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The Growth Comeback in Developing Economies: A New Hope or Back to the Future?

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Research Department

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Abstract

Growth takeoffs in developing economies have rebounded in the past two decades. Although recent takeoffs have lasted longer than takeoffs before the 1990s, a key question is whether they could unravel like some did in the past. This paper finds that recent takeoffs are associated with stronger economic conditions, such as lower post-takeoff debt and inflation levels; more competitive real exchange rates; and better structural reforms and institutions. The chances of starting a takeoff in the 2000s was triple that before the 1990s, with domestic conditions accounting for most of the increase. The findings suggest that if today's dynamic developing economies sustain their improved policies; they are more likely to stay on course compared to many of their predecessors.

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I. INTRODUCTION

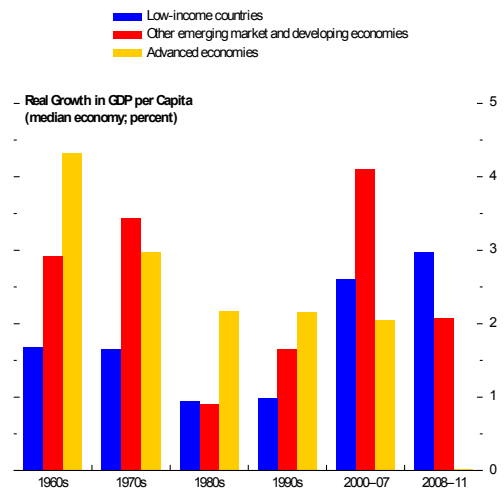
Following a lackluster performance in the 1980s, growth in developing or low-income countries (LICs) rebounded starting in the 1990s (Figure 1). They grew at a faster pace than advanced economies since the turn of the 21st century, and even outpaced other emerging market and developing economies since the Great Recession. This growth comeback in LICs imparts optimism about their prospects for many.

For skeptics, however, it may relate to a relatively favorable global economy, strong commodity prices, and low interest rates. Thus, for instance, strong LIC performance was also observed in the 1960s and early 1970s, only to sputter for many in the late 1970s and 1980s when global conditions turned sour. In fact, much of the recent literature has induced a sense of deep pessimism about LIC prospects given their weak institutions, unimpressive economic reform, and resource-curse challenges (see Pritchett (1997), Sachs and Warner (1997, 2001), Easterly and Levine (1997), and Rodrik (1999) among others). Thus, understanding whether today's dynamic LICs have improved prospects of growing at a strong and sustained pace than in the past will require assessing whether their growth is built on lower economic vulnerabilities today than before. Addressing this question is the main objective of this paper.

We make three small but important contributions to the empirical growth literature in this paper. First, using data from the early 1950s, we exclusively focus on the experiences of nearly 70 LICs. The related recent literature has typically not differentiated between emerging market and low-income countries (see Berg, Ostry, and Zettelmeyer, (2012), Hausmann, Pritchett and Rodrik (2005), Lin and Rosenblatt (2012), Jones and Olken (2008), and Abiad and others (2012))². By zooming in on LICs, we recognize the development challenges that are unique to countries at low income levels, with limited financial depth and integration.

Second, we make an exhaustive classification of each LIC's growth experience into episodes of growth takeoff—defined as a reasonably long period of reasonably strong growth in output per capita—versus other periods. Singling out such takeoffs, we then identify those economic conditions and structural characteristics that are more associated with takeoffs than

Figure 1. Economic Performance of Low-Income Countries and Others



Sources: IMF, World Economic Outlook database (October 2012); Penn World Table 7.1; World Bank, World Development Indicators database; and IMF staff calculations.
Note: Economy groups and indicators are defined in Appendix 1. Real GDP per capita is in purchasing-power-parity terms. The 2008-11 median of real GDP per capita growth of advanced economies is near zero (0.02 percentage point).

² However, a number of recent studies have focused on LICs in Sub-Saharan Africa—for instance, Arbache and Page (2009), McAuliffe, Saxena and Masafumi (2012), and IMF (2008).

with other growth episodes or non-takeoffs. We are also able to then compare how these relationships may have changed over time, in particular between the takeoffs from the past two decades with those before the 1990s. Our aim is to discern from these patterns any differences in potential vulnerabilities between recent takeoffs versus non-takeoffs, and between takeoffs across the two generations.

Third, in light of the sometimes poor data quality and coverage for LICs, we complement the statistical analysis with historical case studies to provide evidence on takeoff experiences of specific countries, to further deepen our understanding of what policies helped sustain or derail takeoff.

Our main findings are as follows: first, LIC growth takeoffs, defined as upswings in per capita output that last at least five years with growth averaging at least 3½ percent, have markedly risen since the 1990s. Recent growth takeoffs have lasted longer than those prior to the 1990s. Second, takeoffs are important step in development as they typically lead to 50-60 percent increases in real per capita GDP within 10 years after takeoff, although some previous generation takeoffs ended in crises or reversed sharply. Third, LICs in recent takeoffs tended to demonstrate stronger post-takeoff macroeconomic outcomes—such as lower debt and inflation, more competitive exchange rates, higher investment levels—as well as structural reforms and institutions—such as better infrastructure, lower regulatory burden, and more political stability—than their predecessors. This is partly due to a greater reliance on FDI-financed investment instead of debt-financed investment. Finally, case studies stress that sustaining strong macroeconomic and structural policies is key to sustaining growth takeoffs.

These findings suggest that although today’s dynamic LICs still face many challenges, they are off with a good start. The key now is to stay on track with their longer-term objectives and avoid procyclical policies despite the ultralow global interest rates. If these economies can continue to sustain their improved policies, they are more likely to stay on course and avoid the reversals in economic fortunes that affected many of their predecessors.

The rest of the paper is organized as follows. Section 2 identifies LIC growth takeoffs and compares them in historical perspective. Section 3 presents the empirical analysis: first, it documents the behavior of key macroeconomic and structural policy variables underlying LIC takeoffs in the two generations—1990-2011 and prior to the 1990s. Next, it presents a multivariate regression analysis to jointly account for the relationship between growth takeoffs and a number of the underlying correlates, and then considers a number of robustness checks. Section 4 presents the case studies. Section 5 concludes.

II. TAKEOFFS IN HISTORICAL PERSPECTIVE

We start by defining a low-income country (LIC). For this, advanced economies are defined as the member economies of the Organization of Economic Cooperation and Development (OECD) as of 1990, with the exception of Turkey. All other economies are

classified as emerging market and developing economies (EMDEs). Among these, at any given time, an LIC is defined as an economy whose average real output per capita over the previous five years is lower than a time-varying low-income threshold. The low-income threshold in 1990 is set at the bottom 45th percentile of average EMDE output per capita (about \$2,600 in purchasing-power-parity-adjusted constant 2005 U.S. dollars). This threshold is extrapolated backward and forward using the average growth rate of global output per capita during 1950–2011 (about 2.3 percent per year) to get a low-income threshold for each year.³

Next, we identify upswings and downswings in LICs' annual purchasing-power-parity-adjusted real GDP per capita level since 1950. Similar to Abiad and others (2012), we use the Harding and Pagan (2002) algorithm to pick turning points in LICs' real GDP per capita. The algorithm searches for local peaks and troughs that meet the specified conditions for the length of cycles and the upswings and downswings. The only condition we impose is that the cycle, comprising one upswing and one downswing, is at least five years long, to avoid picking high frequency fluctuations in output per capita that are very common to developing economies.

Finally, we define a takeoff as an upswing in LIC output per capita that lasts at least five years, with average annual growth of at least 3.5 percent. The threshold of 3.5 percent growth is the 60th percentile of growth in output per capita in all emerging market and developing economies in the past two decades and is the standard threshold used in other studies (see Hausmann, Pritchett, and Rodrik (2005) and Johnson, Ostry, and Subramanian (2007)). The window of five years is long enough to rule out one-off increases in LIC growth rates. These criteria identify 29 growth takeoffs during 1990–2011 (Table 1) and 41 takeoffs prior to 1990s (Table 2).⁴

³ To ensure that the results are unaffected by very small economies, the sample excludes economies whose average 1950–2011 population was less than 1 million inhabitants. China and India are included in EMDEs, but not LICs.

⁴ Some of these episodes followed serious internal or external conflicts and were excluded from the analysis (see Appendix 1 for the definition of a postconflict takeoff). However, the results hold even with the inclusion of these cases, and are available on request. Also see Section 3 for a number of robustness checks.

Table 1. Takeoffs in Current-Generation Low-Income Countries, 1990–2011

Economic Structure	Country	Duration		Average Annual Real GDP per Capita Growth (percent) 3/	
		Start	End1/ (years) 2/		
Predominantly Agricultural	Sudan	1994		18	4.62
	Rwanda	1995		17	6.93
	Kyrgyz Republic	1996	2008	13	3.65
	Liberia	1996	2002	7	17.54
	Nigeria 4/	1996	2008	13	4.70
	Lao P.D.R. 4/	1999		13	6.10
	Sierra Leone	2000		12	5.87
	Ethiopia	2004		8	7.09
	Liberia	2006		6	4.12
Predominantly Manufacturing	Sri Lanka	1992	2000	9	4.39
	Yemen, Republic of 4/	1992	1998	7	5.12
	Cambodia	1996		16	5.63
	Bangladesh	1997		15	3.93
	Tajikistan	1997	2007	11	6.20
	Indonesia 4/	2000		12	3.76
	Moldova	2000	2008	9	6.00
	Sri Lanka	2002		10	4.88
Predominantly Nonrenewable Resource and Forestry	Azerbaijan	1997	2010	14	11.97
	Chad	1997	2005	9	6.55
	Zambia	2000	2008	9	4.70
	Angola	2002	2009	8	10.72
	Georgia	2002		10	6.28
	Ghana	2002		10	4.59
	Mongolia	2002	2008	7	6.22
	Uzbekistan	2002		10	6.04
Other (no specialized economic structure)	Mozambique	1996		16	5.78
	Tanzania	1997		15	4.10
	Afghanistan	2002	2007	6	13.15
	Malawi	2002		10	4.32

Source: IMF staff calculations.

Note: The table lists emerging market and developing economies that started with real output per capita (purchasing-power-parity-adjusted constant 2005 U.S. dollars) below the time-varying threshold at the beginning of the episode and grew at an average rate of 3.5 percent or higher for at least five years at any time since 1990. See Appendix 1 for details on how the economic structure classifications are derived. Countries in red were experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See Appendix 1 for the definition of conflict and the source of the conflict data.

1/ Ongoing takeoffs as of 2011 are left blank.

2/ Ongoing takeoffs as of 2011 use duration as of 2011.

3/ Ongoing takeoffs as of 2011 use average growth as of 2011.

4/ Countries are also validly classified as predominantly nonrenewable resource and forestry producers.

Table 2. Takeoffs in Previous-Generation Low-Income Countries, before 1990

Economic Structure	Country	Start	End1/	Duration (years) 2/	Average Annual Real GDP
					per Capita Growth (percent) 3/
Predominantly Agricultural	Mauritania 4/	1962	1976	15	7.95
	Nigeria 4/	1969	1974	6	8.93
	Mali	1975	1986	12	4.00
	Lao P.D.R.	1980	1986	7	5.43
	Lao P.D.R.	1989	1997	9	4.28
Predominantly Manufacturing	Sri Lanka	1966	1970	5	4.87
	Morocco 4/	1967	1971	5	5.32
	Malawi	1968	1978	11	5.24
	Zimbabwe 4/	1969	1974	6	9.09
	Morocco 4/	1973	1977	5	7.33
	Thailand	1973	1982	10	4.95
	Zimbabwe 4/	1978	1983	6	5.72
	Vietnam	1981		31	4.89
	Egypt 4/	1982	2010	29	4.19
Indonesia 4/	1983	1997	15	4.81	
Predominantly Nonrenewable Resource and Forestry	Zambia	1963	1968	6	6.69
	Indonesia	1964	1981	18	4.87
	Botswana	1966	1973	8	15.48
	Republic of Congo	1978	1984	7	9.10
	Uganda	1988	1994	7	4.70
Other (no specialized economic structure)	Thailand	1959	1971	13	5.43
	Togo	1963	1972	10	4.38
	Republic of Congo	1964	1973	10	6.41
	Cameroon	1968	1979	12	4.38
	Sierra Leone	1968	1972	5	5.49
	Lesotho	1972	1978	7	9.97
	Sri Lanka	1972	1982	11	4.82
	Sierra Leone	1981	1987	7	4.65
	Lesotho	1985	1990	6	3.71
	Tanzania	1985	1991	7	4.33
	Mozambique	1987	1991	5	4.19
Missing data	Bulgaria	1953	1988	36	5.28
	Cambodia	1954	1963	10	3.58
	Morocco	1958	1964	7	8.69
	Malawi	1960	1966	7	5.97
	Burundi	1962	1973	12	3.81
	Tanzania	1962	1975	14	3.76
	Ghana	1968	1974	7	5.01
	Haiti	1973	1980	8	3.91
	Vietnam	1975	1979	5	4.55
	Cambodia	1983	1988	6	6.32

Source: IMF staff calculations.

Note: The table lists emerging market and developing economies that started with real output per capita (purchasing-power-parity-adjusted constant 2005 U.S. dollars) below the time-varying threshold at the beginning of the episode and grew at an average rate of 3.5 percent or higher for at least five years at any time before 1990. See Appendix 1 for details on how the economic structure classifications are derived. Countries in red were experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See Appendix 1 for the definition of conflict and the source of the conflict data.

1/ Ongoing takeoffs as of 2011 are left blank.

2/ Ongoing takeoffs as of 2011 use duration as of 2011.

3/ Ongoing takeoffs as of 2011 use average growth as of 2011.

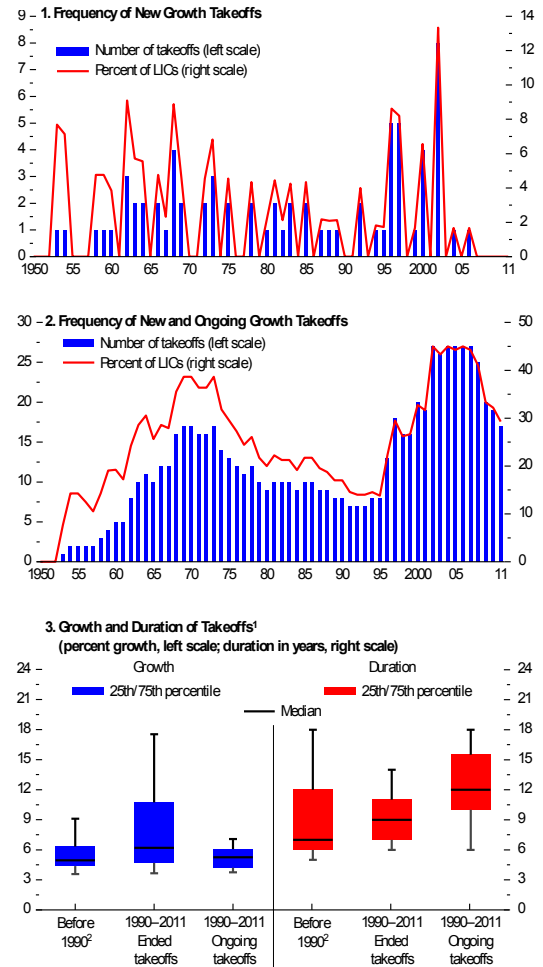
4/ Countries are also validly classified as predominantly nonrenewable resource and forestry producers.

