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**Domestic Amplifiers of External Shocks:  
Growth Accelerations and Reversals in Emerging Market  
and Developing Economies**

by Bertrand Gruss, Malhar Nabar, and Marcos Poplawski-Ribeiro

**I N T E R N A T I O N A L M O N E T A R Y F U N D**

**IMF Working Paper**

Research Department

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Emerging Market and Developing Economies\***

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**Abstract**

External conditions have been found to influence the tendency of emerging market and developing economies to experience episodes of growth accelerations and reversals. In this paper we study the role of domestic policies and other structural attributes in amplifying or mitigating the effect that shifts in external conditions have on growth patterns in emerging market and developing economies over the past five decades. We find that these economies can enhance the growth impulse from external conditions by strengthening their institutional frameworks and adopting a policy mix that protects trade integration; permits exchange rate flexibility; and ensures that vulnerabilities stemming from high current account deficits and external debt, as well as high public debt, are contained.

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## I. INTRODUCTION

In an earlier paper (Gruss, Nabar and Poplawski-Ribeiro 2018), we documented how external conditions affect growth patterns in emerging market and developing economies (EMDEs).<sup>1</sup> The previous work explored how country-specific external demand, finance, and terms-of-trade conditions affect the well-documented tendency of EMDEs to experience episodes of growth accelerations and reversals.<sup>2</sup> In this paper, we study the role of structural attributes and policies in mediating the role of external conditions. Specifically, we investigate how domestic policies and structural attributes amplify or mitigate the effects of shifts in external conditions on EMDE growth patterns.

We study four broad categories of policies and structural attributes to examine how they influence the impact of external conditions on growth patterns in EMDEs. These include: the de jure degree of integration with the global economy; initial conditions at the onset of a growth episode (such as the level of external debt and the current account balance); aspects of the macroeconomic policy framework (such as the exchange rate regime, monetary stability, level of public debt); and structural factors and institutions (such as quality of governance, the legal and regulatory environment, the availability of public services, and the level of education).

Our findings suggest that demand from trading partners has a stronger growth impact in EMDEs that are de jure more open to international trade. Likewise, a given loosening of external financial conditions is more likely to result in sustained growth when these economies impose fewer restrictions on capital mobility and the domestic financial system is sufficiently developed and sound. In other words, when the financial system channels external financing to financially constrained agents while maintaining relatively robust risk management and origination standards that minimize the pitfalls from excessive credit growth.

The results point to the importance of low external imbalances for translating favorable external conditions into positive growth outcomes. The results also suggest that certain policy characteristics help EMDEs experience better growth outcomes for a given impulse from external conditions. In particular, exchange rate flexibility and fiscal discipline appear to have a broadly positive influence on growth outcomes, although their influences vary across

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<sup>1</sup> The emerging market and developing economy group comprises all economies currently classified as such by the IMF's *World Economic Outlook* as well as those that have been reclassified as "advanced" since 1996 (Cyprus, Czech Republic, Estonia, Hong Kong Special Administrative Region, Israel, Korea, Latvia, Lithuania, Macao Special Administrative Region, Malta, Puerto Rico, San Marino, Singapore, Slovak Republic, Slovenia, Taiwan Province of China). Economies with populations in 2010 below 1 million according to the Penn World Tables (PWT) 9.0 vintage are excluded from the sample.

<sup>2</sup> The tendency is established in a long literature including, for example, Ben-David and Papell 1998; Pritchett 2000; Pattillo, Poirson, and Ricci 2004; Hausmann, Pritchett, and Rodrik 2005; Hausmann, Rodriguez, and Wagner 2006; Jerzmanowski 2006; Jones and Olken 2008; Reddy and Minoiu 2010; Berg, Ostry, and Zettelmeyer 2012; IMF 2012; and Eichengreen, Park, and Shin 2013.

specific external conditions and by growth episode. Other structural characteristics that have been identified in the literature as important for medium-term growth, such as the quality of institutions and property rights (Hall and Jones 1999; Acemoglu, Johnson, and Robinson 2001; Acemoglu and Robinson 2014), are also found to influence the effect of external conditions on the likelihood of favorable growth outcomes.

