 20 years has been mostly a result of an increase in steady-state growth and to a lesser extent of lower output variability. However, as discussed below, these results must be viewed with caution because a linear AR(1) model cannot replicate some of the stylized facts presented in this chapter.

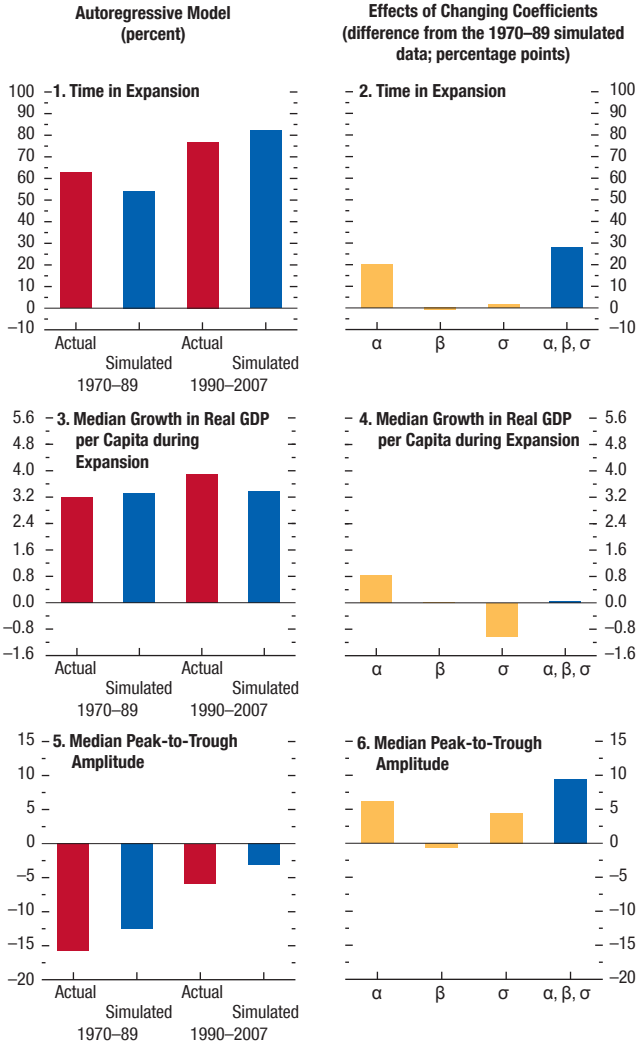
The AR(1) model underestimates the time spent in expansion during 1970–89 and overestimates it during 1990–2007, resulting in a larger rise across periods than in the data (Figure 4.14, panel 1). The increase in time spent in expansion is mostly due to a rise in α. The coefficients β and σ have no impact on the change in time spent in expansion (Figure 4.14, panel 2).

The AR(1) model overestimates growth during expansions during 1970–89 and underestimates growth during 1990–2007, resulting in no change between subperiods, even though the data indicate that there was an increase in the growth rate during this period (Figure 4.14, panel 3). In short, the rise in growth during expansions due to a higher α is fully offset by the fall in growth due to a lower σ

[29]The increase in steady-state growth and the fall in growth variability from 1970–89 to 1990–2007 are both statistically significant.

Figure 4.14. Emerging Market and Developing Economies: Effects of Changing the Autoregressive Model Coefficients

Simulated data from a calibrated AR(1) model with time-varying coefficients broadly replicate the stylized facts of resilience in emerging market and developing economies. However, comparing 1970–89 and 1990–2007 shows that the simulated data overestimate the increase in the time spent in expansion, and underestimate the median real GDP growth during expansions and the amplitude of downturns. Most of the gains in resilience between 1970–89 and 1990–2007 result from an increase in the constant (α) and to a lesser extent from a lower standard deviation of growth innovations (σ).



Source: IMF staff estimates.

Note: Peaks and troughs in output per capita are identified using the Harding-Pagan algorithm (Harding and Pagan, 2002). The simulated data are constructed using the median estimated coefficients from Table 4.4 for each period. These coefficients are plugged into an AR(1) equation for GDP growth per capita, and the growth innovations are drawn from a normal distribution with mean zero and variance of σ^2, to run 1,000 simulations of growth processes for 50 years each for each period. The generated series of GDP growth per capita are then used to construct indices of GDP per capita in levels.

(Figure 4.14, panel 4). In addition, the AR(1) model underestimates the amplitude of downturns during both subperiods (Figure 4.14, panel 5). The decline in the downturns' estimated amplitude from 1970–89 to 1990–2007 is mostly due to an increase in α and to a lesser extent to a decline in σ (Figure 4.14, panel 6).

Appendix 4.3. Duration Analysis

As a first step in the analysis of the duration of each episode (expansion or recovery) we map the data from calendar time into analysis time (denoted by t), which counts the time elapsed since the start of an episode ($t = 0$). Duration analysis then involves modeling how the evolution of the episode (as influenced by various explanatory variables) affects the likelihood that the episode will end at a point during the analysis time.

Bivariate Analysis

Figure 4.7 shows the average probability that an episode will end, conditional on whether or not a shock has occurred. The mean is taken over the sample probabilities that an ongoing episode will end at each point in the analysis time. Statistical significance is calculated from a test of the difference between the set of estimated probabilities in which the shock occurs and the set in which it does not.

Figures 4.8 and 4.9 show the average duration of an episode conditional on whether or not the characteristic of interest was present during the episode. These average durations are calculated from the Kaplan-Meier estimated survival curves conditional on the characteristic. Sometimes known as the "product limit estimators of the survival curve," the Kaplan-Meier curve estimation involves (1) calculating the probability that an episode will continue beyond a point in the analysis time, given that it has lasted until that point; and (2) taking the rolling product of these probabilities at each point in analysis time (Kaplan and Meier, 1958). The result is a mapping of analysis time to the probability of continuation, given that an episode has lasted until that point:

$$\bar{S}(t) = \prod_{j|t_j \le t} \left(\frac{n_j - d_j}{n_j} \right), \qquad (4.2)$$

in which j indexes the set of observed episode lengths, $\hat{S}$ represents the estimated survival curve, n_j is the number of episodes at risk of ending at time t_j, given that they have lasted until that time, and d_j is the number of episodes at time t_j that actually ended.

From this curve (using the sample with or without the characteristic of interest), we calculate the expected duration of the episode. Statistical significance is given by a log-rank test of the difference between the two estimated survival curves. The methods used in the bivariate analysis are fundamentally nonparametric, since no specific probability distribution is assumed to govern the data.