Figure 2 shows that LIC takeoffs have occurred in two waves; the first wave in the 1960s and early 1970s, and the second wave in the last two decades. Panel 1 shows the number and share of LICs that embarked on a takeoff each year, and Panel 2 shows the total number and share of LICs that either took off or sustained an ongoing takeoff. Both panels confirm that after a rise in the share of LICs entering and sustaining takeoffs in the 1960s and early 1970s, this share fell in the 1980s, and rebounded again from the 1990s. Note, however, the frequency of growth takeoffs declined after 2008, in part because of data censoring, but also because of a drop in the share of LICs that had sustained their takeoffs.⁵ Nevertheless, despite the Great Recession, one-third of LICs still sustained their takeoffs as of 2011 compared with an average of 20 percent during the 1980s.

Recent takeoffs have lasted longer than those in the previous generation, and have also had somewhat stronger growth outcomes (panel 3 of Figure 2). Over the past two decades, the median duration was 9 years for growth episodes that were already completed and 12 years for episodes that were still ongoing as of 2011. In fact, as indicated above, more than half of the recent takeoffs continued through the Great Recession. Median growth in output per capita was 6¼ percent and 5¼ percent, respectively, in recent takeoffs that have already ended versus those that were still ongoing. This compares with a median duration of about 7 years and median growth of about 5 percent for takeoffs before 1990.

Global conditions helped spur LIC takeoffs, but there was obviously more at play. Figure 3 documents the behavior of global growth, the U.S. real interest rate as a proxy for global interest rates, and terms-of-trade (TOT) growth during LIC takeoffs. Each global indicator is presented in three snapshots: its average level during the five years before takeoff, five years after takeoff, and during the 6th to the 10th years after takeoff. Global growth and

Figure 2. Frequency of New and Ongoing Takeoffs in Low-Income Countries



Sources: IMF, World Economic Outlook database (October 2012); Penn World Table 7.1; World Bank, World Development Indicators database; and IMF staff calculations.

Note: LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. See the text for definitions of new and ongoing growth takeoffs.

¹The horizontal line inside each box is the median within the group; the upper and lower edges of each box show the top and bottom quartiles. The distance between the black lines (adjacent values) above and below the box indicates the range of the distribution within that generation, excluding outliers.

²The episodes before 1990 include one ongoing takeoff (Vietnam since 1981).

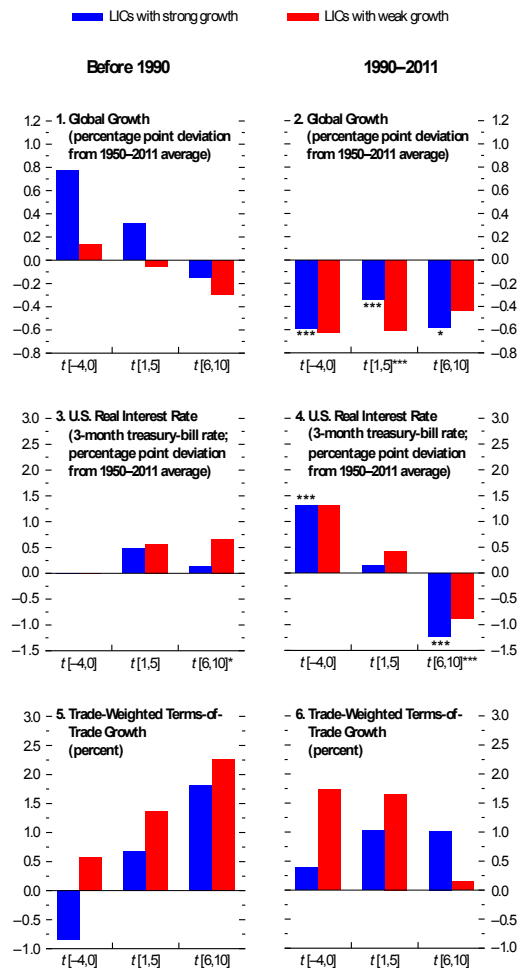
⁵ Given the condition that takeoffs must last at least five years, it is not possible to identify new takeoffs after 2007.

interest rates are expressed as deviations from their average value during the entire sample period. Compared with pre-1990 takeoffs, recent takeoffs started under weaker global growth and higher global interest rates, but these conditions improved after takeoff for the current generation, whereas they deteriorated for the previous generation. Pre-takeoff TOT growth was more favorable for the former than the latter, but TOT growth rose for both generations after takeoff. That said, LICs that were unable to take off faced similar global conditions as those that did, suggesting that domestic conditions and policies also affect whether or not an LIC takes off.

Related to the above, Figure 4 confirms that LIC takeoffs have typically been more than a commodity story. LICs that took off had a variety of economic structures, with some rich in resources and others manufacturing-based. The same holds for their peers that did not take off. Among the current generation of takeoffs, the resource-rich LICs performed particularly well—their GDP per capita typically rose by 80 percent in 10 years—but many of their resource-rich peers could not jump-start growth (Figure 4, panels 1 and 2). Among dynamic LICs prior to 1990, resource-rich LICs tended to perform strongly in the first 10 years after takeoff but were overtaken after 10 years by other LICs (Figure 4, panel 3). Among past weak performers, resource-rich LICs in fact experienced the slowest growth (Figure 4, panel 4). Manufacturing-oriented dynamic LICs among both the current and previous generation of takeoffs saw a 50 percent rise in GDP per capita after 10 years. But many of their manufacturing-oriented peers were unable to take off.

Igniting strong takeoffs appears to pay off in long-term gains in output per capita. Figure 5 shows that LICs that succeeded in taking off—or dynamic LICs—tended to remain on a stronger trajectory for output per capita in the years after takeoff.⁶ For the current generation,

Figure 3. The Global Environment behind Low-Income Countries' Growth Takeoffs
(Median economy; $t = 1$ in the first year of a strong or weak growth episode)



Sources: Haver Analytics; IMF, World Economic Outlook database (October 2012); Penn World Table 7.1; World Bank, World Development Indicators database (2012); and IMF staff calculations.

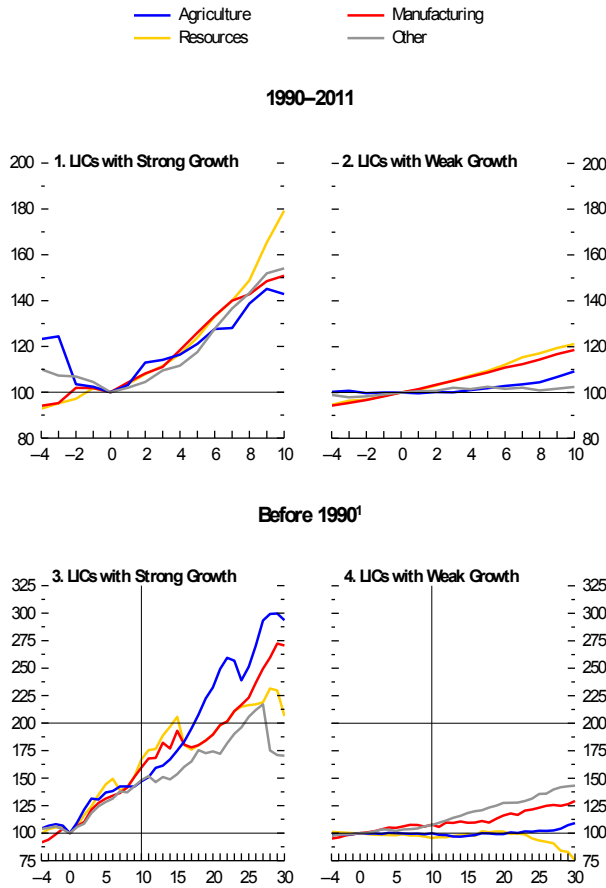
Note: LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. LICs exclude countries experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See the text for definitions of strong and weak growth episodes (takeoffs are strong growth episodes). See Appendix 1 for the definition of conflict and the source of the conflict data. *, **, and *** denote statistically significant difference in distributions (based on the Kolmogorov-Smirnov test) at the 10 percent, 5 percent, and 1 percent levels, respectively. Significance tests on the x-axis are for the difference in the distributions between the groups of strong and weak growth. Significance tests on the blue bars are for the difference in the distributions across 1990-2011 and before 1990 (not shown for red bars). A constant composition sample underlies each of the panels to ensure comparability within the group of strong and weak growth episodes across time for that panel.

⁶ In Figure 5, the year before the start of each growth takeoff is centered at zero. The control group comprises country-year pairs of LICs that did not takeoff in the years in which the dynamic LICs took off.

output per capita typically rose by 60 percent after 10 years following takeoff, compared with about 15 percent for LICs that did not take off (Figure 5, panel 1). For the previous generation, output per capita increased by 50 percent in 10 years after takeoff (compared to less than 5 years for LICs that did not take off) and doubled within 25 years (Figure 5, panels 2 and 3).

Figure 4. Economic Structure and Real Output per Capita after Takeoff in Low-Income Countries

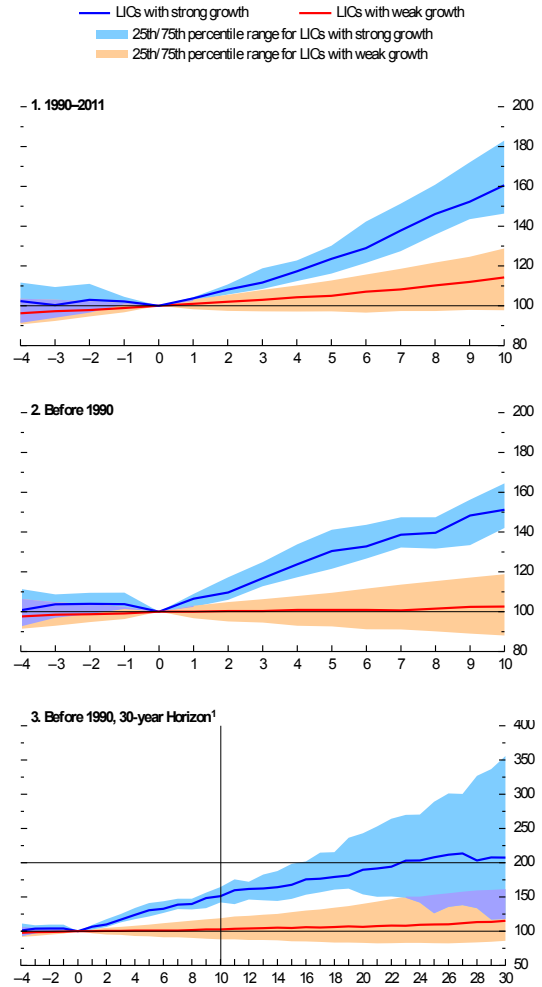
(Median economy; normalized to 100 at $t = 0$, the year before the start of a strong or weak growth episode; years on x-axis)



Source: IMF staff calculations.
 Note: LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. LICs exclude countries experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See the text for definitions of strong or weak growth episodes (takeoffs are strong growth episodes). See Appendix 1 for the definition of conflict and the source of the conflict data.
¹The vertical line indicates the 10-year horizon.

Figure 5. Real Output per Capita after Takeoff in Low-Income Countries

(Median economy; normalized to 100 at $t = 0$, the year before the start of a strong or weak growth episode; years on x-axis)



Source: IMF staff calculations.
 Note: LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. LICs exclude countries experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See the text for definitions of strong and weak growth episodes (takeoffs are strong growth episodes). See Appendix 1 for the definition of conflict and the source of the conflict data.
¹The vertical line indicates the 10-year horizon.

Notwithstanding the benefits from takeoffs, history tells a cautionary tale for LICs today. First, many currently dynamic LICs also belonged to the previous cohort of dynamic LICs. This raises questions about whether the vulnerabilities of these LICs have changed fundamentally. Second, close to one-third of previous takeoffs ended with a currency, debt, or banking crisis (Table 3).⁷ Although less than 15 percent of recent takeoffs have ended with crises thus far, their future prospects remain uncertain. Last but not least, Figure 5, panel 3, shows that the pace of growth in the previous-generation takeoffs slowed after 10 years, but more importantly, those in the bottom quartile of the distribution reversed their gains in output per capita within 20 years after takeoff. The main question in many policymakers' minds is whether this time is different or whether the current-generation dynamic LICs is vulnerable to impending crises or similar reversals as many dynamic LICs in the past. The next section addresses this question.

III. WHAT LIES WITHIN: THE ROLE OF ECONOMIC AND STRUCTURAL POLICIES AND INSTITUTIONS IN TAKEOFFS

This section draws on the growth and development literature to present stylized facts that address two key questions about the nature of LIC growth takeoffs. First, is takeoff associated with strong investment growth? The idea that investment is crucial to fostering growth in developing economies has a long history.⁸ Second, is the growth strategy likely to endure? Even if investment were strong, growth could still fizzle if investment is not financed by sustainable means—giving rise to macroeconomic imbalances—or if it is not productive. Thus, to catalyze a takeoff and sustain it, strong investment growth should be supported by policies that do not induce macroeconomic vulnerability and by reforms and institutions that foster productivity and competitiveness.⁹ Against this premise, this section documents the

⁷ The data on crises draw on Laeven and Valencia (2012) and start in 1970. Thus, we are unable to assess what share of the four growth takeoffs that ended before 1970 was crisis related.

⁸ See, for instance, Rostow (1956) and Rosenstein-Rodan (1943), among others. However, the empirical evidence on the importance of investment is mixed. For instance, Hausmann, Pritchett, and Rodrik (2005) find that strong growth episodes are significantly correlated with increases in investment, whereas Jones and Olken (2008) do not.

⁹ See Commission on Growth and Development (2008), Spence (2011), Rodrik (2003), and Lin (2012).

Table 3. Crises and the Ends of Growth Takeoffs in Low-Income Countries, 1970–2011

Country	Takeoff Start	Takeoff End	Crisis 1/
Indonesia	1964	1981	1979 (currency)
Thailand	1973	1982	1983 (banking)
Mali	1975	1986	1987 (banking)
Vietnam	1975	1979	1981 (currency)
Republic of Congo	1978	1984	1986 (debt)
Zimbabwe	1978	1983	1983 (currency)
Lao P.D.R.	1980	1986	1997 (currency)
Sierra Leone	1981	1987	1989 (currency), 1997 (banking), 1999 (debt)
Indonesia	1983	1997	1998 (currency), 1999 (debt)
Tanzania	1985	1991	1990 (currency)
Uganda	1988	1994	1994 (banking)
Lao P.D.R.	1989	1997	1986 (currency)
Yemen	1992	1998	1996 (banking)
Nigeria	1996	2008	2009 (banking)
Zambia	2000	2008	2009 (currency)
Mongolia	2002	2008	2008 (banking)

Sources: Laeven and Valencia (2012); and IMF staff calculations.
Note: Countries shown in red were experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See Appendix 1 for the definition of conflict and the source of the conflict data.

1/ Growth takeoffs are shown if their end year is coincident with a financial crisis, a financial crisis occurred in the previous two years, or a financial crisis occurred in the following two years. A financial crisis is a banking, currency, or sovereign debt crisis, taken from Laeven and Valencia (2012). Over the period 1970–89, 32 percent of growth takeoffs (either ended or ongoing) were associated with a financial crisis near their end. Over the period 1990–2011, the corresponding incidence was only 14 percent.

differences in economic conditions in recent LIC growth takeoffs compared with those that occurred prior to the 1990s. That said, all stylized facts are based on correlations and should be interpreted as associations with takeoffs rather than drivers of takeoffs.

A. Stylized Facts—Now versus Before

We examine indicators of macroeconomic management, external competitiveness, and structural characteristics related to productivity, economic and political institutions. The indicators proxying for macroeconomic conditions include public and external debt, inflation, current account balance and its financing, foreign reserves. Real exports growth, export concentration, real exchange rate change and its deviation from its productivity-adjusted long-term level are used to proxy external competitiveness conditions. Structural characteristics are given by the size of government, infrastructure, health, education, income distribution (income inequality), and a proxy for political institution (given by the relative constraint on the executive). Appendix 1 discusses in detail the construction and sources for these data.