Previous research on EMDEs’ growth episodes has found evidence of a positive association between the duration of a growth episode and attributes such as macroeconomic stability, quality of domestic institutions, integration with the global economy and economic liberalization (for example, Jong-A-Pin and Haan 2011; Berg, Ostry, and Zettelmeyer 2012). Greater resilience in EMDEs has also been linked to improvements in policy frameworks and augmented policy space—seen, for instance, in low inflation and low public debt (IMF 2012). Conversely, persistent declines in EMDEs’ growth rates (“downbreaks”) have been found to be associated with increases in inflation and possibly diminished monetary policy control (Jones and Olken 2008). The current analysis augments this literature by examining how domestic policy and structure attributes can also play a growth-amplifying or reversal-mitigating role in the presence of external shocks.

The next section discusses the empirical approach and the data used in the analysis. The subsequent section summarizes the main findings. The policy implications are discussed in the concluding section.

## **II. EMPIRICAL APPROACH AND DATA**

As in Gruss, Nabar and Poplawski-Ribeiro (2018), we use logit regressions to assess how country-specific external conditions and policy variables affect the likelihood of growth accelerations and reversals (defined in Sections II.A, B, C below):

$$\Pr(\textit{episode}_{it} = 1) = \Phi(\gamma Z_{it}, \beta X_{it}), \quad (1)$$

where  $episode_{it}$  is a dummy variable that takes a value of 1 for country  $i$  in year  $t$  if it experienced a growth episode in  $t - 1$ , in  $t$ , or in  $t + 1$ , and zero otherwise;<sup>3</sup>  $Z_{it}$  is a vector of moving averages (between  $t + 1$  and  $t + 5$ ) of country-specific external condition variables;<sup>4</sup>  $X_{it}$  denotes a vector of moving averages (between  $t - 3$  and  $t - 1$ ) of domestic policy variables;<sup>5</sup> and  $\Phi$  is a nonlinear function representing how  $Z_{it}$  and  $X_{it}$  affect the probability  $\Pr(episode_{it} = 1)$ .

The nonlinear binary dependent model is then empirically estimated using a logit functional form to replace  $\Phi(\cdot)$  and including the vectors of external condition variables and domestic policy variables, as well as country-fixed effects:

$$\log\left(\frac{\Pr(episode_{it}=1)}{1-\Pr(episode_{it}=1)}\right) = \gamma Z_{it} + \beta X_{it} + \alpha_i + \epsilon_{it}, \quad (2)$$

where  $\alpha_i$  denotes time-invariant country fixed effects aimed at controlling for unobserved country characteristics that may influence the probability of experiencing acceleration or reversal growth episodes.

The logit estimates can also be used to compute the average *marginal effect* of a one-unit change in a given variable on the likelihood of a growth episode. The average marginal effects can be represented by

$$\frac{\partial \Pr(episode_{it}=1)}{\partial z_{1,it}} = \gamma_1 \Phi'(\gamma_1 z_{1,it} + \gamma_2 z_{2,it} + \gamma_3 z_{3,it} + \beta_1 x_{1,it} + \dots + \beta_n x_{n,it} + \alpha_1 + \dots + \alpha_N). \quad (3)$$

The marginal effect of, for instance, the first variable ( $z_{1,it}$ ) in this nonlinear binary dependent model depends not only on  $\gamma_1$ , but also on the value of  $z_{1,it}$  and all other variables in equation (3).

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<sup>3</sup> Given the empirical challenge of accurately dating growth episodes, following Hausmann, Pritchett and Rodrik (2005) the dummy variables also take a value of 1 in the first lead and lag around each identified episode.

<sup>4</sup>The specifications include as independent variables the moving average of each of the three external condition variables between periods  $t$  and  $t + h$ . Using leading moving averages implies that the external condition variables are contemporary to the output outcome used to identify episodes in the economy in question, raising concerns of potential endogeneity. However, these variables are based on measures of the external environment that are expected to be exogenous to the economy in question.