Multivariate Analysis

The duration model used in the multivariate analysis is an accelerated-failure-time model, based on the Weibull distribution. The model assumes that the length of episode j, here denoted t_j, can be expressed as the product of a Weibull-distributed random variable τ_j and a scaling proportion that depends on the weighted sum of a set of explanatory variables (denoted by the vector x_{t_j}):

$$t_j = \exp(x_{t_j}'\beta)\tau_j$$
$$= \exp\left(\sum_{k=1}^{K} \beta_k x_{k,t_j}\right)\tau_j, \qquad (4.3)$$

in which τ_j has a Weibull distribution with shape parameter γ. The estimated coefficients β_k are the weights applied to each of the explanatory variables in the scaling proportion. As described in the text, we show the exponentiated coefficients in Table 4.1, which may be interpreted as time ratios, indicating how much the baseline expected duration $E(\tau_j)$ would be shortened or lengthened by a one-unit change in a variable. See Cleves and others (2010) for an in-depth description of the approach.

Appendix 4.4. Robustness and Additional Results

We undertook six robustness checks of our baseline model, including (1) accounting for unobserved heterogeneity in episodes across countries by random effects (also known as "frailties" in the duration analysis literature); (2) an alternative definition of the sudden stop indicator, in which it is interacted with an indicator for spikes in global uncertainty, to capture "systemic" sudden stops; (3) a more stringent cutoff for the low-inflation indicator, in which we consider whether an economy had an inflation rate below 5 percent; (4) accounting for common decade fixed effects; (5) an alternative distributional assumption (the generalized gamma); and (6) using real GDP instead of real GDP per capita to define periods of expansion. The results of these robustness checks are shown in Table 4.5.

It is readily apparent that the point estimates for the time ratios are typically quite similar across the columns (with the baseline specification repeated in column 1 for convenience). The statistical significance of the estimates is also similar across specifications, although it tends to be marginally reduced when frailties are used to account for unobserved heterogeneity.

We also looked at whether our findings for expansions hold for expansions characterized by rapid and sustained growth. To identify these episodes, we removed a 4 percent linear growth trend from real GDP per capita for each economy and applied the Harding-Pagan algorithm to find the turning points in the detrended series. We then undertook our baseline duration analysis for the growth expansions (periods from trough to peak in the detrended series). The results of this analysis are shown in column 8 of Table 4.5. The results are broadly aligned with the findings for the level expansions (column 1)—external and domestic shocks tend to shorten growth expansions, whereas policy space tends to lengthen them. The statistical significance of the estimated results is sometimes reduced, but this appears to be largely a function of the much smaller sample size, given that the point estimates themselves are quite similar to the baseline for level expansions. Thus, the variables associated with longer level expansions are also associated with longer growth expansions.

We investigated whether the stylized facts for emerging market and developing economies' expansions over the past decades were driven by the experience of commodity exporters or by

Table 4.5. What Shortens Expansions? Robustness Checks

Explanatory Variable	Baseline	Baseline with Economy Frailties	Alternative Sudden Stop	Alternative Inflation	Decade Dummies	Alternative Distribution (generalized gamma)	Alternative Output	Growth Expansions
Implied S&P 100 Volatility (VXO)[1]	0.951***	0.951***	0.951***	0.952***	0.944***	0.950***	0.937***	0.967**
	(–4.179)	(–3.688)	(–4.138)	(–3.851)	(–4.624)	(–4.659)	(–4.785)	(–2.191)
U.S. Ex Ante Real Interest Rate	0.956	0.956	0.956	0.944*	0.982	0.939*	0.917**	0.986
	(–1.461)	(–1.170)	(–1.471)	(–1.801)	(–0.494)	(–1.862)	(–2.399)	(–0.328)
Terms-of-Trade Bust Indicator	0.968	0.968	0.969	0.953	0.982	0.926	1.051	0.801
	(–0.214)	(–0.200)	(–0.209)	(–0.298)	(–0.116)	(–0.450)	(0.231)	(–0.826)
Sudden Stop (capital inflows) Indicator	0.590***	0.590**		0.622**	0.590***	0.523***	0.363***	0.657
	(–2.927)	(–2.134)		(–2.536)	(–2.731)	(–2.656)	(–4.946)	(–1.333)
Advanced Economy Recession Indicator	0.642***	0.642**	0.648***	0.608***	0.619***	0.622***	0.685***	0.680***
	(–4.074)	(–2.512)	(–4.016)	(–4.449)	(–3.967)	(–4.091)	(–3.065)	(–2.590)
Credit Boom during Past Three Years	0.616***	0.616***	0.620***	0.617***	0.626***	0.601***	0.596***	0.497***
	(–3.913)	(–2.977)	(–3.843)	(–3.664)	(–3.631)	(–3.373)	(–3.454)	(–3.697)
Banking Crisis Indicator	0.550***	0.550**	0.550***	0.524***	0.567***	0.480***	0.516***	0.451**
	(–3.376)	(–2.392)	(–3.387)	(–3.584)	(–3.180)	(–3.079)	(–3.561)	(–1.977)
Single-Digit Inflation Indicator	1.473***	1.473***	1.475***		1.444***	1.434***	1.604***	1.145
	(3.185)	(2.938)	(3.192)		(2.954)	(2.925)	(3.077)	(0.688)
Low Public Debt to GDP Indicator	1.009	1.009	1.001	1.019	0.989	1.016	0.740*	1.276
	(0.0713)	(0.0651)	(0.0119)	(0.149)	(–0.0811)	(0.127)	(–1.699)	(0.988)
International Reserves to GDP	1.009***	1.009	1.009***	1.009***	1.009***	1.009***	1.010**	1.012*
	(2.866)	(1.584)	(2.887)	(3.099)	(3.037)	(2.620)	(2.122)	(1.893)
Income Inequality (Gini coefficient)	0.986**	0.986**	0.986**	0.986**	0.987**	0.990	0.998	0.990
	(–2.144)	(–1.988)	(–2.154)	(–2.094)	(–2.035)	(–1.327)	(–0.271)	(–0.847)
Trade Openness (exports plus imports to GDP)	0.999	0.999	0.999	1.000	0.999	1.000	0.997*	1.003
	(–0.451)	(–0.317)	(–0.495)	(–0.377)	(–0.468)	(0.0951)	(–1.888)	(1.605)
Financial Openness (external assets plus liabilities to GDP)	0.999***	0.999*	0.999***	0.999***	0.999***	0.999**	1.000	0.998**
	(–3.121)	(–1.766)	(–3.094)	(–3.037)	(–3.577)	(–2.417)	(–0.484)	(–2.324)
Global Uncertainty Spike and Sudden Stop Joint Indicator			0.603***					
			(–2.828)					
Below 5 Percent Inflation Indicator				1.330*				
				(1.729)				
Observations	1,264	1,264	1,264	1,264	1,264	1,264	1,417	452
Weibull Shape Parameter	1.516	1.516	1.519	1.476	1.498		1.401	1.438
Z Statistic of Shape Parameter	6.829	2.653	6.817	5.968	6.411		5.372	3.177
Number of Episodes	188	188	188	188	188	188	163	84
Number of Exits	126	126	126	126	126	126	99	63
Number of Economies	75	75	75	75	75	75	75	54
Log Likelihood	–103.0	–103.0	–103.7	–105.6	–101.0	–99.2	–73.5	–58.0
Model Chi-Squared *p* Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: IMF staff calculations.