As before, each indicator in Figures 6–10 is presented in three snapshots: its average level during the five years before takeoff, five years after takeoff, and during years six to ten after takeoff. Significant tests are done on two levels—along the x axis, tests are between the distribution of the indicator for takeoffs versus non-takeoffs for each generation (pre-1990, and 1990–2011); along the blue bars, tests are between the distributions of the indicator for takeoffs in 1990–2011 versus those prior to 1990.

Although both the current and previous generation of takeoffs coincided with strong investment growth, they differed significantly in how the saving-investment gaps were financed. Takeoffs in both generations were correlated with higher levels of investment and national saving rates compared with LICs that could not launch a growth takeoff (Figure 6, panels 1–4). In addition, current account deficits were broadly similar in both generations (Figure 6, panels 5 and 6). However, a larger share of the current account deficits was financed by foreign direct investment (FDI) flows for the current generation of takeoffs compared with the previous generation. FDI flows also rise sharply after takeoff for the current generation of dynamic LICs compared with both the LICs with weak growth and the previous generation of dynamic LICs (Figure 6, panels 7 and 8).¹⁰

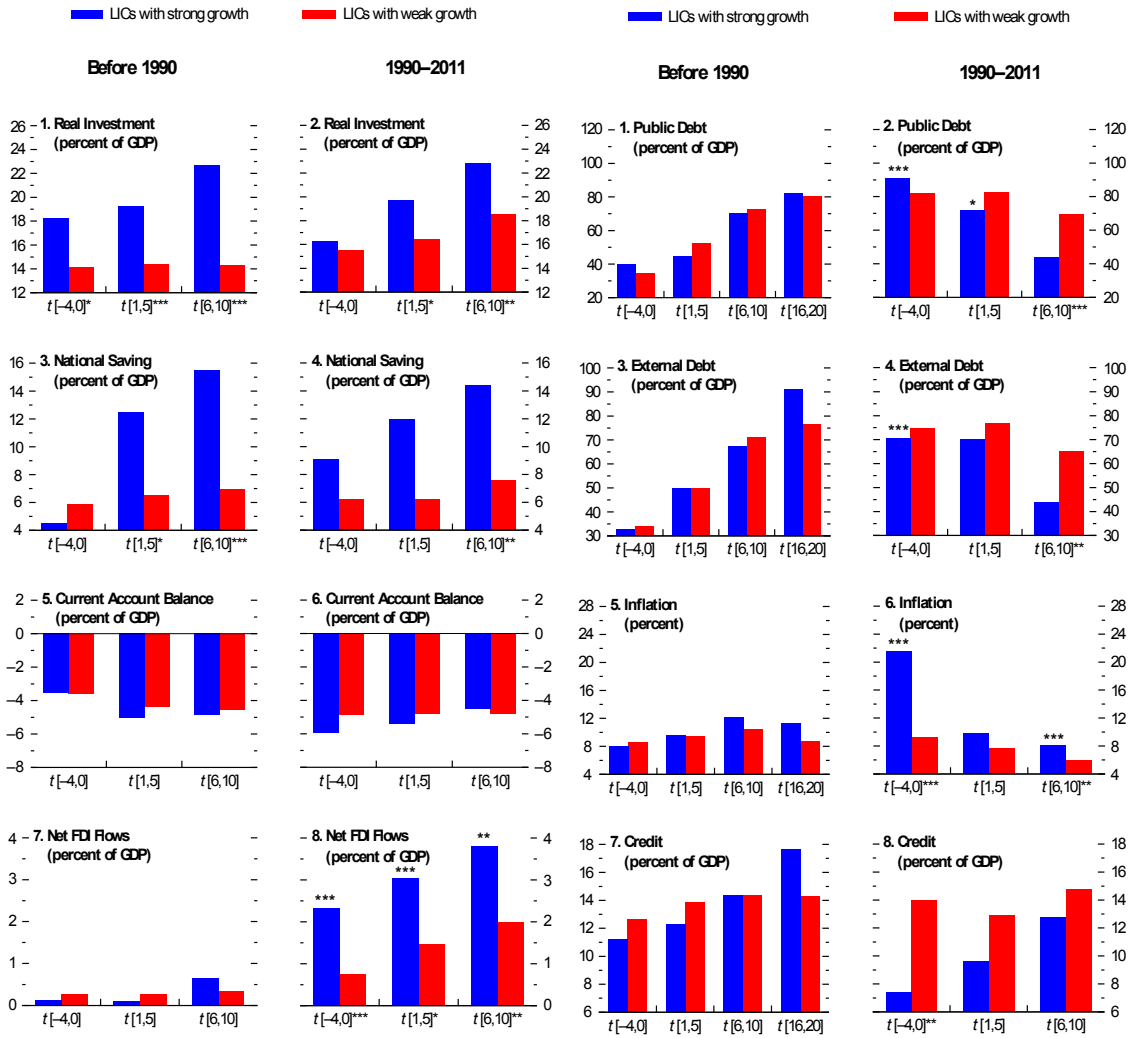
Recent LIC takeoffs were supported by sharp declines in public and external debt levels, in part as a result of their greater reliance on FDI, as well as by policy adjustments undertaken to qualify for debt relief (Figure 7, panels 1–4). Among the current-generation dynamic LICs,

¹⁰ The remarkable increase in FDI inflows to LICs has also been noted by others (see Dabla-Norris and others, 2010). However, the sharp increase post-takeoff is particularly observed for the resource rich dynamic LICs. For the manufacturing-oriented LICs, although FDI levels for the current generation exceed those in previous generations, they did not increase sharply following takeoff. The share of foreign aid in GDP was also higher for the current generation of LICs compared to the previous generation. For more details see Chapter 4 of IMF (2013).

within 10 years after takeoff, public debt decreased from more than 90 percent of GDP to 44 percent of GDP, and external debt fell from more than 70 percent of GDP to about 44 percent. Even if economies that received debt relief are excluded from the sample, the pattern of lower external and public debt over time still holds—public debt typically declines from 50 percent of GDP before takeoff to 40 percent of GDP in 10 years after takeoff, whereas external debt declines from 60 percent of GDP to about 45 percent of GDP during the same period. More

Figure 6. Investment and Financing in Low-Income Countries
(Median economy; $t = 1$ in the first year of a strong or weak growth episode)

Figure 7. Macroeconomic Conditions in Low-Income Countries
(Median economy; $t = 1$ in the first year of a strong or weak growth episode)



Sources: IMF, Balance of Payments Statistics database; IMF, World Economic Outlook database (October 2012); Penn World Table 7.1; World Bank, World Development Indicators database (2012); and IMF staff calculations.
Note: FDI = foreign direct investment; LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. LICs exclude countries experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See the text for definitions of strong or weak growth episodes (takeoffs are strong growth episodes). See Appendix 1 for the definition of conflict and the source of the conflict data. *, **, and *** denote statistically significant difference in distributions (based on the Kolmogorov-Smirnov test) at the 10 percent, 5 percent, and 1 percent levels, respectively. Significance tests on the x-axis are for the difference in the distributions between the groups of strong and weak growth. Significance tests on the blue bars are for the difference in the distributions across 1990–2011 and before 1990 (not shown for red bars). A constant composition sample underlies each of the panels to ensure comparability within the group of strong and weak growth episodes across time for that panel.

Sources: Abbas and others (2010); IMF, International Financial Statistics database; IMF, World Economic Outlook database (October 2012); Lane and Milesi-Ferretti (2007) updated to 2011; World Bank, World Development Indicators database (2012); and IMF staff calculations.
Note: LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. LICs exclude countries experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See the text for definitions of strong and weak growth episodes (takeoffs are strong growth episodes). See Appendix 1 for the definition of conflict and the source of the conflict data. *, **, and *** denote statistically significant difference in distributions (based on the Kolmogorov-Smirnov test) at the 10 percent, 5 percent, and 1 percent levels, respectively. Significance tests on the x-axis are for the difference in the distributions between the groups of strong and weak growth. Significance tests on the blue bars are for the difference in the distributions across 1990–2011 and before 1990 (not shown for red bars). A constant composition sample underlies each of the panels to ensure comparability within the group of strong and weak growth episodes across time for that panel.

reliance on FDI and greater macroeconomic policy discipline also appears to have been associated with lower inflation after takeoff in the current generation of dynamic LICs relative to the previous generation (Figure 7, panels 5 and 6). For the latter, public and external debt stood at 40 and 33 percent of GDP, respectively, before takeoff, but more than doubled within 10 to 20 years after takeoff, and inflation tended to increase as well.

Finally, there is no compelling evidence that recent takeoffs are accompanied by rising financial imbalances. The ratio of credit to GDP tends to increase gradually in recent takeoffs, corroborating the symbiotic relationship between financial intermediation and growth (Figure 7, panels 7 and 8). Still, credit-to-GDP ratios in dynamic LICs were lower than in LICs with weaker growth and in LICs that took off in the previous generation.¹¹

Competitiveness and export growth are important for LIC takeoffs. Both today and in the previous generation, LICs with takeoffs experienced stronger export growth than LICs with weaker growth (Figure 8, panels 1 and 2). Today's LIC takeoffs tend to have more geographically diversified exports, which may be one reason they have been able to sustain strong export growth—along with the fast growth in EMDEs such as China and India—despite anemic growth in advanced economies (Figure 8, panels 3–4).¹² However, greater trade exposure to other EMDEs also implies greater exposure to risks to growth in the latter and the related risks to commodity prices.

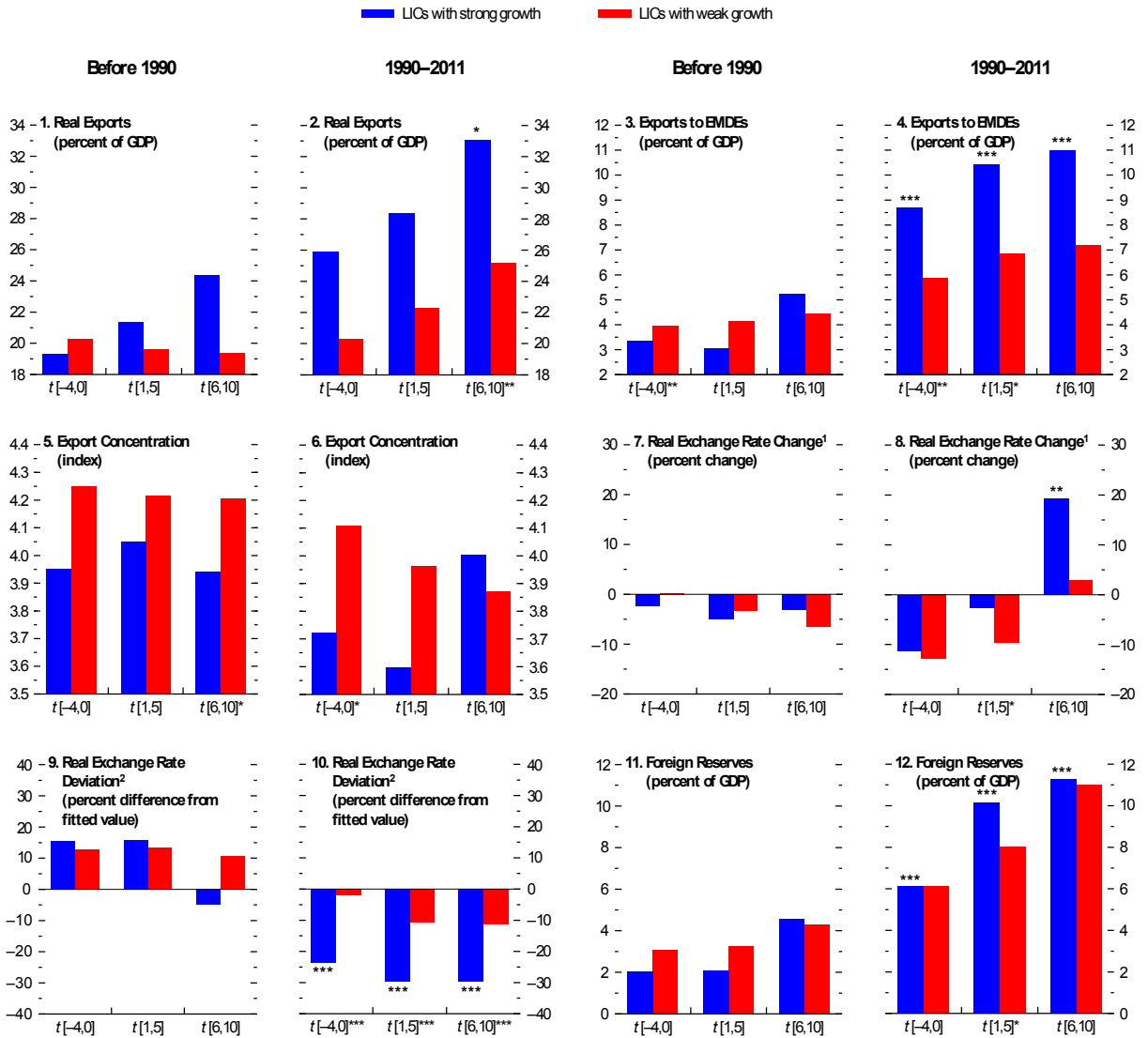
Related to the above, export structures were also more diversified in the dynamic LICs of both generations than in those with weak growth, but diversification reversed in the 10 years after takeoff for the current generation (Figure 8, panels 5 and 6). The greater concentration of exports after takeoff partly relates to increased specialization in commodity-related activity in LICs that discover natural resources. Given the potential risks from such product concentration, including increased exposure to adverse external shocks and limited scope for quality upgrading, continued economic and export diversification will be needed to improve the resilience of today's LIC takeoffs.¹³

¹¹ However, owing to data constraints, we were unable to assess other dimensions of financial stability related to prudential supervision and regulation or the use of macroprudential policies.

¹² Dabla-Norris, Espinoza, and Jahan (2012) find a sharp increase in LIC exports to emerging markets during the past three decades. China and India have become significant destinations for LIC exports from all regions, whereas other emerging market economies, such as Brazil, Mexico, Russia, Saudi Arabia, South Africa, and Turkey, account for a large share of regional LIC exports.

¹³ See, for example, Hausmann, Rodriguez, and Wagner (2006) and Papageorgiou and Spatafora (2012) for the benefits of economic diversification.

Figure 8. External Competitiveness, Export Growth and Diversification in Low-Income Countries
(Median economy; t = 1 in the first year of a strong or weak growth episode)



Sources: IMF, Direction of Trade Statistics database; IMF, World Economic Outlook database (October 2012); Lane and Milesi-Ferretti (2007) updated to 2011; Papageorgiou and Spatafora (2012); Penn World Table 7.1; World Bank, World Development Indicators database (2012); and IMF staff calculations.

Note: EMEs = emerging market and developing economies; LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. LICs exclude countries experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See the text for definitions of strong and weak growth episodes (takeoffs are strong growth episodes). See Appendix 1 for the definition of conflict and the source of the conflict data. *, **, and *** denote statistically significant difference in distributions (based on the Kolmogorov-Smirnov test) at the 10 percent, 5 percent, and 1 percent levels, respectively. Significance tests on the x-axis are for the difference in the distributions between the groups of strong and weak growth. Significance tests on the blue bars are for the difference in the distributions across 1990-2011 and before 1990 (not shown for red bars). A constant composition sample underlies each of the panels to ensure comparability within the group of strong and weak growth episodes across time for that panel.

¹The real exchange rate change is the percent change in the five-year average real exchange rate versus the United States over a five-year period.

²The real exchange rate deviation is the residual from a linear regression of the log real exchange rate versus the United States on the productivity differential of a country and the United States, as proxied by the income per capita differential.