<sup>5</sup> Each domestic attribute is measured as the moving average of the variable during the three years preceding the onset of the episode to minimize concerns that the attributes are responding to changes in economy growth rates during the episode.

### A. Growth Accelerations and Reversals

The set of growth episodes are from Gruss, Nabar, and Poplawski-Ribeiro (2018):

- A *persistent acceleration episode* is defined as an interval spanning five years during which: (i) trend growth rate of real GDP per capita during the period is relatively strong (at least 3.5 percent a year); (ii) trend growth increases by at least 2 percentage points; (iii) the level of real GDP per capita at the end of the episode is at least as large as the maximum level recorded prior to the onset of the episode (to rule out capturing the rebound from a collapse); and (iv) are not followed by a growth reversal that starts within three years of the end of the acceleration episode, or a banking crisis (as identified by Laeven and Valencia 2013) that starts three years before or after the end of the acceleration episode.
- A growth reversal episode is defined as an interval spanning five years during which: (i) there is a discrete drop in the trend growth rate such that it is at least 2 percentage points lower than during the preceding five-year interval; and (ii) the level of real GDP per capita declines such that its average during the five-year episode is lower than the average during the five-year period immediately preceding the episode.

These conditions identify 95 persistent accelerations and 125 growth reversals in the sample during 1970–2014. The sample of countries included in the analysis is shown in Annex Table 2. The years identified as persistent acceleration episodes are shown in Annex Table 3, and those identified as a reversal episode are shown in Annex Table 4.

### B. Country-specific external conditions

The analysis focuses on three sets of external conditions—external demand conditions, external financial conditions, and terms of trade—which vary at the level of individual countries, as defined in Gruss, Nabar, and Poplawski-Ribeiro (2018). The country-specific metrics capture the specific influence of the global context for each economy, while at the same time are exogenous from the point of view of each individual economy.

- *External demand conditions* – Country-specific external demand conditions are measured by the export-weighted growth rate of domestic absorption of trading partners, along the lines of Arora and Vamvakidis (2005) and IMF (2014).
- *External financial conditions* – Country-specific external financial conditions are proxied by a quantity-based measure of capital flows to peer economies (other EMDEs within the same region) as a share of their aggregate GDP (constructed to be exogenous to each country along the lines of Blanchard, Adler, and de Carvalho Filho 2015).

- *Terms of trade* – Country-specific changes in the terms of trade are based on international commodity prices as in Gruss 2014, IMF (2015), and Gruss and Kebabaj (2019)—that is, as a trade-weighted average of the world price of imported and exported commodities—to ensure that they are exogenous from the perspective of each economy. It provides an indication of the income windfall gains and losses (as a share of GDP) associated with changes in international prices.

### C. Domestic Attributes and Policies

Following the literature, four categories of policy variables and structural attributes are analyzed (see Annex Table 1 for details). The first category includes the degree of de jure trade and financial integration, as well as domestic financial depth (as a proxy for the capacity to intermediate cross-border capital flows and allocate them domestically). Economies more integrated with the global economy would be more sensitive to external conditions than those that are relatively closed. Within this category, four aspects are considered:

- *Free Trade Agreements*— Data on flows of agreements by year of signature are obtained from IMF (2016) using the Design of Trade Agreements database. This data set is complemented with the stock of free trade agreements in effect from the World Trade Organization Regional Trade Agreements database. The former builds on the latter, supplementing it with data from other multilateral institutions and national sources.
- *Financial Depth*— Financial depth is proxied by total assets held by deposit money banks as a share of GDP from the World Bank’s Global Financial Development database.
- *Sound credit growth*— While a deeper financial system is associated with increased access to finance and greater support for economic activity, a too-rapid expansion of credit may lead to vulnerabilities that end up undermining growth. The identification of excessive credit growth—or credit booms—follows Dell’Ariccia and others 2016.
- *Capital account openness*—The index of de jure capital account openness is an update of the Quinn 1997 measure of capital controls, which draws from the narrative portion of the IMF’s *Annual Report on Exchange Arrangements and Exchange Restrictions*. A higher value denotes fewer restrictions.