Note: Exponentiated coefficients shown are time ratios, which indicate whether the variable tends to shorten (less than 1) or lengthen (greater than 1) the expected time-in-episode. *Z* statistics are given in parentheses underneath the coefficient estimates. A negative *z* statistic indicates that the associated variable tends to shorten an episode; if the *z* statistic is positive, it tends to lengthen an episode. *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

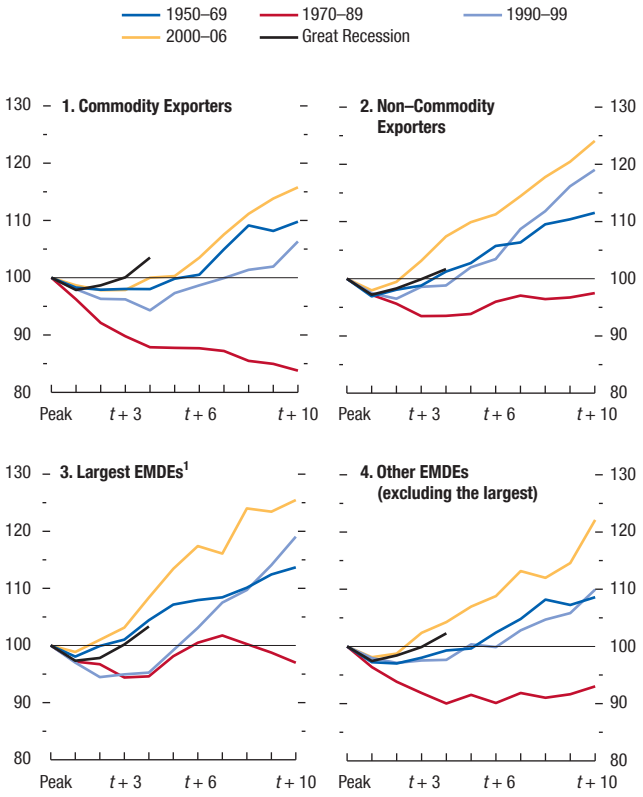
[1]VXO = Chicago Board Options Exchange S&P 100 volatility index.

the largest economies. Figure 4.15 shows that neither of these groups appears to be driving the changes in resilience seen from the 1980s to the 2000s. Commodity exporters and noncommodity exporters follow the same patterns, although at a somewhat different pace. The median commodity exporter was more adversely impacted in the 1980s, whereas the median noncommodity exporter tended to have even stronger growth in the 2000s after a peak. The largest 30 economies also show similar patterns of resilience when compared with the other, smaller economies. The most marked difference is probably the somewhat poorer performance after a peak of smaller economies during the 1980s.

Finally, we examine whether the relative contributions of shocks, policies, and structural characteristics differ across regions, commodity and non–commodity exporters, and for heavily indebted poor countries eligible for debt relief under the Heavily Indebted Poor Country Initiative. We use the same method for decomposing the change in expected duration of expansions as in Figure 4.13. As mentioned in the main text, this decomposition is an accounting exercise, and care should be taken that these contributions not be given a causal interpretation.

As shown in Figure 4.16, our finding that improved policies account for the bulk of the increase in expected duration of expansions from the 1980s to the 2000s holds across all emerging market and developing economy regions and subsamples. Less frequent domestic and external shocks also contributed to improved performance. Structural characteristics had a negligible contribution in almost all subsamples, with the exception of emerging and developing Asia—in that region, financial openness almost doubled between the 1980s and 2000s, resulting in a negative contribution to expected duration of expansions.

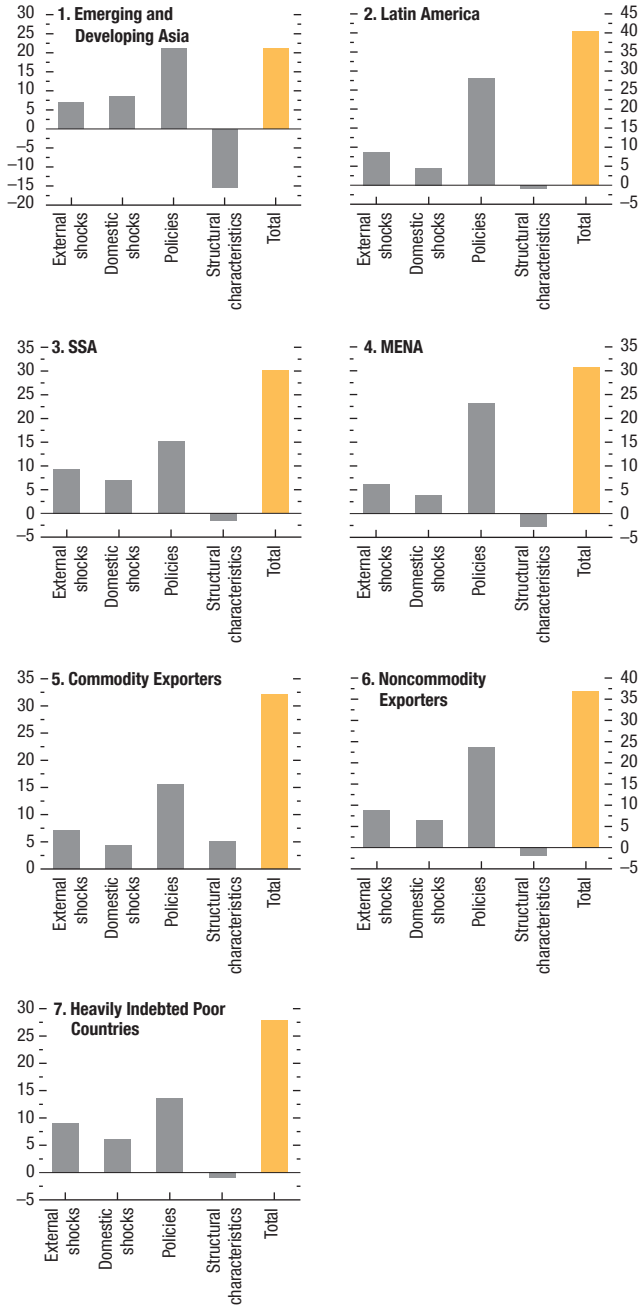
Figure 4.15. Emerging Market and Developing Economy Subgroups: Dynamics of Output per Capita following Peaks
(Median output per capita; peak = 100; years on x-axis)



Source: IMF staff calculations.
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. EMDE = emerging market and developing economy. Peaks in output per capita are identified using the Harding-Pagan algorithm (Harding and Pagan, 2002). Output per capita at the peak (t) is normalized to 100, and the median output per capita is plotted in years ($t + 1$) through ($t + 10$) for each group.
[1]Refers to the 30 largest emerging market and developing economies based on their average real GDP over the sample period.