The real exchange rate also seemed to help boost export performance for recent LIC takeoffs. Their real exchange rates versus the U.S. dollar typically depreciated during the five year periods before and at the start of a takeoff, but there was appreciation pressure during the 6 to 10 years after takeoff (Figure 8, panels 7 and 8). However, the real exchange rate was

typically some 25 to 30 percent weaker than its productivity-adjusted long-term level (Figure 8, panels 9 and 10), implying that these dynamic LICs were able to maintain price competitiveness.¹⁴ A greater accumulation of foreign reserves (Figure 8, panels 11 and 12) may have helped in this regard. For takeoffs before 1990, the behavior of the real exchange rate was not that different during the periods before and after takeoff, but it was as much as 10 to 15 percent stronger than its productivity-adjusted long-term level until five years after takeoff. This could be associated with weak macroeconomic conditions combined with exchange rate pegs.

LIC takeoffs tend to be complemented by improvements in the business climate and with productivity growth, but the record for recent generation of takeoffs is much stronger than for the previous generation. Dynamic LICs in both generations tend to have smaller governments, lower regulatory barriers (proxied by the level of regulation in business, labor, and credit markets), better infrastructure, and higher human capital levels (proxied by the number of years of school) than LICs with weaker growth (Figure 9, panels 1–8). For recent takeoffs, the size of government and the level of regulatory barriers continued to decline after takeoff, and infrastructure and education continued to improve, whereas with the exception of education, these conditions remained the same or deteriorated for the previous generation.¹⁵

Turning to the role of social and political institutions in underpinning growth takeoffs, the findings suggest that today's dynamic LICs performed better on these institutional measures compared with both LICs with weak growth and dynamic LICs before the 1990s. The recent literature underscores the central role of economic and political institutions in determining why some economies are able to escape poverty and sustain strong growth, whereas others are not.¹⁶ We analyzed the evolution of economic and political inclusiveness, as proxied by the degree of income inequality and the degree of control over the executive, respectively (Figure 9, panels 9–12). Recent takeoffs display more income equality, whereas income inequality was typically high in the previous generation of takeoffs. Political institutions are also stronger in the current generation of takeoffs—possibly reflecting the end of conflicts or greater democratization in many dynamic LICs in recent years.

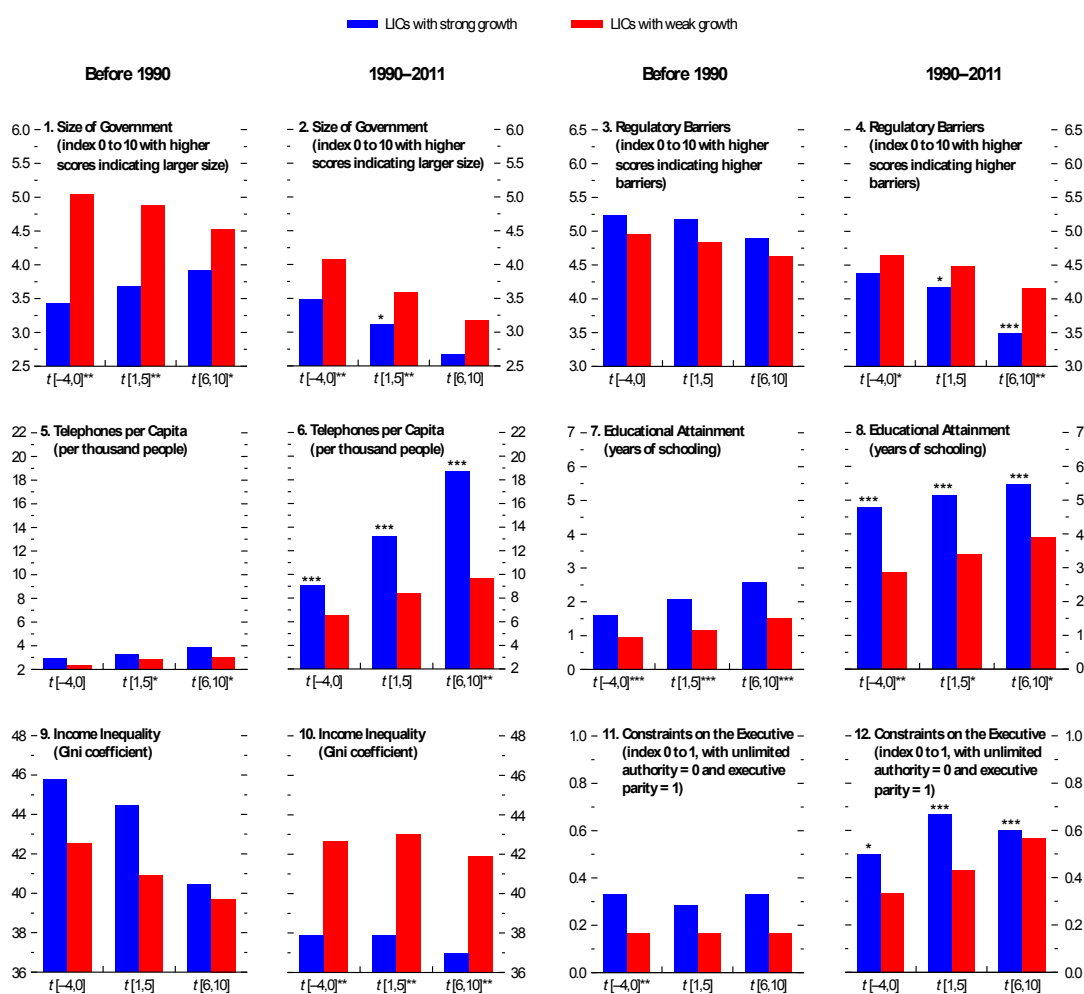
¹⁴ Following Rodrik (2008), we regress an economy's real exchange rate—measured by the price level relative to that of the United States from the Penn World Table—on its real GDP per capita relative to that of the United States. The predicted value of the real exchange rate from this regression provides the long-term level of the real exchange rate, whereas the difference between the predicted and actual real exchange rate is the degree of overvaluation. See also Johnson, Ostry, and Subramanian (2007) for a similar approach. The real effective exchange rate (REER) is not shown because fewer LICs have these data.

¹⁵ Aiyar and others (2013) discuss the positive association between deterioration in these measures and economic deceleration in middle-income countries, suggesting that structural reforms are not just important for LICs.

¹⁶ See Acemoglu and Robinson (2012) and Johnson, Ostry, and Subramanian (2007) on the role of political institutions. See Berg, Ostry, and Zettelmeyer (2012), Hausmann, Pritchett, and Rodrik (2005), and Abiad and others (2012) on economic institutions as proxied by income inequality. Although not shown here, we also found that recent takeoffs were positively correlated with greater life expectancy as well.

Overall, these stylized facts suggest that recent LIC growth takeoffs are generally underpinned by stronger fundamentals compared with takeoffs prior to 1990. The strong investment- and externally oriented growth in recent takeoffs relied less on foreign borrowing, which likely gave dynamic LICs more room to maneuver policies. Growth was also helped by a broad range of productivity-enhancing structural reforms and inclusive institutions, although further export diversification will be essential to improve their economic resilience. Many of these indicators are regarded as key determinants of sustained growth and bode well for today's dynamic LICs, particularly if they can maintain their policy momentum.¹⁷

Figure 9. Structural Reforms, Infrastructure, and Political Conditions in Low-Income Countries
(Median economy; $t = 1$ in the first year of a strong or weak growth episode)



Sources: Banks and Wilson, Cross-National Time-Series Data Archive (2012); Barro and Lee (2010); Economic Freedom Network, *Economic Freedom of the World 2012 Annual Report*; Political Regime Characteristics and Transitions database (2011); Solt (2009); World Bank, World Development Indicators database (2012); and IMF staff calculations.
Note: LICs = low-income countries. Economy groups and indicators are defined in Appendix 1. LICs exclude countries experiencing or recovering from a serious external or internal conflict at the start of their takeoffs. See the text for definitions of strong and weak growth episodes (takeoffs are strong growth episodes). See Appendix 1 for the definition of conflict and the source of the conflict data. *, **, and *** denote statistically significant difference in distributions (based on the Kolmogorov-Smirnov test) at the 10 percent, 5 percent, and 1 percent levels, respectively. Significance tests on the x-axis are for the difference in the distributions between the groups of strong and weak growth. Significance tests on the blue bars are for the difference in the distributions across 1990-2011 and before 1990 (not shown for red bars). A constant composition sample underlies each of the panels to ensure comparability within the group of strong and weak growth episodes across time for that panel.

¹⁷ See Berg, Ostry, and Zettelmeyer (2012), Hausmann, Pritchett, and Rodrik (2005), and Abiad and others (2012).

Note, however, these univariate correlations cannot answer whether there are one or more key correlates or drivers of these takeoffs. In all likelihood the recent takeoffs were the result of a combination of several factors and their interplay with global conditions. Moreover, the policy improvements thus far may not be enough for sustained improvements in growth and income convergence. Both of these questions are addressed in the next subsection.

B. Logit Regressions—Putting it All Together

A conditional probability of an LIC new growth takeoff is estimated at an annual frequency to assess which conditions and policies are most strongly associated with growth takeoffs in LICs. The binary dependent variable is an indicator for a strong growth takeoff:

$$g_{i,t} = \begin{cases} 1, & \text{if economy } i \text{ starts a strong growth takeoff at time } t \\ 0, & \text{if not starting or not in a strong growth takeoff at time } t \end{cases},$$

in which $i = 1, \dots, N$ indexes countries and $t = 1, \dots, T$ indexes time (years). The logit model assumes that the conditional probability of an event ($g_{i,t} = 1$) takes the form

$$P(g_{i,t} = 1 | x_{j,i,t} \forall j \in \{1, \dots, K\}) = \frac{1}{\exp\left[-\left(\alpha + \sum_{j=1}^K \beta_j x_{j,i,t}\right)\right] + 1},$$

in which j indexes the set of K potential covariates, β_j is the coefficient on variable x_j , and α is a constant term (the constant is not reported in results tables to save space). The model is estimated by maximum likelihood. The possibility that there was a structural break in these relationships in 1990 is also investigated. However, as in most statistical investigations, all estimated relationships should be interpreted solely as associational, rather than causal. Moreover, given the limited availability of data for many variables and the relative rarity of a takeoff, the model's results should be taken with a grain of salt.¹⁸

To assess the performance of the logit models, statistics from the receiver operating characteristic (ROC) curve defined by the estimates are shown (Table 4). The ROC curve summarizes how well the model is able to explain the occurrence of a success (takeoff) and a failure (no takeoff). See Berge and Jordà (2011) for an in-depth discussion of the interpretation of ROC statistics. In brief, the ROC captures the relationship between the true positive rate, $\text{TPR}(\pi)$, or share of correctly classified takeoffs for the threshold probability π and the false positive rate, $\text{FPR}(\pi)$, or share of incorrectly classified non-takeoffs. The area under the ROC

¹⁸ A number of variables that stood out as significantly different for the current generation of takeoff countries could not be incorporated into the logit model because of limited data coverage. These include net FDI flows, external debt, foreign reserves, among others. However, as shown in the next subsection, we consider a number of robustness checks, including the rare-events problem, and the findings broadly hold for these checks.

curve (AUC) is a global measure of the performance of different logit models—the most accurate model shows the largest AUC and the least accurate shows an AUC close to one-half.¹⁹

Table 4. Explaining Growth Takeoffs in Dynamic Developing Economies

Explanatory Variable	Full Sample		Before 1990		1990–2011	
	Logit Coef.	Aver. Marg. Eff.	Logit Coef.	Aver. Marg. Eff.	Logit Coef.	Aver. Marg. Eff.
Global Conditions						
Contemporaneous World Real GDP Growth	0.800**	2.250**	0.859**	2.450**	1.866***	4.200***
Contemporaneous U.S. Three-Month Treasury Bill Real Rate	0.032	0.091	0.110	0.313	0.433	0.973
Contemporaneous Terms-of-Trade Growth	0.008	0.024	0.031	0.088	0.002	0.005
Income per Capita and Size						
Initial Log Real GDP per Capita	-2.439***	-6.880***	-1.543	-4.400	-7.095***	-16.000***
Initial Log Real GDP Level	0.538*	1.520*	0.363	1.030	1.707***	3.840***
Openness and Integration						
Initial Real Exchange Rate vs. U.S. Deviation	-0.013*	-0.038*	0.005	0.015	-0.069***	-0.154***
Change in Real Exchange Rate vs. U.S.	-0.021*	-0.058*	-0.004	-0.010	-0.087***	-0.195***
Initial Trade Openness	0.001	0.003	-0.005	-0.015	0.036	0.080
Initial Exports to EMDEs 1/ Divided by GDP	0.027	0.075	-0.298**	-0.851*	0.012	0.026
Structural Conditions						
Initial Indicator for Constraint on Executive	0.063	0.176	1.470	4.190	-2.472	-5.560
Initial Life Expectancy	0.012	0.033	0.059	0.170	0.044	0.099
Initial Educational Attainment	0.301*	0.848*	0.048	0.137	0.903**	2.030*
Initial Real Investment Divided by GDP	0.066	0.186	0.160***	0.456***	0.010	0.023
Macroeconomic Conditions						
Change in Real Investment Divided by GDP	0.149***	0.420***	0.234***	0.668***	0.177***	0.397***
Change in Inflation	-0.002	-0.006	-0.004	-0.012	0.019	0.043
Change in Public Debt Divided by GDP	-0.003	-0.009	-0.019	-0.055	-0.014***	-0.031**
Observations	892		383		509	
Pseudo R Squared	0.171		0.259		0.386	
Number of Cases	28		13		15	
Log Likelihood	-103.2		-42.1		-41.5	
AUC 2/	0.818		0.845		0.940	
90% Lower Bound for AUC 2/	0.750		0.752		0.906	
90% Upper Bound for AUC 2/	0.886		0.938		0.973	
Optimal Youden Cutoff	0.025		0.125		0.045	
True Positive Rate (%)	89		62		87	
False Positive Rate (%)	35		5		13	

Source: IMF staff calculations.

Note: The dependent variable is a dummy variable for the start of a new growth takeoff. Indicators (variables) are defined in Appendix 4.1. Heteroscedasticity and autocorrelation within country robust standard errors are in parentheses under the logistic (logit) regression coefficient estimates. *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively. Statistically significantly different coefficient estimates across the subsamples before 1990 and 1990–2011 are shown in bold (at the 10 percent level or lower). The average marginal effects by variable on the chances of a new growth takeoff are shown in the column next to the corresponding sample's logit coefficients. The marginal effect shows the average impact of a one-unit change in the explanatory variable on the probability of a growth takeoff (scaled to range from 0 to 100).

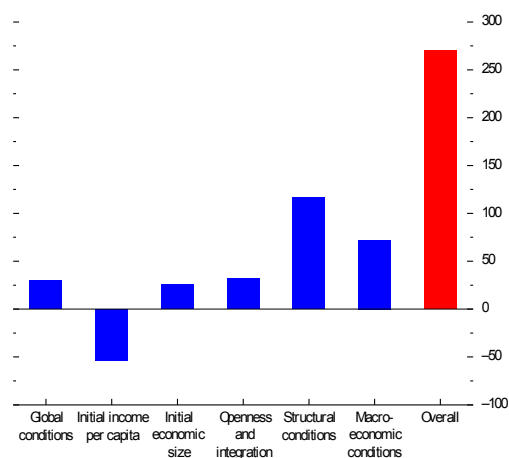
¹⁹ To make the classification using the model practicable, an optimal threshold probability needs to be selected from the large set of possible thresholds characterized by the ROC curve. Because of its simplicity, the so-called Youden index and its associated cutoff threshold, π^* , are used. The Youden index (J) is the difference between the true positive rate and the false positive rate. Then π^* is the value of π that maximizes $J = \{TPR(\pi) - FPR(\pi)\}$.