The second category includes initial conditions, such as the level of external debt and the current account balance, at the onset of a growth episode. Low external debt, for instance, may be associated with stronger confidence effects and thus a more forceful response of domestic economic activity to favorable shifts in the external environment, as well as with stronger buffers that can smooth the impact from worsening global financial conditions (IMF 2016b). This category includes:



- *Current account balance*—The current account balance as a share of GDP is from the IMF World Economic Outlook database.
- *External debt*—The measure of external debt corresponds to the stock of external debt liabilities (updated from Lane and Milesi-Ferretti 2007) as a share of GDP.

The third category covers aspects of the macroeconomic policy framework (such as the exchange rate regime, monetary stability, level of public debt). The policy framework affects expectations of future fundamentals, borrowing costs, and the overall predictability of the economic environment. In turn, these factors shape investment decisions by firms and spending by households on durable goods—both critical channels that determine the persistence of the response of domestic activity to shifts in the external environment. Prudent fiscal policy, for example, may be associated with less crowding out of private investment as public debt remains contained (IMF 2016c). It could also imply larger buffers and fiscal space for a countercyclical policy response to reduce the probability of a persistent reversal. In addition, a flexible exchange rate regime can play an important role in adjusting to shifting external conditions by mitigating persistent deviations in the real exchange rate from its equilibrium level and facilitating price signals that ensure an efficient allocation of resources. The variables used to capture the policy framework include:

- *Exchange rate flexibility*—The degree of exchange rate flexibility is based on the de facto index developed by Aizenman, Chinn, and Ito (2010).
- *Public debt*—The ratio of public debt to GDP from Mauro and others (2013) is used as a proxy for fiscal prudence.
- *Sound monetary framework*— The quality of the monetary framework is proxied by the sound money index from Gwartney, Lawson, and Hall (2016). The index is a standardized measure that combines indicators on the growth of money supply, the level and volatility of inflation, and the possibility of owning foreign currency bank accounts, based on data from the *World Development Indicators* (World Bank), *International Financial Statistics* and *Annual Report on Exchange Arrangements and Exchange Restrictions* (IMF), and United Nations National Accounts.

The fourth category represents structural factors and institutions (such as quality of governance, the legal and regulatory environment, the availability of public services, and the level of education). These elements have an important bearing on long-term growth outcomes (Acemoglu, Johnson, and Robinson 2001). They could also influence, for example, how economies respond to changes in external factors (Rodrik 1999) or the implementation of fiscal policy (Lledo and Poplawski-Ribeiro, 2013):

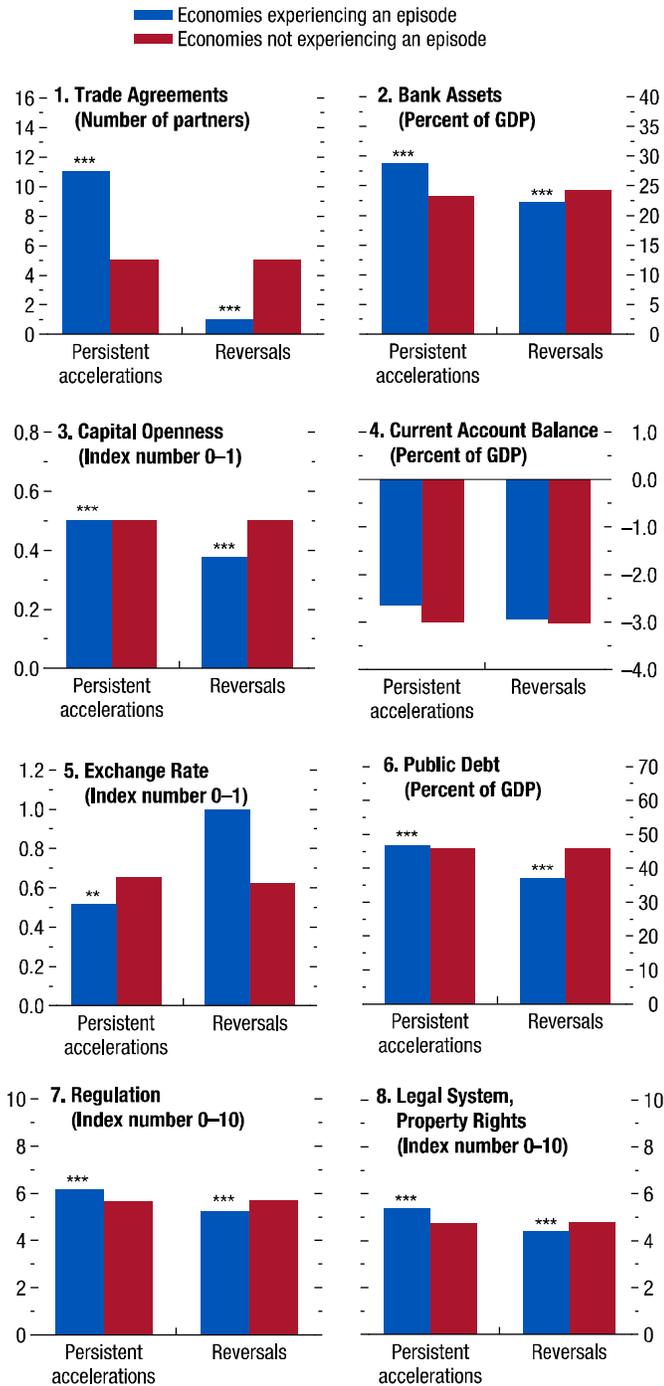
- *Regulation, Legal System and Property Rights*— The indices on the quality of regulation, the legal system, and protection of property rights are from Gwartney,