Figure 4.16. Emerging Market and Developing Economy Regions: Contributions of Shocks, Policies, and Structure to the Length of Expansions

(Contribution to change in expected mean duration of expansions from 1980s to 2000–07; percent)



Source: IMF staff calculations.

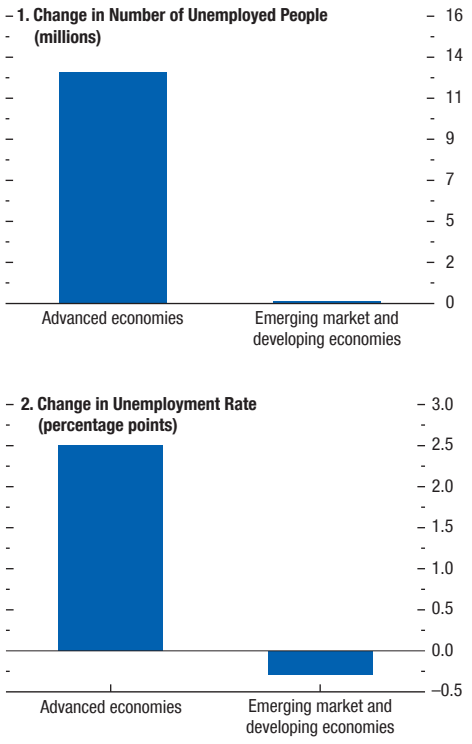
Note: Economy groups are defined in Table 4.3 of Appendix 4.1. MENA = Middle East and North Africa; SSA = sub-Saharan Africa. Peaks in output per capita are identified using the Harding-Pagan algorithm (Harding and Pagan, 2002).

Box 4.1. Jobs and Growth: Can't Have One without the Other?

Emerging market and developing economies have enjoyed robust growth during the past decade and bounced back quickly from the Great Recession, in marked contrast to the more tepid recovery in advanced economies. These divergent growth trajectories were reflected in their labor markets. For instance, unemployment—both numbers of people unemployed and rates—remained substantially higher in 2011 in advanced economies compared with 2007. In contrast, although unemployment in emerging market and developing economies did go up during the Great Recession, by 2011 it was essentially back to precrisis levels (Figure 4.1.1).

Is the observed correspondence between jobs and growth a surprise, or does it represent a systemic feature of emerging market and developing economies? This box shows that the short-term relationship between labor market developments and output growth has been fairly strong in many of these economies for the past 30 years. Hence, although the emphasis on structural policies to lower long-term unemployment and raise labor force participation remains appropriate, cyclical developments deserve adequate consideration as well. The short-term relationship between jobs and growth suggests that macroeconomic policies to maintain aggregate demand also likely play an important role in labor market outcomes in many of these economies.

Figure 4.1.1. Diverging Global Labor Market Trends, 2007–11



Source: IMF staff calculations.

Does One Law Fit All?

The short-term relationship between U.S. output and unemployment documented by Okun (1962) has since become famous as "Okun's law." Ball, Leigh, and Loungani (forthcoming) investigate how well Okun's law explains short-term changes in the unemployment rate for the United States since 1960 and for a sample of 20 advanced economies since 1980.

Ball and others (forthcoming) conclude that Okun's law is a strong and stable relationship in most advanced economies. That is, they confirm the view that short-term changes in unemployment are driven by changes in output. On average, a 1 percent deviation of output from potential leads to a reduction in cyclical unemployment of about ½ percentage point. Deviations from Okun's law occur, but they are usually modest in size and short lived.

However, although Okun's law fits the data for most countries, the coefficient in the relationship—the effect of a 1 percent change in output on the unemployment rate—varies across countries, ranging from –0.16 in Japan to –0.85 in Spain.

How well does Okun's law hold in emerging market and developing economies? As in Ball and others (forthcoming), we interpret Okun's law as a relationship between the deviation of unemployment from its natural rate and the deviation of output from its potential:

The authors of this box are Davide Furceri and Prakash Loungani. Jair Rodriguez and Hites Ahir provided research assistance.

Box 4.1. *(continued)*

$$u_t - u_t^* = a(y_t - y_t^*) + error_t, \quad (4.1.1)$$

in which u is the unemployment rate, y is log output, and * indicates a long-term (natural rate or potential) level. The assumption behind equation (4.1.1) is that shifts in aggregate demand cause fluctuations in output, which in turn cause firms to hire and fire workers. The error term captures factors that shift the unemployment-output relationship, such as unusual changes in productivity or in labor force participation. To measure u^*, the natural rate of unemployment, and y^*, potential output, we smooth the series for u and y with the Hodrick-Prescott filter.

We also estimate a version of Okun's law in first differences:

$$u_t - u_{t-1} = c + a(y_t - y_{t-1}) + error_t. \quad (4.1.2)$$

Here, the change in unemployment depends on the change in output and a constant. This follows from equation (4.1.1) if the natural rate u^* is constant and potential output grows at a constant rate c/a. For many of these economies, these assumptions may not be reasonable because of time variation in u^* and growth accelerations and slowdowns. As noted in the main text of this chapter, output in these economies is often characterized not by "smooth hills" but by "mountains, cliffs, plateaus, and plains." Nevertheless, both the levels and the first-differences specifications show some evidence of the robustness of the results to alternate assumptions about the long-term levels of output and unemployment.[1]

The usefulness of unemployment rates as an indicator of labor market slack in emerging market and developing economies is often questioned. One argument is that in low-income countries people cannot afford to be unemployed; everyone is in some kind of job, either in the rural sector or in self-employment. Another argument is that many of these economies have large informal sectors, so that neither the unemployment nor the employment statistics have much relevance (Agénor and Montiel, 2008; Singh, Jain-Chandra, and Mohommad, 2012).

To address the first of these issues, we also estimate a version of Okun's law using employment as the dependent variable:

$$e_t - e_{t-1} = c + a(y_t - y_{t-1}) + error_t, \quad (4.1.3)$$

in which e is log employment. The second issue is addressed later when we look at the relationship between Okun coefficients and the level of informality.