The results (see Table 4) suggest that a country's chances of a new growth takeoff are related both to the global economic environment and to the initial levels and changes in the LIC's domestic macroeconomic conditions and structural characteristics. In particular, takeoffs in both generations were supported by higher global growth. A low initial level of per capita income raises the probability of a growth takeoff suggesting conditional convergence, as does the initial size of the economy, although these two relations are more significant today than prior to the 1990s.

Even after controlling for global conditions, a few policy variables stand out as significantly correlated with chances of a takeoff. The initial deviation of the real exchange rate from its productivity adjusted long run level (a measure of the degree of overvaluation), as well as the appreciation of the real exchange rate are negatively related to the probability of a takeoff, in line with findings by others (Rodrik, 2008, and Johnson, Ostry and Subramanian, 2007). Takeoffs are positively correlated with the level of educational attainment, and a reduction in the level of public debt. However, these correlations are significant only in the last two decades and not prior to the 1990s. Also, deeper trade linkages with other EMDEs have become more important for takeoff in the last two decades. It is possibly that as global trade and competition have increased over time, greater external competitiveness, export market diversification, and economies of scale, and higher human capital levels raise LICs' chances of takeoff relatively more than when the global economy were less integrated. Both, the initial level of investment and the increase in investment during takeoff are positively correlated with the probability of a takeoff in both generations, although the initial investment level is significant only for the takeoffs prior to the 1990s.

The baseline results suggest that the chances of takeoff more than tripled during the 2000s compared with the period before 1990 (Figure 10). The predicted annual probability of a new takeoff in any given year increased from less than 1 percent before 1990 to close to 3 percent during the 2000s. Improved structural conditions (more years of schooling) contributed most to this increase. Better macroeconomic conditions (higher investment growth, lower debt) are the next most important. Finally, stronger global growth and more outward-oriented policies (a more competitive real exchange rate, more exports to EMDEs) equally boosted the chance of a new takeoff. Higher initial income per capita in the 2000s lowered the chance of a takeoff, reflecting convergence, whereas larger economic size raised it, suggesting gains from economies of scale. However, as noted, the results should be treated with

Figure 10. Contributions to the Change in the Chances of a Strong Growth Takeoff in Low-Income Countries
(Percent change in odds ratio; 2000s versus before 1990)



Source: IMF staff calculations.
Note: The odds ratio is the probability of starting a takeoff divided by the probability of not starting one. The estimated contribution of the variables to the percent change in the predicted odds ratio is based on the logistic regression coefficient estimates in Table 4, for the full sample. The variable groups shown correspond to those in Table 4. The average values of the variables over either the period before 1990 or 2000–11 are used to calculate the predicted odds ratio. The associated predicted probabilities at these average values are 0.8 percent for the subsample before 1990 and 2.8 percent for the 2000–11 subsample. To calculate the overall change, the product of the contributions is used. See Appendix 3 for additional details on the model specification and estimation.

caution because these are only associations and because data issues preclude a deeper analysis of some channels.

C. Robustness Checks

We now explore whether the stylized facts and regression results are robust to alternative samples of LICs. We consider five alternative robustness checks based on two different definitions of the sample of LICs, and three alternative criteria to qualify for a growth takeoff. Below we describe each of these discuss how these robustness checks affect both, the stylized facts, and logit regression.

Alternative Samples of LICs

Recall that the baseline sample considers a time varying income threshold, in which a country is defined as an LIC if its average real output per capita during the previous five years is below that threshold. In addition, the baseline sample excludes LICs experiencing or recovering from an external or internal conflict at the start of their takeoffs. We now consider two alternative samples: (1) the baseline sample including LICs experiencing or recovering from a conflict; and (2) an alternative sample built with a time-invariant income threshold, in which a country is considered an LIC if its average real output per capita over the previous five years is below \$2,600 in purchasing-power-parity-adjusted constant 2005 U.S. dollars. This threshold corresponds to the 45th percentile of per capita real GDP output for the entire sample of EMDEs as of 1990. The latter sample excludes LICs experiencing or recovering from conflict.

Alternative Measures of Takeoffs

Next, three alternative measures of takeoffs are considered. The first alternative criterion for a growth takeoff follows Hausmann, Pritchett, and Rodrik (2005): the growth episode is at least eight years long, during which GDP per capita growth averages at least 3.5 percent, and average growth during the episode is at least 2 percentage points higher than growth during the eight years before the takeoff, and output at the end of the episode exceeds its peak before the takeoff. In the second criterion, the growth takeoff allows for temporary delays or breaks in growth—for instance if a country has two growth takeoffs separated by less than or equal to 5 years, the second episode is considered to be a continuation of the previous episode for that country. In the third criterion, a takeoff is defined as in the baseline, except the growth threshold for per capita output is raised from 3.5 percent to 5 percent.

Applying the Hausmann, Pritchett, and Rodrik (2005) algorithm to the sample of LICs results in 55 growth accelerations (31 during 1990–2011, and 24 prior to the 1990s), with a significant overlap with the baseline sample. Excluding temporary delays from the baseline sample reduces the number of episodes from 29 to 24 during 1990–2011 and from 41 to 31 during the period prior to the 1990s. If the cutoff for qualification as a takeoff is raised

to 5 percent, the number of takeoffs falls to 17 from 29 during 1990–2011 and to 20 from 41 during 1950–89.

The stylized facts in Subsection A of this section broadly hold for the alternative definitions for the LIC sample and alternative definitions of growth takeoffs, and are available on request. As in the baseline, both current- and previous-generation dynamic LICs experienced high investment and national saving rates compared with LICs that did not take off. The current account deficits were broadly similar for both generations of dynamic LICs, but a larger share of the deficit was financed by foreign direct investment flows for the current generation. Recent LIC takeoffs were also supported by sharp decreases in inflation and public and external debt, which contrasts with the increases in these indicators in the previous generation. Moreover, both current- and previous-generation takeoffs involved stronger export growth, although today's LIC takeoffs have more geographically diversified exports and more competitive exchange rates. Finally, dynamic LICs, especially the current generation, have smaller governments, better infrastructure, and higher human capital levels than LICs that did not take off.

However, there are two differences between the univariate correlations using the baseline criterion for growth takeoffs and those with the alternative criteria using the Hausmann, Pritchett, and Rodrik (2005) methodology. Although income inequality is still lower in dynamic LICs than in LICs that could not take off, current-generation dynamic LICs do not have lower income inequality than dynamic LICs before 1990. Second, the current-generation dynamic LICs do not have stronger political institutions, as measured by the constraints on the executive, than the previous-generation dynamic LICs or the LICs that could not take off.

There are also two differences between the baseline results and the ones using a higher threshold for takeoff (at 5 percent growth in GDP per capita). We find that recent takeoffs have lower income inequality and stronger political institutions than takeoffs prior to the 1990s, but not relative to the LICs that did not take off. All other stylized facts are broadly similar to those with the baseline criteria.

Logit Results with Alternative Specifications and Estimation Methods

The regression analysis now considers a specification that adds decadal dummies to the baseline, and two alternative definitions of takeoff, one drawing on the Hausmann, Pritchett, and Rodrik (HPR) definition of growth acceleration (2005) and the second using a fixed income per capita threshold below which a country is classified as an LIC. As shown in Table 5, the baseline findings are robust to the alternative specification and definition. When the HPR-derived definition of takeoff is used, the same general pattern of coefficient signs is seen, although they are statistically insignificant for the structural conditions. This insignificance may reflect the lower incidence of HPR growth accelerations in the full sample and their greater concentration in the sample since 1990. The model based on the HPR definition is not estimable for LIC takeoffs prior to 1990 because of the paucity takeoffs among LICs during that period (and the lack of comprehensive data on all the indicators).

In other checks, we also found our baseline results to be robust to including conflict cases and to merging takeoff episodes that are within five years of each other. The latter check reduced the number of takeoffs in the logit sample to 17 from 29, so the results should be interpreted with caution. These results are available on request.

Table 5. Logistic Regression Robustness to Alternative Specifications and Definition

Explanatory Variable	Decadal Dummies			HPR Growth Acceleration		Fixed Income-LIC Threshold		
	Full Sample	Before 1990	1990–2011	Full Sample	1990–2011	Full Sample	Before 1990	1990–2011
Global Conditions								
Contemporaneous World Real GDP Growth	0.640* (0.346)	0.561 (0.463)	1.392* (0.727)	0.788** (0.360)	1.896*** (0.567)	0.509* (0.285)	0.403 (0.429)	2.191* (1.247)
Contemporaneous U.S. Three-Month Treasury Bill Real Rate	0.099 (0.289)	-0.081 (0.531)	1.124 (0.859)	-0.277* (0.158)	-0.592 (0.415)	-0.002 (0.195)	-0.086 (0.328)	0.585 (0.364)
Contemporaneous Terms-of-Trade Growth	0.011 (0.018)	0.033* (0.019)	0.001 (0.028)	0.007 (0.010)	-0.013 (0.018)	-0.003 (0.016)	0.011 (0.018)	0.024 (0.031)
Income per Capita and Size								
Initial Log Real GDP per Capita	-2.691*** (0.786)	-1.642 (1.413)	-7.016*** (2.014)	-0.010 (0.623)	-0.382 (0.944)	-1.551** (0.656)	-1.445 (1.052)	-9.854*** (2.698)
Initial Log Real GDP Level	0.582** (0.286)	0.391 (0.636)	1.687*** (0.406)	0.301 (0.240)	0.612* (0.316)	0.128 (0.313)	-0.005 (0.512)	1.966** (0.872)
Openness and Integration								
Initial Real Exchange Rate vs. U.S. Deviation	-0.017** (0.007)	0.006 (0.012)	-0.072*** (0.016)	-0.014* (0.007)	-0.033*** (0.013)	-0.012* (0.006)	-0.003 (0.009)	-0.088*** (0.027)
Change in Real Exchange Rate vs. U.S.	-0.027** (0.012)	-0.004 (0.019)	-0.091*** (0.025)	-0.022** (0.010)	-0.046*** (0.015)	-0.016 (0.011)	-0.017 (0.015)	-0.099** (0.040)
Initial Trade Openness	0.008 (0.011)	-0.006 (0.024)	0.036 (0.044)	0.007 (0.011)	0.000 (0.020)	-0.009 (0.012)	0.003 (0.020)	0.077 (0.065)
Initial Exports to EMDEs 1/ Divided by GDP	0.025 (0.017)	-0.321** (0.163)	0.014 (0.061)	-0.027 (0.023)	-0.031 (0.042)	0.040** (0.017)	-0.030 (0.100)	-0.054 (0.063)
Structural Conditions								
Initial Indicator for Constraint on Executive Initial Life Expectancy	-0.371 (1.095)	1.615 (1.685)	-2.454 (1.811)	-0.471 (0.802)	-1.517 (1.604)	0.510 (0.739)	1.155 (1.189)	-0.984 (1.886)
Initial Educational Attainment	0.019 (0.046)	0.062 (0.078)	0.041 (0.065)	-0.019 (0.037)	-0.039 (0.057)	0.022 (0.041)	0.117 (0.077)	0.057 (0.069)
Initial Real Investment Divided by GDP	0.417*** (0.159)	0.017 (0.251)	0.882** (0.420)	0.212 (0.168)	0.330 (0.250)	0.144 (0.158)	-0.335 (0.233)	0.975*** (0.348)
Initial Real Investment Divided by GDP	0.044 (0.036)	0.170*** (0.052)	0.016 (0.138)	0.001 (0.030)	0.050 (0.064)	0.096*** (0.037)	0.128*** (0.037)	-0.131 (0.166)
Macroeconomic Conditions								
Change in Real Investment Divided by GDP	0.145*** (0.042)	0.241*** (0.082)	0.181*** (0.055)	0.054 (0.043)	0.151** (0.069)	0.152*** (0.046)	0.190*** (0.068)	0.217*** (0.061)
Change in Inflation	0.000 (0.007)	-0.001 (0.071)	0.021 (0.013)	-0.006 (0.009)	-0.015 (0.012)	-0.004 (0.007)	-0.004 (0.077)	0.029** (0.013)
Change in Public Debt Divided by GDP	-0.006 (0.004)	-0.018 (0.032)	-0.013** (0.005)	-0.006** (0.003)	-0.008** (0.004)	-0.001 (0.004)	-0.017 (0.018)	-0.019*** (0.007)
Observations	892	383	509	1,008	560	926	452	474
Pseudo R Squared	0.202	0.262	0.394	0.139	0.305	0.155	0.248	0.458
Number of Cases	28	13	15	25	18	30	17	13
Log Likelihood	-99.3	-41.9	-41.0	-100.8	-55.3	-111.9	-54.5	-32.3
AUC 2/	0.845	0.847	0.939	0.785	0.904	0.797	0.819	0.958
90% Lower Bound for AUC 2/	0.784	0.751	0.909	0.689	0.859	0.724	0.714	0.928
90% Upper Bound for AUC 2/	0.907	0.942	0.968	0.880	0.949	0.870	0.923	0.989
Optimal Youden Cutoff	0.050	0.170	0.034	0.032	0.014	0.054	0.089	0.057
True Positive Rate (%)	79	62	93	76	94	60	65	85
False Positive Rate (%)	16	3	15	22	32	15	8	9

Source: IMF staff calculations.

Note: The dependent variable is the indicator for a new takeoff in growth. Heteroscedasticity and autocorrelation within country robust standard errors are in parentheses under the logistic (logit) regression coefficient estimates. *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively. The last two columns show results using the Hausmann, Pritchett, and Rodrik (HPR, 2005) definition of growth accelerations as the binary dependent variable. The subsample before 1990 is not shown because of the exceedingly low incidence of takeoffs as defined by HPR during the period.

1/ EMDEs = emerging market and developing economies.

2/ AUC = area under the receiver operating characteristic curve.

Because growth takeoffs are comparatively rare events (with a less than 5 percent unconditional probability of occurrence in a year), alternative estimators that are more robust to the problems associated with rare events in the logit model (for example, attenuation bias in small samples) were also tried. In particular, the model was estimated using (1) Firth's (1993)

bias-reducing transformation of the log likelihood; (2) King and Zeng's (2001) procedure for the generation of approximately unbiased coefficients in logit modeling; (3) the complementary log-log transformation, which helps account for skew in the distribution of the dependent variable; and (4) the random effects logit model. As seen in Table 6, the signs and magnitudes of the logit coefficients are similar across estimation methods.