Lawson, and Hall (2016). A higher value is associated with better quality of institutions. Each index compiles indicators from several sources, including the *Global Competitiveness Report* (World Economic Forum), *International Country Risk Guide* (Political Risk Services Group), *Doing Business* and *World Development Indicators* (World Bank), and *International Financial Statistics* (IMF). Some individual indicators may be vulnerable to perception-based rankings and measurement uncertainties. However, by combining several indicators—including from international financial institutions that compile their data from national official sources—the constructed indices potentially have more comprehensive data coverage than a single indicator and may also be less sensitive to outliers and concerns about subjectivity.

An initial inspection of the domestic attributes comparing episodes with non-episodes (Figure 1) indicates that de jure trade integration, financial depth, institutional quality, and infrastructure quality are significantly different across growth episodes and non-episode comparators over the same time period. For example, economies experiencing accelerations (reversals) have a larger (smaller) number of free trade agreements than comparator economies not experiencing accelerations (reversals) over the same period. Similarly, economies experiencing accelerations (reversals) have higher (lower) financial depth—measured as the ratio of bank assets to GDP—than comparators not experiencing accelerations (reversals) over the same period.

**Figure 1. Domestic Attributes across Persistent Accelerations and Reversals, 1970–2015**

Domestic attributes are significantly different between economies that experience a persistent acceleration or reversal and economies that do not.



Source: IMF staff calculations.

Note: The results are robust to a Kolmogorov-Smirnov test of congruence of the distribution of the variable for the two sets of economies. Each variable is measured as the average between  $t-3$  and  $t-1$ , where  $t$  corresponds to the onset of the episode. \*\*\*, \*\*, and \* denote significance of an equality test of medians at the 1, 5, and 10 percent.

### **III. HOW DO DOMESTIC ATTRIBUTES AFFECT THE INFLUENCE OF EXTERNAL CONDITIONS ON GROWTH EPISODES?**

As already established Gruss, Nabar and Poplawski-Ribeiro (2018), the three external conditions influence the likelihood of growth accelerations and reversals. This section examines whether this sensitivity depends on domestic attributes. More precisely, it explores whether a change in each domestic attribute leads to an additional increase in the likelihood of an acceleration for a given impulse from external conditions, an additional decrease in the likelihood of a reversal, or both.

#### **A. Direct Effect of Domestic Policies and Attributes on the Likelihood of Growth Episodes**

Some domestic attributes are likely to affect medium-term growth outcomes in and of themselves—that is, independently of their effect through the impact of external conditions. So before analyzing how policies and other domestic attributes affect the impact of external conditions on the likelihood of acceleration or reversal episodes, we assess the direct effect of these domestic attributes on the likelihood of growth episodes. To this end, we use specification (2) and include one domestic policy or attribute at a time to test whether it significantly affects the likelihood of growth episodes—once all three external conditions and country fixed effects are controlled for.