Okun's Law in Emerging Market and Developing Economies: The Evidence[2]

We use data on employment, unemployment, and real GDP for 80 economies between 1980 and 2011, but the length of the time series varies across countries. We also present results for a subset of countries that have at least 30 years of data.

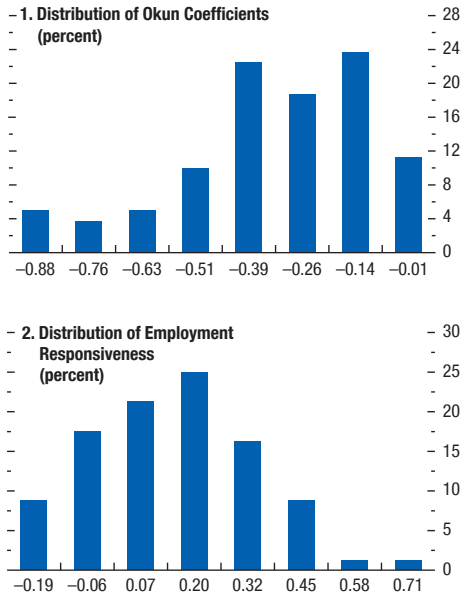
The results confirm the validity of Okun's law for most countries, though the strength of the relationship varies. Figure 4.1.2, panel 1, shows the distribution of Okun coefficients using equation (4.1.2). As shown, the estimates range from small positive values to –0.8, with the majority of the estimates between –0.2 and –0.4. For the group of countries with longer time series, the distribution is quite similar. Estimating the specification in levels (equation 4.1.1 above) yields qualitatively similar results; the rank correlation between the two sets of Okun coefficients is 0.6. Using employment as the dependent variable, the estimates range from small negative values to 0.8 (Figure 4.1.2, panel 2). The rank correlation with the estimates using unemployment as the dependent variable is –0.6.

[1]We carried out other robustness checks as well. In the levels specification—equation (4.1.1)—we tried smoothing parameters for the Hodrick-Prescott filter of 100 and 12 (the latter suggested by Rand and Tarp, 2002, for developing economies). The results are quite similar, so only the ones for the smoothing parameter of 100 are discussed here. In the first-differences specification—equation (4.1.2)—we also tried a version including a time trend and the lag of the change in unemployment. The results of these specifications were very similar to the baseline specification and therefore not reported.

[2]This section draws on ongoing work by Ball and others (forthcoming).

Box 4.1. *(continued)*

Figure 4.1.2. Distribution of Okun's Law Coefficients and Employment Responsiveness, 2007–11



Source: IMF staff calculations.

To summarize, regardless of the choice of the three specifications discussed above, there is a significant short-term relationship between output fluctuations and developments in the labor market.

Table 4.1.1 compares the average value of the Okun coefficient and the employment responsiveness in advanced economies with that in emerging market and developing economies. It is evident that on average the short-term relationship between labor market outcomes and output is weaker in emerging market and developing economies than in advanced economies.

Accounting for Cross-Country Differences[3]

We also carry out an investigation of some of the factors that account for the cross-country variation in Okun coefficients. As discussed, many emerging market and developing economies are characterized by large informal sectors. Intuitively, countries with larger informal sectors should have a smaller Okun coefficient—that is, unemployment should respond less to a given change in output (see Figure 4.1.3, panel 1). Ball and others (forthcoming) document a positive relationship for advanced economies between the estimated Okun coefficient and the average level of unemployment: in countries in which unemployment is higher on average, it also fluctuates more in response to output movements. Although the reason for this association is not apparent, we find that a similar correlation holds for emerging market and developing economies as well (Figure 4.1.3, panel 2).

Some recent studies have probed the responsiveness of employment to output (Crivelli, Furceri, and Toujas-Bernaté, forthcoming; Ahmed, Guillaume, and Furceri, 2012). These studies suggest that the responsiveness could depend on features such as labor and product market flexibility. For instance, in discussing hiring and firing regulations in Middle Eastern and North African countries, Ahmed, Guillaume, and Furceri (2012) argue that such regulations can discourage "firms from expanding employment in response to favorable changes in the economic climate." That is, greater employment protection can dampen hiring and firing as output fluctuates, reducing the employment responsiveness.

[3]The data on informality used in this box are from Schneider (2004) and Schneider, Buehn, and Montenegro (2010). The indicators of labor and product market flexibility are described in Crivelli, Furceri, and Toujas-Bernaté (forthcoming).

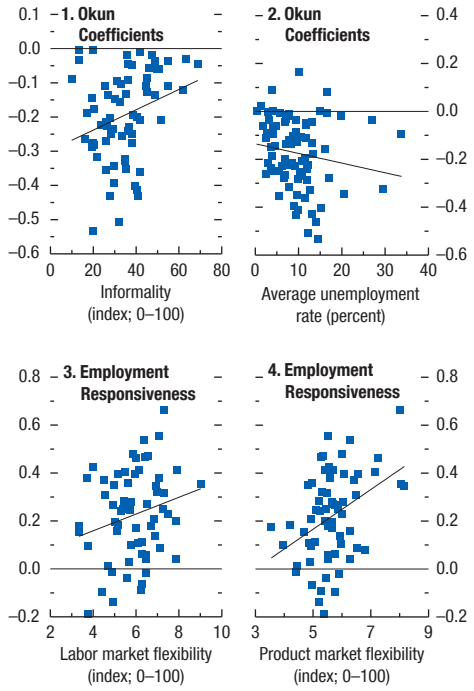
Table 4.1.1. Short-Term Relationship between Labor Market Outcomes and Growth, by Country Group

	Okun Coefficients (equation 4.1.1)	Okun Coefficients (equation 4.1.2)	Employment Response (equation 4.1.3)
Advanced Economies	–0.39	–0.33	0.49
Emerging Markets and Developing Economies	–0.17	–0.29	0.20

Source: IMF staff calculations.

Box 4.1. *(continued)*

Figure 4.1.3. Okun's Law: Employment and Output in Emerging Market and Developing Economies



Source: IMF staff calculations.
Note: The index of informality is taken from Schneider (2004) and Schneider, Buehn, and Montenegro (2010). The indicators of labor and product market flexibility are described in Crivelli, Furceri, and Toujas-Bernaté (forthcoming).

Figure 4.1.3, panels 3 and 4, suggests that greater labor and product market flexibility may indeed be correlated with higher employment responsiveness.