Table 6. Logistic Regression Robustness to Alternative Estimation Methods, Full Sample

Explanatory Variable	Baseline	Firth Correction	King and Zen Correction	Complementary Log-Log Transformation	Random Effects
Global Conditions					
Contemporaneous World Real GDP Growth	0.800** (0.323)	0.760** (0.349)	0.765** (0.334)	0.754** (0.301)	0.927** (0.415)
Contemporaneous U.S. Three-Month Treasury Bill Real Rate	0.032 (0.220)	0.034 (0.166)	0.034 (0.221)	0.017 (0.219)	-0.006 (0.186)
Contemporaneous Terms-of-Trade Growth	0.008 (0.018)	0.010 (0.016)	0.009 (0.016)	0.005 (0.017)	0.019 (0.020)
Income per Capita and Size					
Initial Log Real GDP per Capita	-2.439*** (0.724)	-2.252*** (0.679)	-2.258*** (0.775)	-2.441*** (0.720)	-2.989*** (0.988)
Initial Log Real GDP Level	0.538* (0.290)	0.499** (0.224)	0.498** (0.227)	0.533* (0.280)	0.766** (0.338)
Openness and Integration					
Initial Real Exchange Rate vs. U.S. Deviation	-0.013* (0.007)	-0.011 (0.007)	-0.010 (0.007)	-0.013* (0.007)	-0.018** (0.009)
Change in Real Exchange Rate vs. U.S.	-0.021* (0.011)	-0.019* (0.010)	-0.019 (0.012)	-0.020* (0.011)	-0.027** (0.012)
Initial Trade Openness	0.001 (0.013)	0.002 (0.011)	0.002 (0.012)	0.001 (0.012)	0.011 (0.016)
Initial Exports to EMDEs 1/ Divided by GDP	0.027 (0.016)	0.026 (0.022)	0.025 (0.022)	0.026* (0.015)	0.007 (0.034)
Structural Conditions					
Initial Indicator for Constraint on Executive	0.063 (0.820)	0.024 (0.795)	0.001 (0.799)	0.102 (0.769)	-0.003 (1.020)
Initial Life Expectancy	0.012 (0.046)	0.010 (0.048)	0.011 (0.047)	0.013 (0.045)	0.013 (0.062)
Initial Educational Attainment	0.301* (0.163)	0.291** (0.148)	0.293** (0.140)	0.295* (0.163)	0.255 (0.197)
Initial Real Investment Divided by GDP	0.066 (0.041)	0.063** (0.031)	0.063 (0.038)	0.063 (0.041)	0.047 (0.041)
Macroeconomic Conditions					
Change in Real Investment Divided by GDP	0.149*** (0.045)	0.138*** (0.039)	0.138*** (0.042)	0.139*** (0.037)	0.171*** (0.050)
Change in Inflation	-0.002 (0.006)	-0.005 (0.006)	-0.005 (0.006)	-0.002 (0.006)	-0.003 (0.009)
Change in Public Debt Divided by GDP	-0.003 (0.004)	-0.004 (0.003)	-0.004 (0.004)	-0.003 (0.004)	-0.005 (0.004)
Observations	892	892	892	892	892
Number of Cases	28	28	28	28	28
AUC 2/	0.818	0.818	0.818	0.814	0.817
90% Lower Bound for AUC 2/	0.750	0.749	0.750	0.743	0.752
90% Upper Bound for AUC 2/	0.886	0.886	0.887	0.884	0.882

Source: IMF staff calculations.

Note: The dependent variable is a dummy variable for the start of a new growth takeoff. Indicators (variables) are defined in Appendix 1. Heteroscedasticity and autocorrelation within country robust standard errors are in parentheses under the logistic regression coefficient estimates. *, **, and *** denote significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

1/ EMDEs = emerging market and developing economies.

2/ AUC = area under the receiver operating characteristic curve.

IV. LESSONS FROM HISTORY

This section looks at five individual experiences of growth takeoffs in developing economies to provide more details on the policies and conditions that affected these countries' macroeconomic outcomes after takeoff. The cases include two economies that pursued industrial development with very different growth strategies (Brazil and Korea, 1960–80);²⁰ a resource-rich economy that diversified into manufacturing (Indonesia since the mid-1960s); an economy that is shifting into commodities (Mozambique since the mid-1990s); and an economy driven by manufacturing activity (Cambodia since the mid-1990s). Rather than a discussion of the detailed country experiences, which is already available for some of these cases in the development literature (see the references for each case study), the focus here is on drawing out differences in these countries' growth and investment strategies, the financing of their saving-investment gaps, and policy measures that affected productivity and competitiveness.

A. Brazil and Korea, 1960–80: Strong Takeoffs but Diverging Trajectories²¹

These two experiences emphasize the importance of mobilizing sustainable finances for an investment-driven growth strategy. Although both these economies focused on industrialization, Brazil increasingly relied on external debt to finance its saving-investment gap, with the situation exacerbated by large public dissaving. Korea started with a much worse current account position than Brazil, but strengthened its external balances with greater fiscal discipline, higher domestic saving rates, and strong export growth.

Both Brazil and Korea experienced strong growth between 1960 and 1980, but their post-1980 experiences were diametrically opposite (Figure 11 panel 1). In Brazil, output per capita stagnated for more than two decades after a debt crisis in the early 1980s. In Korea, after a recession in 1980, the economy regained momentum.

Although both economies pursued industrial development policies, they had markedly different growth strategies. Brazil's growth model was oriented inward, with production geared toward its large domestic market. Import substitution—which discouraged imports and subsidized domestic producers—was the cornerstone of the strategy. Growth was driven mainly by domestic demand, and export growth was slow (Figure 11, panels 2 and 3). In contrast, Korea began to shift away from import-substitution policies beginning in the 1960s and became increasingly export oriented. Initially, the government promoted labor-intensive industrial exports, but in the face of increased protectionism for labor-intensive industries in advanced

²⁰ Note that Brazil and Korea were not LICs at the time of their takeoffs, as determined by the chapter's baseline definition of a time-varying low-income threshold. However, their initial income levels were low in absolute terms, and their experiences portray efforts in structural transformation and development.

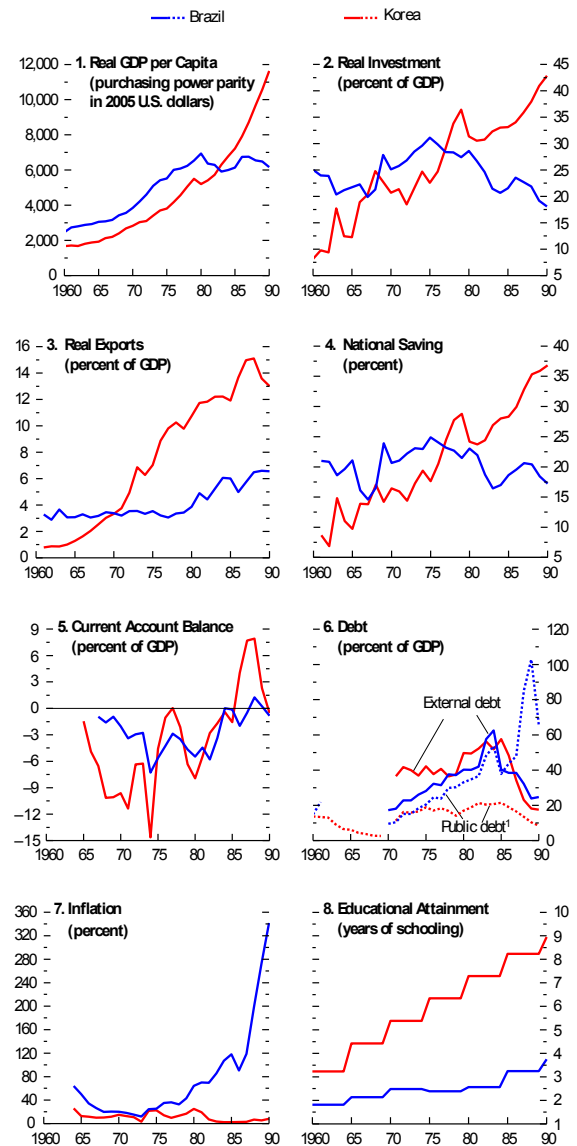
²¹ These Brazil case study draws on Baer (2001), Coes (1995), Pinheiro and others (2004), and World Bank (1983). The Korea case draws on Collins (1991), Dornbusch and Park (1987), Kim (2008), Kwon (1990), and Song (2003).

economies, the focus shifted to promoting higher-value-added industries. Large-scale investment in shipbuilding, steel, and petrochemicals helped Korea become a leading producer and exporter in these sectors.

The ways in which Brazil and Korea financed investment, particularly after the first oil price shock in the early 1970s, also help explain the differences in their macroeconomic outcomes. Although Brazil's national saving rate was high, it did not keep pace with investment. The rising current account deficit was increasingly financed by external borrowing. Public debt also rose beginning in the 1970s (Figure 11, panels 4–6). Overheating pressure intensified when policies to push growth were not adjusted after the first oil shock (Figure 11, panel 7). Debt became unsustainable after the economy was hit by the second oil price shock combined with significantly higher world interest rates, culminating in the debt crisis. Korea also had a large current account deficit until the early 1970s, which was financed with foreign aid and external borrowing. However, the saving rates grew rapidly over time: the budget deficit stayed relatively low and the government encouraged both personal saving, through mandatory long-term saving for civil servants and other employees, and corporate saving, through a policy mandating low dividends. This helped narrow the current account deficit in the 1970s. Although it rose again after the second oil shock, it fell soon thereafter on the back of strong export growth. Fiscal discipline and strict monetary targeting helped keep inflation under control.

Policies in Korea were better aligned with maintaining external competitiveness and sustaining investment productivity, and these in turn were helped by macroeconomic policies to contain internal imbalances. The real exchange rate was maintained at a relatively depreciated level relative to Korea's trading partners (using step devaluations within an implicit crawling peg), exporters received a variety of incentives, and labor skills in key sectors were upgraded

Figure 11. Brazil's and Korea's Growth Experiences during 1960–90



Sources: Abbas and others (2010); Barro and Lee (2010); IMF, World Economic Outlook database (October 2012); Lane and Milesi-Ferretti (2007) updated to 2011; Penn World Table 7.1; World Bank, World Development Indicators database (2012); and IMF staff calculations. Note: Indicators are defined in Appendix 1.

¹Public debt data for Brazil are missing from 1962 to 1969, and for Korea for 1970.

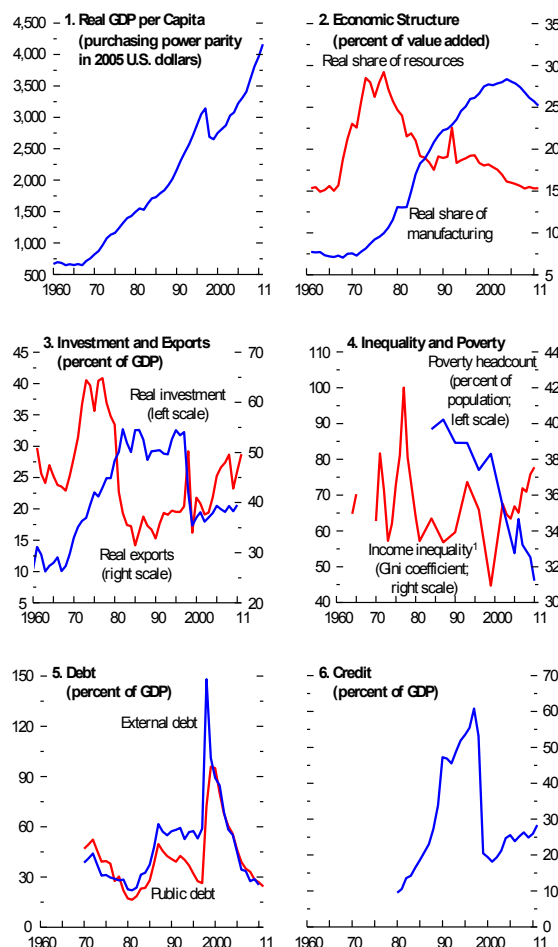
via vocational and in-plant training. The government put a high priority on increasing overall education levels (Figure 11, panel 8). In the 1960s, when policy promoted labor-intensive industries, the emphasis was on general education. Later, when high-value-added industries were targeted, the emphasis was on strengthening engineering education and establishing specialized research institutes. And income inequality was relatively low in Korea even after takeoff, in contrast to Brazil, where income inequality remained high and educational advancements slow.

B. Indonesia, Mid-1960s to Present: Growth with Shared Prosperity²²

Indonesia's experience stands out not only because growth remained remarkably strong over a long period but also because the structure of the economy successfully shifted from commodities to manufacturing. The development strategy put a priority on rural and agricultural development, and oil windfalls were used to develop infrastructure and strengthen health and education. Thus, growth was both strong and relatively inclusive.

Indonesia's takeoff started out with commodities and became more broad-based over time. Growth was led by the energy sector until the early 1980s and increasingly by the manufacturing sector afterward (Figure 12, panels 1 and 2). In the 1960s and 1970s, a large share of the government's revenue from commodity windfall gains was directed toward public investment in rural infrastructure, agriculture, health, and education.²³ When the oil boom ended in the early 1980s, the government supported a shift toward manufacturing. Private investment and export growth were encouraged through

Figure 12. Indonesia's Growth Experience since the 1960s



Sources: Abbas and others (2010); IMF, International Financial Statistics database; IMF, World Economic Outlook database (October 2012); Lane and Milesi-Ferretti (2007) updated to 2011; Penn World Table 7.1; Solt (2009); World Bank, World Development Indicators database (2012); and IMF staff calculations.
Note: Indicators are defined in Appendix 1.
¹Income inequality data are missing from 1966 to 1969.

²² This case study draws on Temple (2003), Timmer (2007), and World Bank (2005).

²³ The contribution of the oil boom to economic development in other sectors also reduced the risk of Dutch disease effects. Moreover, the pro-poor growth focus contrasts sharply with the behavior often associated with resource-rich economies—namely, risky investment of resource windfalls.

industrial deregulation and through trade, capital account, and financial liberalization (Figure 12, panel 3). At the same time, growth in the agricultural sector was supported by efforts to improve agricultural productivity, including through the adoption of high-yield seeds and increased use of fertilizers and irrigation—so-called Green Revolution technologies. Strong growth during this period was accompanied by sharp declines in poverty levels and relatively low income inequality (Figure 12, panel 4).

Growth was also accompanied by macroeconomic policy discipline. The government used strict monetary targets to reduce inflation from triple digits in the mid-1960s to less than 15 percent by the end of that decade. Fiscal targets adopted in the late 1970s kept public debt relatively low (Figure 12, panel 5). However, strong growth and macroeconomic stability masked some latent financial and corporate sector imbalances, whereby financial deregulation in the absence of adequate prudential regulation and supervision fueled a credit boom centered in the property sector beginning in the 1980s (Figure 12, panel 6). The boom was financed by short-term capital flows in the context of a pegged exchange rate regime. In 1998, after the economy was hit by contagion from Thailand, Indonesia experienced a banking and balance of payments crisis. The economy rebounded again in 2000, based on stronger macroeconomic policies and structural reforms. Annual growth in real GDP output per capita averaged 3¾ percent in the 2000s, and Indonesia remained resilient through the Great Recession.

C. Mozambique, 1990s to Present: How Will History See It?²⁴

Mozambique's experience highlights the benefits of undertaking policies and measures that attract FDI to finance private investment. It also reveals the challenges arising from commodity-based growth, specifically the need for durable structural reforms that support broad-based improvements in productivity, growth, and living standards.

Peace and political stability have supported vibrant growth in Mozambique for nearly two decades. By the end of the civil war in 1992, Mozambique had endured nearly 30 years of conflict and was the second poorest country in our sample of LICs.²⁵ However, the economy rebounded in 1996, and annual growth in per capita real GDP averaged 5¾ percent over the next 16 years (Figure 13, panel 1).

²⁴ This study draws on: African Development Bank (2012); Banco Portugues de Investimento (2012); Batley (2005); Brück (1997, 2006); Brück, FitzGerald, and Grigsby (2000); Canning (1998); Economic Commission of Africa (2004); Hall and Young (1997); Hoeffler (2000); Lledó and Garcia-Verdu (2011); Peiris and Clément (2008); Pretorius (2000); Schwartz, Hahn, and Bannon (2004); UNDP (2011); UN (2012); Vitek (2009), and Wiles, Selvester, and Fidalgo (2005).

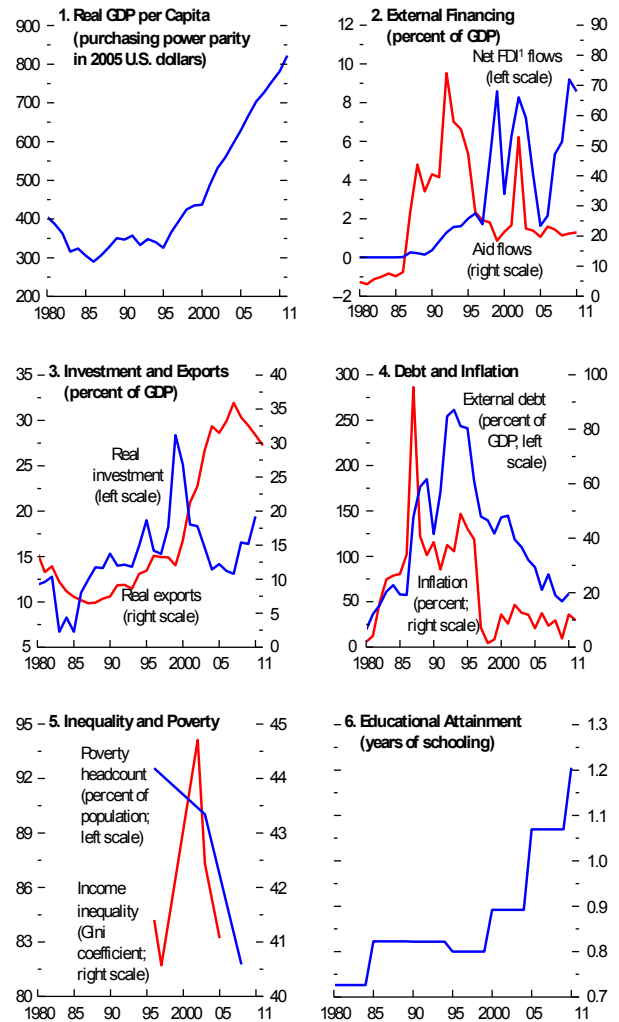
²⁵ Mozambique's war of independence against Portugal started in 1964 and came to an unexpected end with the military coup in Portugal in April 1974. The civil war began in 1977 and lasted until 1992.

Growth was driven by a surge in investment, supported by improvements in the business climate. Investment before the takeoff largely reflected aid-financed reconstruction (Figure 13, panels 2 and 3). After takeoff, investment included public-private initiatives for infrastructure building to develop the resource sector. The government took several steps to make the economy more investment friendly, including establishing a one-stop investment center, improving investor property rights and contract enforcement, and providing generous tax incentives.²⁶ Although investment declined after the completion of major infrastructure projects, growth was sustained with a commensurate rise in resource exports, particularly aluminum. Investment in the resource sector accelerated again in recent years, particularly in coal mining and natural gas exploration (the existence of vast offshore gas fields was confirmed in 2011).

Given its own limited savings, the government sought to attract FDI to fund its public-private investment projects. Improved macroeconomic policies helped provide a stable economic environment for such FDI, including by preserving relatively low inflation and reducing fiscal deficits (Figure 13, panel 4). Mozambique qualified for debt relief under the Heavily Indebted Poor Country Initiative and Multilateral Debt Relief Initiative, which freed up fiscal space for the government's contributions for the infrastructure projects.

Nonetheless, Mozambique's growth experience has been capital intensive and focused on resources. As such, its investment projects have generated employment only to a

Figure 13. Mozambique's Growth Experience since the 1990s



Sources: Barro and Lee (2010); IMF, Balance of Payments Statistics database; IMF, World Economic Outlook database (October 2012); Lane and Milesi-Ferretti (2007) updated to 2011; Penn World Table 7.1; Solt (2009); World Bank, World Development Indicators database (2012); and IMF staff calculations.

Note: Indicators are defined in Appendix 1.
¹FDI = foreign direct investment.

²⁶ Specifically, the government supported establishment of “development corridors,” which created industrial clusters along major highways and connected these clusters to a port. A key project focused on processing imported bauxite into aluminum for export. Note that although we highlight the role of domestic policies, other factors also played a role in investment growth, including the country's vast natural resources, favorable global commodity prices, and continued donor support, as well as proximity to South Africa and recent alliances with other EMDEs.

limited extent. It has also allowed only limited fiscal gains, given the tax exemptions for these projects. Furthermore, there have been only modest declines in poverty and income inequality, and slow improvement in health and education, despite donor support (Figure 13, panels 5 and 6). The country ranks among the poorest performers in the United Nations Development Program's *Human Development Report*. Moreover, although the FDI- and aid-financed growth strategy has reduced vulnerabilities related to external borrowing, it has raised the risks of Dutch disease effects that will need to be addressed.

Thus, the economy faces an unfinished policy agenda. In this context, the experience of Indonesia in the 1960s and 1970s in reorienting investment toward rural and agricultural development is illuminating. Key policy priorities for Mozambique include developing transport and energy infrastructures, continuing to enhance human capital, ensuring access to financing more broadly to attract domestic private investment, and expanding the use of agricultural land to enhance agricultural productivity.

D. Cambodia, 1990s to Present: Remarkable Strides, but Far to Go²⁷

Cambodia's experience underscores the importance of peace and stability as well as the importance of recent government efforts toward investment and development. It also illustrates the benefits of tapping into a vibrant regional production chain. However, Cambodia still needs to make significant improvements to its infrastructure and business climate to attract private investment and further diversify its economy.

Real GDP per capita gained momentum in the mid-1990s when reconstruction, macroeconomic adjustments, and structural reform bore fruit after years of conflict and political tension. Rapid growth has continued for nearly two decades, and output per capita has grown at an average annual rate of 6 percent over the past decade (Figure 14, panel 1). This suggests that Cambodia's takeoff is more than a postconflict recovery story.

Growth has been supported by a steady rise in investment related to the export-oriented textile industry, although more recently also to investment in infrastructure (Figure 14, panels 2 and 3). The growth takeoff was catalyzed by Cambodia's preferential access to the United States under the Multi-Fiber Arrangement (MFA).²⁸ Investment growth decelerated in the early 2000s in part because of concerns about a burdensome regulatory environment, but it picked up again recently, after a concerted government effort to improve the business climate.²⁹ Recent

²⁷ This study draws on Coe (2006) and IMF (2011, 2012a, 2013, forthcoming) and Rungcharoenkitkul (2012).

²⁸ Although the MFA ended in 2005, Cambodia has continued to enjoy preferential access to markets in the European Union.

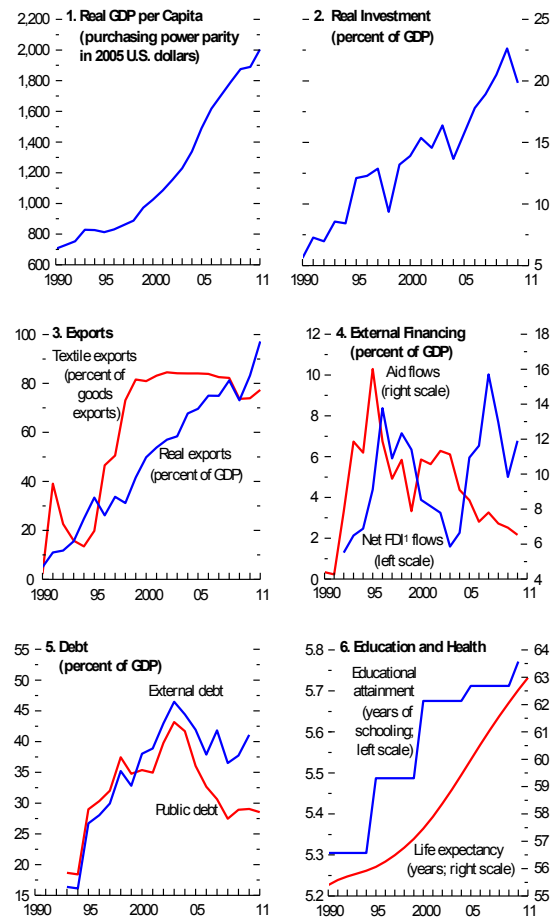
²⁹ Cambodia's rank in the World Bank's *Doing Business* indicators moved up by eight places in 2012 to 133rd out of 185 countries, for several measures to reduce the regulatory burden and improve the business climate. The government also strengthened enforcement of the anticorruption law in 2011.

public-private initiatives have focused on power generation and rural development. Rice exports have increased sharply since 2010, largely as the result of measures to boost yields, storage capacity, and trade.

Cambodia has relied heavily on FDI to finance its saving-investment gap (Figure 14, panel 4). Recent FDI flows have been harnessed into public-private initiatives to improve power generation. The economy's relatively open trade and investment regimes, combined with Cambodia's proximity to some of the most dynamic economies in the world, have also attracted FDI in the manufacturing sector recently. In fact, recent FDI shows promising signs of diversification in the manufacturing sector, particularly through outsourcing efforts by multinational companies that are responding to rising wages elsewhere in Asia, and these will likely increase with improved power generation. Thus far, the textile sector continues to dominate the economy—accounting for three-quarters of total exports of goods—followed by tourism and agricultural products.

Sustaining strong growth in Cambodia will require further economic diversification and strengthened macroeconomic policies. Although nascent signs of product diversification have been emerging, removing infrastructure bottlenecks and improving the business climate will remain critical for attracting private investment and for further diversification. Financial intermediation needs to continue to deepen, and financial stability must be maintained through strong prudential supervision and regulation—the credit-to-GDP ratio has quadrupled to 35 percent in less than 10 years and continues to rise unabated. Improved public debt management will lower risks arising from the potentially large contingent fiscal liabilities inherent in substantial public-private initiatives. Mobilizing fiscal revenue will help build fiscal buffers to meet the country's development needs, including human capital development through improved health and education (Figure 14, panel 5 and 6).

Figure 14. Cambodia's Growth Experience since the 1990s



Sources: Abbas and others (2010); Barro and Lee (2010); IMF, Balance of Payments Statistics database; IMF, World Economic Outlook database (October 2012); Lane and Milesi-Ferretti (2007) updated to 2011; Penn World Table 7.1; UN Comtrade Statistics; World Bank, World Development Indicators database (2012); and IMF staff calculations.

Note: Indicators are defined in Appendix 1.

¹FDI = foreign direct investment.

E. Takeaways from the Case Studies

The case studies echo the development literature in emphasizing that growth takeoffs are feasible under a variety of development strategies. Growth was strong in all five of these economies despite their different economic structures and strategies. Cambodia, Indonesia, Korea, and Mozambique took the standard route of promoting growth through investment and exports; in Brazil, investment was geared toward the domestic market. The degree of government involvement also varied among these countries. In Mozambique and Cambodia in the 1990s, the government focused on maintaining political stability in the postwar era—the key prerequisite for growth—and developing an investment-friendly environment. There was much heavier public sector involvement in Brazil and Korea in the 1960s, with varying macroeconomic effects.

However, a key lesson from these countries' experiences is that sustaining strong growth requires continued effort to reduce external and internal imbalances. For all five economies, the growth takeoff was accompanied by some narrowing of fiscal and external current account deficits, but not all were able to sustain this momentum. Where imbalances grew or where growth was excessively reliant on foreign borrowing, the takeoffs ended disruptively or were interrupted even after decades of strong growth (Brazil in 1982, Indonesia in 1997). These experiences suggest that today's dynamic LICs, now only 9 to 12 years into their takeoffs, should avoid financing investment by excessive debt.

A second lesson is that structural reforms can be instrumental in raising productivity and ensuring broad-based growth. In Korea, labor training in the export-oriented sectors helped sustain growth by moving the manufacturing sector up the value chain. In both Korea and Indonesia in the 1960s, measures were taken to upgrade agricultural productivity, infrastructure, and human capital, and these raised living standards on a broad scale. In contrast, growth from infrastructure projects and import substitution in Brazil in the 1960s did not alleviate income inequality. Similarly, the capital-intensive growth under way in Mozambique, with limited employment generation, may increase social vulnerabilities unless emphasis continues on improving productivity, education, and health. In addition, although Mozambique's FDI-financed growth strategy produces less debt, it could produce Dutch disease challenges as the economy broadens its growth strategy.

Finally, these countries' experiences demonstrate that policies need to adjust to changing global conditions. Strong global growth, low interest rates, and terms-of-trade gains (or preferential access to larger markets) benefited all five economies at different times. Indonesia's timely shift from natural resources helped it maintain strong growth even after the end of the oil price boom in the 1980s and underscores the significance of further economic diversification for many of today's dynamic LICs. Brazil's struggle to adjust domestic demand to the oil price shocks of the 1970s exacerbated its external imbalances. The important lesson for today's LICs is to avoid procyclical policies despite the prevalence of ultralow global interest rates.

V. CONCLUSIONS

This paper examines episodes of growth takeoffs in nearly 70 developing economies or low income countries (LICs) over the past six decades, identifying a second wave of LIC takeoffs since the 1990s. Following a first wave of takeoffs in the 1960s and early 1970s, takeoffs fell in the late 1970s and 1980s as global conditions turned worse, but have rebounded in the past two decades. The share of LICs that sustained their take offs also increased sharply in the past two decades, with more than half of recent takeoffs, or one-third of all LICs, continuing to expand through 2011, despite the Great Recession. Recent takeoffs have lasted 9 to 12 years on average, whereas takeoffs prior to the 1990s typically lasted only 7 years.

Although the literature has argued that sustaining growth is more important than igniting it, we find that even just igniting a takeoff—as defined by an expansion in per capita output that lasts at least five years, with average growth during the period of at least 3½ percent—pays off over the long run with a 50 to 60 percent rise in LICs per capita output in the 10 years after the start of a takeoff, compared to only 5 to 15 percent for LICs that did not take off. This is an important message for LICs that have yet to take off.

The paper establishes some common patterns in LIC takeoffs across time. Both recent takeoffs and takeoffs before 1990 were based on higher investment rates and greater trade integration, setting apart dynamic LICs of both generations from LICs that failed to take off, and highlighting priorities for the latter. This is consistent with the literature, which has long emphasized the key roles of capital accumulation and trade integration in economic development. Export growth rose faster in dynamic LICs than in LICs that were unable to take off, and it was higher in recent takeoffs than in earlier ones.

However, stylized facts also suggest that current-generation takeoffs are associated with lower economic vulnerabilities than those in the past, as seen in declines in debt and inflation after takeoff compared to the increases in these imbalances observed in previous generation takeoffs. This is partly related to a greater reliance on FDI-financed investment rather than debt financed investment for the current generation. Other economic conditions that set apart recent LIC takeoffs from those before include more competitive exchange rates, deeper links with emerging market and developing economies in trade, and a faster-paced implementation of structural reforms and institution building, such as lower regulatory burdens, better infrastructure, higher education levels, and greater political stability.

The strong association between growth takeoffs and domestic economic conditions remains significant even after controlling for global conditions. The probability of takeoffs rises with higher global growth, initial size, years of schooling, and the initial level and increases in investment. It falls with initial income per capita, an appreciation and an overvaluation of the real exchange rate, and an increase in the public debt. Overall, the chances of starting a takeoff have tripped in the 2000s compared to the period before the 1990s, with domestic conditions

and policies accounting for a majority of the rise. These regularities align with the literature that has analyzed factors behind sustained growth, boding well for today's dynamic LICs.

Despite their progress, there are many caveats to LICs' future prospects. With income per capita typically still a fraction of that in advanced economies, they have a long journey before convergence. Many of them experience growth in a few sectors only, and will remain vulnerable unless they further diversify. Their recent greater reliance on FDI flows—while reducing vulnerabilities from debt-financed investment—could raise familiar Dutch disease problems in the future. A related challenge is to ensure that growth results in improvements in living standards on a broader scale. The case studies are a reminder that takeoffs can fall apart even after many years of strong growth. In sum, today's dynamic developing economies cannot afford to lose sight of the need to continue with reforms, avoid major macroeconomic imbalances, and maintain external competitiveness.