Table 4.1.2 reports weighted-least-squares (WLS) estimates of these determinants of Okun coefficients and employment responsiveness.[4] The results presented in the first two columns confirm that Okun coefficients do depend on the size of the informal sector and the average unemployment rate, as suggested by Figure 4.1.3, panels 1 and 2. The other four regressions in the table examine the determinants of employment responsiveness. Informality influences the responsiveness, but the average unemployment rate does not have a significant impact. Greater labor and product market flexibility each individually raise employment responsiveness. However, when the two are entered in the regression together, only the effects of product market flexibility are statistically significant.[5]

Policy Implications

The structural challenges facing labor markets in emerging market and developing economies deservedly receive a lot of attention. In many of these economies, unemployment rates, particularly youth unemployment rates, remain alarmingly high. Other economies face the challenge of raising labor force participation, particularly among women. The results of this box lend support to a focus on policies to address these structural challenges: the cyclical relationship between jobs and growth is weaker, on average, in emerging market and developing economies than in advanced economies.

At the same time, the finding of a significant relationship in many countries suggests that cyclical considerations should not be ignored. Aggregate demand policies that support output growth in the short term can also help labor markets recover. The results also point to an interaction of cyclical and structural considerations. The strength of the short-term relationship between jobs and growth depends on structural features of the economy such as informality and the degree of product market flexibility. The evidence suggests that as informality is reduced and product markets become more flexible, the short-term relationship between labor market outcomes and growth will become stronger.

[4]Because our dependent variables are based on estimates, the dependent variable is measured with different degrees of precision across countries; hence, we use a WLS estimator. Specifically, the WLS estimator assumes that the errors ε_t are distributed as $\varepsilon_i \sim N(0, \sigma^2 \div s_i)$, in which s_i is the estimated standard deviation of the residual of the Okun coefficients (or employment responsiveness) for each country i, and σ^2 is an unknown parameter that is estimated in the second-stage regression.

[5]We do not find evidence of a significant relationship between labor and product market flexibility and the Okun coefficients, which is similar to the findings of Ball and others (forthcoming) for advanced economies.

Box 4.1. *(continued)*

Table 4.1.2. Determinants of Okun Coefficients and Employment Responsiveness

	Okun Coefficients		Employment Responsiveness			
	Levels Specification	Changes Specification				
	(1)	(2)	(3)	(4)	(5)	(6)
Informality	0.0027***	0.0044**	–0.0034**	–0.0058***	–0.0034***	–0.0044***
	(0.0009)	(0.0021)	(0.0014)	(0.0014)	(0.0013)	(0.0014)
Average Unemployment Rate	–0.0094***	–0.0131***	0.0027	–0.0003	0.0057	0.0031
	(0.0030)	(0.0047)	(0.0049)	(0.0048)	(0.0046)	(0.0047)
Labor Market Flexibility				0.0390**		0.0083
				(0.018)		(0.43)
Product Market Flexibility					0.0727***	0.0747***
					(0.0222)	(0.0250)
R^2	0.20	0.14	0.09	0.28	0.30	0.38
N	67	67	67	56	58	55

Source: IMF staff calculations.

Note: The *t*-statistics are reported in parentheses; *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Box 4.2. How Would an Investment Slowdown in China Affect Other Emerging Market and Developing Economies?

This box explores the potential impact of an investment slowdown in China on growth in other emerging market and developing economies. China's growth model has become increasingly dependent on investment during the past decade. Investment contributed about one-half of China's GDP growth in the first decade of the 2000s, with particularly large contributions toward the end of the decade (Figure 4.2.1, panel 1). In part, this reflects the steep increase in infrastructure investment during the 2008–10 stimulus response to the Great Recession. But it appears that other forces are increasingly contributing to investment growth, including the ongoing urbanization process, the more recent emphasis on social housing construction, and capacity building in high-end manufacturing and services.

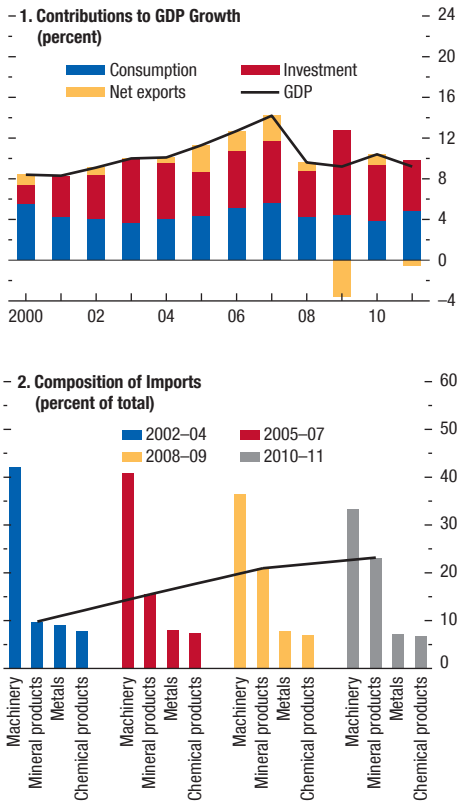
Associated with these changes are important shifts in China's import basket. As more manufacturing takes place onshore, the share of machinery imports has been gradually declining, whereas mineral and metal imports have grown steadily (Figure 4.2.1, panel 2).

These developments have had a noticeable impact on global trade flows over the past decade as trading partners sent an increasing fraction of their exports to China (Figure 4.2.2, panel 1). The importance of exports to China, when assessed relative to trading partner GDP, shows even sharper increases for several economies. This ratio has, on average, quadrupled during 2001–11 (Figure 4.2.2, panel 2).

The trends suggest that China's rapidly expanding investment may have had a large positive impact on its trading partners' growth. But with investment already close to 50 percent of output and China's continued reliance on investment to drive growth, it is unclear whether the new capacity will be profitable. An abrupt and disorderly end to the investment boom, albeit a tail risk, could have adverse effects on China's trading partners.

To get a sense of the potential magnitude of this dynamic, the spillover from investment activity in China on its trading partners is measured by the product of an economy's exports to China (as a share of GDP) and China's fixed investment growth.[1]

Figure 4.2.1. Composition of China's Growth and Imports



Source: IMF staff calculations.

[1]More specifically, the spillover is defined as

$$China\ spillover_{j,t} = exCHN_{j,t} \times China\ fixed\ investment\ growth_t, \quad (4.2.1)$$

in which

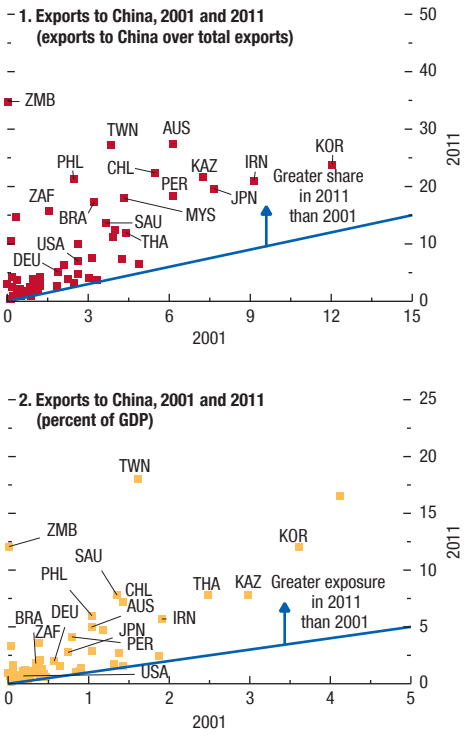
$$exCHN_j = \left(\frac{Exports\ to\ China}{GDP}\right)_j,$$

and $China\ fixed\ investment\ growth_t$ is the annual percent change of real gross fixed capital formation from the national accounts.

The main authors of this box are Ashvin Ahuja and Malhar Nabar. The box draws on Ahuja and Nabar (forthcoming).

Box 4.2. *(continued)*

Figure 4.2.2. Increasing Exports to China



Source: IMF staff calculations.
Note: AUS = Australia; BRA = Brazil; CHL = Chile; DEU = Germany; IRN = Iran; JPN = Japan; KAZ = Kazakhstan; KOR = Korea; MYS = Malaysia; PER = Peru; PHL = Philippines; SAU = Saudi Arabia; THA = Thailand; TWN = Taiwan Province of China; USA = United States; ZAF = South Africa; ZMB = Zambia.

This spillover measure varies across countries based on their export exposure to China and over time based on fluctuations in China's fixed investment growth. By construction, it measures only the influence of Chinese activity on other economies through the direct trade channel; indirect exposure through vertically integrated intermediate economies or through lower commodity prices is not captured.

The effect of the spillover on China's trading partners' growth is estimated by regressing emerging market and developing economies' growth rates on this spillover measure and a number of other controls, including these economies' lagged growth, terms of trade, and output volatility. The sample covers the period of China's membership in the World Trade Organization (2002–11) and includes the set of emerging market and developing economies classified under the MSCI AC World Index and key commodity producers. The regression is also estimated using different measures of fixed investment growth in China: overall, manufacturing, and nontradables (calculated by applying shares in fixed asset investment data, available beginning in 2003). This breakdown allows for a comparison of spillovers from a slowdown in manufacturing investment with a deceleration concentrated in nontradables.[2]

In line with China's widening footprint on global imports, the effect of China's investment on its trading partners' growth has increased over time. The most heavily exposed emerging market economies are those within the Asian regional supply chain, such as Korea, Malaysia, and Taiwan Province of China. The results suggest that GDP growth in Taiwan Province of China decreases by slightly over nine-tenths percentage point for every 1 percentage point deceleration in investment growth in China (Figure 4.2.3, panel 1).

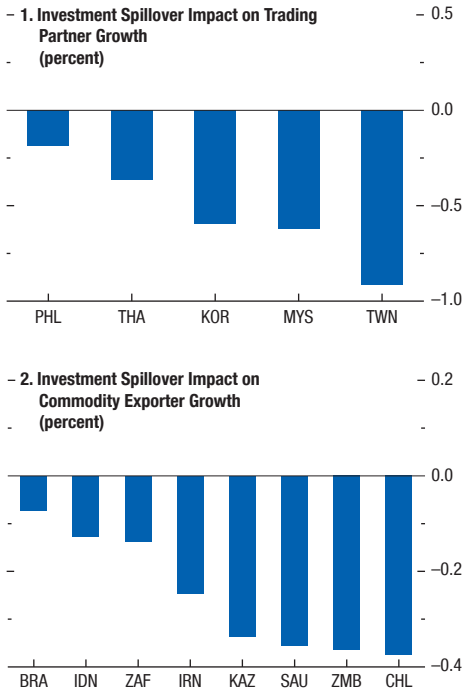
Among commodity exporters, the impact is largest on mineral ore exporters with relatively less diversified economic structures and higher concentrations of exports to China. In response to a 1 percentage point slowdown in investment growth in China, the estimated effect on Chile's growth is a decrease of close to two-fifths of a percentage point. By contrast, larger commodity exporters with more diversified economies, such as Brazil and Indonesia, experience smaller declines in growth (Figure 4.2.3, panel 2).[3]

[2]The nontradables sector is defined to include utilities, construction, transportation and storage, information technology, wholesale and retail trade, catering, banking and insurance, real estate, leasing and commercial services, education, health care, sports and entertainment, and public administration.

[3]Related to this analysis, a factor-augmented vector autoregression model relating G20 macroeconomic, financial, trade, and global commodity price variables finds that a 1 percent decline in China's fixed asset investment from baseline would, on average, lead to drops of 0.8, 1.0, 1.6, 1.8, 1.8, and 2.2 percent for prices of iron ore, aluminum, copper, lead, nickel, and zinc, respectively, within one year

Box 4.2. *(continued)*

Figure 4.2.3. Impact of an Investment Slowdown in China



Source: IMF staff calculations.
Note: BRA = Brazil; CHL = Chile; IDN = Indonesia; IRN = Iran; KAZ = Kazakhstan; KOR = Korea; MYS = Malaysia; PHL = Philippines; SAU = Saudi Arabia; THA = Thailand; TWN = Taiwan Province of China; ZAF = South Africa; ZMB = Zambia. Bars show the effect of a 1 percentage point slowdown in Chinese investment growth.

A decomposition of investment into manufacturing and nontradables shows that spillover effects from China's manufacturing investment reflect the influence of global demand. Once global demand is included as an additional control in the regression, the spillover from manufacturing fixed investment in China no longer has a statistically significant impact on its trading partners' growth (whereas global demand does). By contrast, nontradables investment in China has a significant spillover impact on its trading partners' growth above and beyond the effects of global demand.

The analysis also shows that direct spillover effects from consumption growth on trading partners' growth have been negligible in recent years. China's share in global consumer goods imports has increased at a slower pace than its share in global consumption over the past 15 years. China currently plays a small role as an importer of consumer goods, accounting for only 2 percent of global consumer goods imports.[4] The low import intensity of final consumption in China suggests that if a transition to consumption-based growth takes place in response to the structural reforms envisaged in the 12th Five-Year Plan, the direct benefits to consumer goods exporters are likely to be small. Nevertheless, China's trading partners may still benefit from indirect access to Chinese consumers by selling intermediate goods, parts, and components to Chinese firms that then assemble and customize final products for the local market.

after the shock. For further details, see Ahuja and Nabar (forthcoming).

[4]See IMF (2012) for more details.