APPENDIX 1. DATA DEFINITIONS AND SOURCES AND COUNTRY GROUPINGS

Data Definitions and Sources

The primary data sources for this chapter are the IMF's World Economic Outlook (WEO), Penn World Table version 7.1 (PWT; Heston, Summers, and Aten, 2012), and the World Bank's World Development Indicators (WDI) databases. All the data sources used in the analysis are listed in Table 7. For indicators with multiple sources, the sources are listed in the order in which they are spliced (which entails extending the level of a primary series using the growth rate of a secondary series). For example, aggregate real GDP and real GDP per capita in constant 2005 purchasing-power-parity U.S. dollars are from the PWT, and where missing, are extended with data from the WEO and WDI.

Domestic Shocks

Bank, currency, and debt crises are from Laeven and Valencia (2012). *Conflict* indicates whether a country is involved in a serious internal or external conflict in a given year in which the country's output per capita falls by more than 3 percent. This measure is derived from information on external and internal state conflicts from the Correlates of War (COW) database (The New COW War Data, 1816–2007 v4.0) and the measure of real output per capita detailed earlier. In the analysis, low-income country (LIC) episodes of strong or weak growth are excluded if they occur in the year after a conflict to avoid confounding a growth takeoff with a simple bounce back from a war.

Economic Structure

Export concentration is from Papageorgiou and Spatafora (2012) and corresponds to the Theil index on an updated version of the UN-NBER data set, which harmonizes COMTRADE bilateral trade flow data at the four-digit Standard International Trade Classification (Rev. 1) level. *Exports to emerging and developing economies* are from the IMF's Direction of Trade Statistics database. It is calculated by taking the sum of the bilateral merchandise exports data across all EMDEs (see Table 9 for country groupings) for a given country. It is expressed as a percent of nominal GDP in U.S. dollars from the WDI, extended with the WEO. *National saving to GDP* is derived as the share of real gross national product in real GDP from the WDI minus the share of private and public consumption in real GDP from the PWT. *Real exports to GDP* is real exports of goods and services as a percent of GDP, from the WDI, extended with the WEO. *Real investment in percent of GDP* is from the PWT. *Real share of manufacturing and real share of resources in value added* are from the WDI. Resources are calculated as the contribution of industry in value added minus the contribution of manufacturing in value added. Total value added is the sum of value added from agriculture, industry, and services. *Textile exports as a percent of goods exports* is from the United Nations Comtrade Statistics database.

Table 7. Data Sources

Indicator	Source
	<i>Global Conditions</i>
Global Growth (percent)	IMF, World Economic Outlook Database (2012); Penn World Table 7.1 (2012)
U.S. Real Interest Rate (three-month treasury-bill rate minus realized inflation rate; annualized percent)	Haver Analytics
	<i>Country-specific Variables</i>
Aid Flows (millions of current U.S. dollars)	World Bank, World Development Indicators Database (2012)
Bank Crises	Laeven and Valencia (2012)
Conflict	The New COW War Data, 1816–2007 v. 4.0 (2011)
Currency Crises	Laeven and Valencia (2012)
Current Account Balance (percent of GDP)	World Bank, World Development Indicators Database (2012); IMF, World Economic Outlook Database (2012)
Credit (percent of GDP)	IMF, International Financial Statistics
Debt Crises	Laeven and Valencia (2012)
Educational Attainment (years of schooling)	Barro and Lee (2010)
Constraints on the Executive (index 0 to 1, with unlimited authority = 0 and executive parity = 1)	Political Regime Characteristics and Transitions Database (2011)
Export Concentration	Papageorgiou and Spatafora (2012)
Exports to EMDEs (percent of GDP)	IMF, Direction of Trade Statistics Database
External Debt (percent of GDP)	Lane and Milesi-Ferretti (2007) updated to 2011
Foreign Reserves (percent of GDP)	Lane and Milesi-Ferretti (2007) updated to 2011
Income Inequality (Gini coefficient)	Solt (2009), Standardized World Income Inequality Database v. 3.1
Inflation (percent)	World Bank, World Development Indicators Database (2012); IMF, World Economic Outlook Database (2012)
Life Expectancy (years)	World Bank, World Development Indicators Database (2012)
National Saving (percent of GDP)	Penn World Table 7.1 (2012); IMF, World Development Indicators Database (2012)
Net FDI Flows (percent of GDP)	IMF, Balance of Payments Statistics Database; IMF, World Economic Outlook Database (2012)
Poverty Headcount (percent of population)	World Bank, World Development Indicators Database (2012)
Public Debt (percent of GDP)	Abbas and others (2010); Lane and Milesi-Ferretti (2007) updated to 2011
Real Exchange Rate Change (percent change)	Penn World Table 7.1 (2012)
Real Exchange Rate Deviation (percent difference from fitted value)	Penn World Table 7.1 (2012)
Real Exports (percent of GDP)	World Bank, World Development Indicators Database (2012); IMF, World Economic Outlook Database (2012)
Real GDP (billions of purchasing-power-parity in 2005 U.S. dollars)	Penn World Table 7.1 (2012); IMF, World Economic Outlook Database (2012); IMF, World Development Indicators Database (2012)
Real GDP per Capita (purchasing-power-parity in 2005 U.S. dollars)	Penn World Table 7.1 (2012); IMF, World Economic Outlook Database (2012); IMF, World Development Indicators Database (2012)
Real Investment (percent of GDP)	Penn World Table 7.1 (2012)
Real Share of Manufacturing (percent of value added)	World Bank, World Development Indicators Database (2012)
Real Share of Resources (percent of value added)	World Bank, World Development Indicators Database (2012)
Regulatory Barriers (index 0 to 10 with higher scores indicating higher barriers)	Gwartney, Lawson, and Hall (2012)
Size of Government (index 0 to 10 with higher scores indicating larger size)	Gwartney, Lawson, and Hall (2012)
Telephones per Capita (per thousand people)	Banks and Wilson, Cross-National Time-Series Data Archive (2012)
Textile Exports (percent of goods exports)	United Nations, Comtrade Statistics
Trade Openness	World Bank, World Development Indicators Database (2012); IMF, World Economic Outlook Database (2012)
Trade-Weighted Terms-of-Trade Growth (percent)	World Bank, World Development Indicators Database (2012); IMF, World Economic Outlook Database (2012)

Note: EMDEs = emerging market and developing economies; FDI = foreign direct investment.

External Policies

Aid flows is from the WDI and is deflated by the U.S. consumer price index to obtain *real aid flows*. The *current account balance* in percent of GDP is from the WDI, extended with the WEO. *Foreign reserves* to GDP is from the External Wealth of Nations Mark II Database (Lane and Milesi-Ferretti, 2007). *Net FDI Flows* as a percent of GDP is from the IMF Balance of Payments Statistics Database (line 4500). *Trade openness* is measured as the sum of imports and exports of goods and services divided by GDP. The individual components are from the WDI, extended with the WEO.

Global Environment

Global growth is the world GDP growth aggregate from the WEO, weighted by purchasing-power-parity (PPP) GDP. It is then extended by the growth of the aggregate GDP PPP levels from the PWT. The *U.S. real interest rate* is the U.S. three-month Treasury bill rate (secondary market, annual average) minus the realized U.S. inflation rate, expressed in annualized percent. Both the interest rate and the inflation rate are from Haver Analytics.

International Relative Prices

The *real exchange rate* comes from the PWT and is the price level of GDP versus that of the United States. The *real exchange rate deviation* is the residual from a linear regression of the log real exchange rate on the productivity differential of the country with the United States, as proxied by the difference in log real GDP per capita with the United States. The *real exchange rate change* is the percent change over a five year period in the five-year average of the real exchange rate. The *trade-weighted terms of trade* is the percent change of the terms-of-trade index 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 WDI and WEO. In particular, the terms-of-trade index is calculated as the ratio of the export price deflator exponentiated by the share of exports in GDP to the import price deflator exponentiated by the share of imports in GDP.

Monetary and Fiscal Policies

Credit as a percent of GDP is from the IMF's International Financial Statistics Database publication and refers to bank credit to the private sector (line 22D). *External debt* to GDP is from the External Wealth of Nations Mark II Database (Lane and Milesi-Ferretti, 2007). *Inflation* is calculated as the log difference of the consumer price index (CPI). CPI data are from the WDI, extended with WEO data. *Public debt* is from Abbas and others (2010) taken as a ratio to GDP: the GDP data are from the WDI, extended with WEO data. The public-debt-to-GDP ratio is then extended using the change in external debt to GDP.

Structural and Political Conditions

Constraints on the executive is from the Political Regime Characteristics and Transitions Database (2011) but rescaled to zero to 1 (from 1 to 7): unlimited authority equals zero and executive parity equals 1. *Educational attainment* is measured by years of schooling from Barro and Lee (2010). *Income inequality* is the Gini coefficient of household disposable income from Solt (2009). *Life expectancy* is from the WDI and refers to life expectancy at birth, in years. *Poverty headcount* is also from the WDI and is the percent of the population living on \$2 a day in PPP terms. *Regulatory barriers* and *size of government* are from the Economic Freedom Network's *Economic Freedom of the World 2012 Annual Report* (Gwartney, Lawson, and Hall, 2012). These indices are from zero to 10 with 10 indicating the most freedom (lower barriers and smaller government size, respectively) but are positively transformed (10 minus the original values) so that higher scores indicate more restraints and larger size, respectively. For poverty headcount, regulatory restraints, and size of government, missing data in intervening years are linearly interpolated to obtain a time series. *Telephones per capita* is from the Banks and Wilson Cross-National Time-Series Data Archive (2012). The data are expressed in units of telephones per thousand people.

Transformations for the Logistic Regression

Variables used in the logistic regression appear in one of three forms: (1) initial—the once-lagged, backward-looking five-year average, which captures the average behavior of the variable in the five years before a potential takeoff; (2) contemporaneous—the current year, forward-looking five-year average, which captures the average behavior of the variable in the first five years of a potential takeoff; and (3) change—the difference between the contemporaneous and initial values of a variable as defined here, capturing the average trajectory of the variable from before the takeoff during the first years of a potential takeoff. The moving average in each case is calculated only if there are at least 2 nonmissing observations for the indicated variable during the window.

Country Groups

Advanced economies comprise the member economies of the Organization for Economic Cooperation and Development before 1990, with the exception of Turkey. The other economies are classified as emerging market and developing economies (EMDEs). At any given time, LICs are defined as economies in which output per capita, averaged over the previous five years, is lower than the corresponding low-income threshold, which is time varying. The low-income output per capita threshold represents the bottom 45th percentile of EMDEs' output per capita in 1990 (\$2,600 in 2005 U.S. dollar PPP terms). This threshold is then spliced back for the pre-1990 period and forward for the post-1990 period using the average growth rate of global output per capita during 1950–2011 (about 2.3 percent per year) to obtain the low-income thresholds for the whole sample period. To ensure that the results are unaffected by very small

or very large economies, the analysis is restricted to economies that had an average population of at least 1 million but no more than 500 million. The latter restriction excludes China and India from the group of LICs. See Table 8 for the country composition of each of these analytical groupings. For each of the bar charts comparing cases and referents from Figure 3 onward, a constant composition sample underlies each of the panels to ensure comparability within the group of cases or referents across time.

Table 8. Economy Groups

Advanced Economies (AEs)	Emerging Market and Developing Economies (EMDEs)		
Australia	Afghanistan*+	Guinea*+	Pakistan*
Austria	Albania*	Haiti*+	Panama
Belgium	Algeria	Honduras*+	Papua New Guinea*
Canada	Angola*	Hong Kong SAR	Paraguay*
Denmark	Argentina	Hungary	Peru
Finland	Armenia*	India	Philippines*
France	Azerbaijan*	Indonesia*	Poland
Germany	Bangladesh*	Iran	Republic of Congo*+
Greece	Belarus	Iraq*	Romania
Ireland	Benin*+	Israel	Russia
Italy	Bolivia*+	Jamaica	Rwanda*+
Japan	Bosnia and Herzegovina*	Jordan	Saudi Arabia
Netherlands	Botswana	Kazakhstan	Senegal*+
New Zealand	Brazil	Kenya*	Serbia
Norway	Bulgaria	Korea	Sierra Leone*+
Portugal	Burkina Faso*+	Kuwait	Singapore
Spain	Burundi*+	Kyrgyz Republic*	Slovak Republic
Sweden	Cambodia*	Lao P.D.R.*	Slovenia
Switzerland	Cameroon*+	Latvia	Somalia*+
United Kingdom	Central African Republic*+	Lebanon	South Africa
United States	Chad*+	Lesotho*	Sri Lanka*
	Chile	Liberia*+	Sudan*+
	China	Libya	Syrian Arab Republic*
	Colombia	Lithuania	Taiwan Province of China
	Costa Rica	Madagascar*+	Tajikistan*
	Côte d'Ivoire*+	Malawi*+	Tanzania*+
	Croatia	Malaysia	Thailand
	Czech Republic	Mali*+	Togo*+
	Democratic Republic of the Congo*+	Mauritania*+	Tunisia
	Dominican Republic	Mexico	Turkey
	Ecuador	Moldova*	Turkmenistan
	Egypt*	Mongolia*	Uganda*+
	El Salvador	Morocco*	Ukraine
	Eritrea*+	Mozambique*+	United Arab Emirates
	Estonia	Namibia	Uruguay
	Ethiopia*+	Nepal*	Uzbekistan*
	FYR Macedonia	Nicaragua*+	Venezuela
	Georgia*	Niger*+	Vietnam*
	Ghana*+	Nigeria*	Yemen*
	Guatemala	Oman	Zambia*+
			Zimbabwe*

Note: * denotes low-income countries (LICs) anytime from 1990 onward based on a time-varying threshold for low-income output per capita. The definition of LICs is given in Appendix 1. The sample of countries excludes economies that had an average population less than 1 million. The group of LICs also excludes China and India. + denotes countries eligible for the Heavily Indebted Poor Countries (HIPC) Initiative.

The sample of country episodes is divided into four nonexclusive groups according to their economic structure. In particular, the analysis uses data from the WDI on sectoral value added in local currency at constant prices to classify the country episodes as predominantly agricultural, manufacturing oriented, resource rich, or “other.” The exercise starts by

constructing the shares of each sector—agriculture, manufacturing, resources, and other—in total value added and considers nonmanufacturing industry to be resources.³⁰ The 10-year average of these shares is then calculated from the start of a growth episode or from the first year for which a country episode is considered a valid referent. A country episode is classified as predominantly agricultural if its 10-year average agriculture share is in the 70th percentile for the whole sample of country episodes between 1960 and 2011. Similarly, a country episode is classified as manufacturing oriented (or resource rich) if its 10-year average share of manufacturing (or resources) value added is higher than the 70th percentile for the whole sample of country episodes between 1960 and 2011. The group “other” includes all country episodes that were not classified either as predominantly agricultural, manufacturing oriented, or resource rich.

For country episodes with insufficient data, the grouping is complemented with WDI data on rents from resources. There were a few cases for which data for an industry were available but not their decomposition between manufacturing and nonmanufacturing. In these cases, a country episode was classified as resource rich if its 10-year average resource rents as a percent of GDP were in the 70th percentile for all country episodes between 1960 and 2011.³¹ A country episode was classified as manufacturing oriented if the 10-year average of its industry sector value-added share was in the 70th percentile of all country episodes between 1960 and 2011 and the 10-year average of its resource rents as a percent of GDP was not in the 70th percentile of all country episodes between 1960 and 2011. Tables 1 and 2 present the list of strong-growth country episodes grouped according to their economic structure.

³⁰ Nonmanufacturing industry value added is a proxy for resource-related value added, because this sector includes not only mining and quarrying but also construction and utilities.

³¹ The WDI resource rents are defined as the difference between the value of production at world prices and total costs of production for oil, natural gas, coal, minerals, and forestry. These series are calculated at current prices and are thus affected by changes in international resource prices.

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