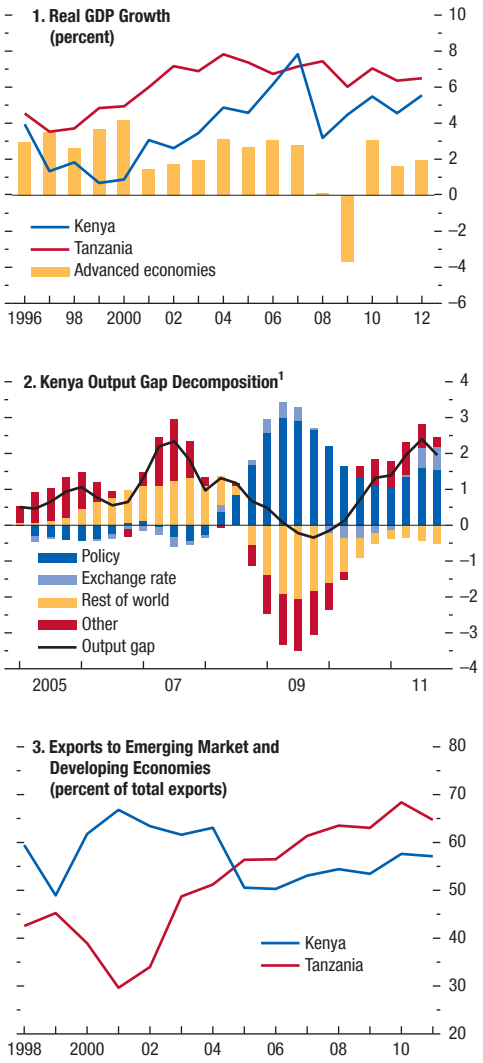
Box 4.3. Resilient Growth in Low-Income Countries: Kenya and Tanzania

Kenya and Tanzania are among the group of emerging market and developing economies that showed marked resilience during the Great Recession. Both outpaced earlier advanced economy growth, experienced only a modest growth slowdown during 2008–09, and have charted a subsequent rapid and robust recovery (Figure 4.3.1, panel 1).[1]

A decade of improved macroeconomic stability has helped underpin this resilience. In Tanzania, reforms since the late 1990s liberalized foreign exchange and financial markets and foreign trade, and diminished the role of parastatals. Inflation fell from 20 to 30 percent in the 1990s to 5 percent in the mid-2000s, fiscal revenues increased from 10 to 15 percent of GDP, and gross reserve cover broadly doubled. With the help of the IMF's Heavily Indebted Poor Country/Multilateral Debt Relief Initiative, the debt burden was also halved in relation to GDP. In Kenya, reforms started earlier, with a major program to liberalize price controls, import licensing, and exchange restrictions, as well as steps to privatize parastatals and reduce civil service numbers. As a result of prudent fiscal policy, Kenya's public debt fell from 54 percent of GDP in 2001 to 38 percent in 2008.

Macroeconomic stability and market-friendly policies helped provide a durable growth impetus. As in much of Africa, growth in Kenya and Tanzania has been driven by strong domestic markets, led by a growing middle class. For both countries, an improved investment outlook contributed to a sustained expansion in private sector construction spending. At the same time, the adoption of new technologies has contributed to rapid growth in communications and finance. This engine of growth helped shield both economies from the global downturn, with spending on construction, communications, and finance continuing to grow

Figure 4.3.1. The Resilience of Kenya and Tanzania



Source: IMF staff estimates.
[1]See Andrle and others (forthcoming) for further details on this output gap decomposition.

The main authors of this box are Nick Gigineishvili, Dimitre Milkov, Armando Morales, and Peter Allum.

[1]In Kenya, growth trends were distorted by domestic factors, with a slowdown in 2008 on account of postelection violence and drought conditions during 2008–09 that undercut agricultural production. Given the latter, panel 1 of Figure 4.3.1 focuses on growth in Kenya's nonagricultural economy.

Box 4.3. *(continued)*

at a 9 to 10 percent real rate throughout the Great Recession.

Strengthened macroeconomic buffers also provided space for a countercyclical policy response to the global downturn. With modest fiscal deficits and sustainable levels of public debt, both countries allowed government spending to rise between 2006/07 and 2008/09—by 4½ percentage points of GDP in Tanzania and by 2 percentage points in Kenya.[2] This fiscal stimulus helped offset growth spillovers from a less favorable external environment. Monetary policy was also supportive. Tanzania halved its short-term interest rates between 2007 and 2009. And in Kenya, a recent IMF study shows that supportive monetary conditions were successful in offsetting most of the contractionary impact of the Great Recession, which would otherwise have resulted in output falling well below its potential (Figure 4.3.1, panel 2).[3] Under floating exchange rate regimes, both currencies appreciated in real terms against the dollar through 2009, though this did not offset the overall impact of fiscal and monetary easing. Both countries saw quick, albeit temporary, deterioration in their overall balance of payments in 2008, but weathered it readily using their healthy gross reserve buffer (of about four months of imports) and by resorting to new IMF financing.

Diversification of production and export activity may also have helped their resilience. At the product level, Kenya has increased its exports of intermediate nonmanufactured goods while diversifying its tourism market. In Tanzania, a significant decline in traditional agricultural exports was offset by growth in exports of minerals and manufactured goods. At the market level, Kenya's trade with other emerging market and developing economies has remained broadly stable at slightly more than half of total exports; in Tanzania, sales to these economies doubled to represent two-thirds of exports, helping the country decouple from the advanced economy growth cycle (Figure 4.3.1, panel 3).

Both countries are projected to sustain a robust pace of growth through 2012. The rate of expansion is likely to remain somewhat below the peak rates seen during 2006–07 given steps to gradually reverse the 2008–09 fiscal stimulus and because of the monetary tightening adopted since mid-2011 to bring down food-price-related inflation. Credit growth has decelerated in both countries but remains sufficient to support steady growth. More generally, unlike in some other emerging market and developing economies, growth has been supported by direct investment and capital repatriation, which are less likely to experience sudden stops, and the financial sector remains robust, with low levels of nonperforming loans.

The resilience of Kenya and Tanzania could be tested, however, in the event of an intensified downturn in the global economy. Sustained growth in exports has supported their external performance so far, but a new global downturn, including emerging market and developing economies, would bring new balance of payments pressures. Both countries also have more constrained policy space than at the start of the Great Recession, with higher fiscal deficits and debt levels, higher inflation, and somewhat lower gross reserve cover. Accordingly, both countries are rebuilding macroeconomic buffers under programs supported by the IMF: Kenya's economic program has been supported by a three-year Extended Credit Facility since 2011, and Tanzania recently accessed an 18-month precautionary Standby Credit Facility to complement its preexisting Policy Support Instrument arrangement.

[2]For fiscal years starting July 1.
[3]Andrle and others (forthcoming).

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