Tables 1 and 2 report the results for persistent acceleration and reversal episodes, respectively. The coefficients on the domestic attribute variables indicate their impact, in percent, on the odds ratio of experiencing a growth episode versus not experiencing one: values below (above) 1 indicate lower (higher) odds of experiencing an episode versus not experiencing an episode for higher values of the domestic attribute variable.

Table 1. Logistic Estimates of the Effects of Policy Variables on the Odds Ratio of Persistent Accelerations

External Demand	1.266*** (0.088)	1.296*** (0.094)	1.234*** (0.091)	1.382*** (0.110)	1.275*** (0.088)	1.285*** (0.093)	1.264*** (0.097)	1.268*** (0.090)	1.282*** (0.104)	1.352*** (0.109)	1.279*** (0.104)	1.293*** (0.103)	1.401*** (0.143)
External Financial	1.200*** (0.041)	1.217*** (0.042)	1.209*** (0.041)	1.193*** (0.044)	1.223*** (0.040)	1.213*** (0.039)	1.224*** (0.040)	1.195*** (0.040)	1.204*** (0.040)	1.218*** (0.045)	1.213*** (0.049)	1.215*** (0.047)	1.215*** (0.055)
Change in Terms of Trade	0.970 (0.082)	0.950 (0.044)	0.945 (0.062)	0.955 (0.049)	0.967 (0.049)	1.016 (0.053)	0.985 (0.060)	0.981 (0.051)	0.995 (0.070)	1.005 (0.070)	1.066 (0.080)	1.024 (0.081)	1.318 (0.223)
Number of Trading Partners (Log)	0.928 (0.088)												0.916 (0.112)
Financial Openness Index		0.813 (0.312)											
Deposit Money Banks' Assets to GDP			1.007** (0.003)										1.009** (0.004)
Capital Account Openness				1.190 (0.523)									0.919 (0.674)
Credit Booms					0.599 (0.308)								0.643 (0.339)
Current Account Balance to GDP						0.979 (0.022)							0.960 (0.024)
External Debt to GDP							1.000 (0.001)						1.002 (0.002)
Exchange Rate Stability Index								0.586 (0.204)					1.539 (0.768)
Public Debt to GDP									0.999 (0.002)				0.998 (0.004)
Sound Monetary Framework										1.120** (0.063)			
Regulation											1.018 (0.101)		0.975 (0.155)
Legal System and Property Rights												1.189** (0.102)	1.037 (0.133)
Constant	0.017*** (0.007)	0.011*** (0.004)	0.011*** (0.004)	0.010*** (0.004)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.017*** (0.006)	0.013*** (0.004)	0.004*** (0.002)	0.011*** (0.007)	0.005*** (0.003)	0.008*** (0.010)
Model Chi-Squared Test	44.99***	51.42***	49.63***	40.97***	56.28***	56.67***	54.39***	48.60***	48.73***	47.14***	37.43***	47.29***	45.49***
Number of Economies	113	116	114	92	115	116	116	114	115	103	103	105	81
Number of Observations	3,044	3,793	3,203	3,292	4,159	4,048	3,880	4,138	3,643	3,353	2,871	2,780	1,699

Source: IMF staff calculations.

Note: Estimations do not include country fixed effects. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level, respectively. The coefficients report changes in the odds ratio of persistent accelerations. Value greater (smaller) than 1 indicates increase (decrease) in the odds ratio relative to the unconditional odds. Robust standard errors are reported in parentheses.

Table 2. Logistic Estimates of the Effects of Policy Variables on the Odds Ratio of Reversals

External Demand	0.820** (0.063)	0.694*** (0.052)	0.686*** (0.057)	0.705*** (0.059)	0.806*** (0.049)	0.731*** (0.048)	0.717*** (0.051)	0.694*** (0.048)	0.755*** (0.057)	0.700*** (0.055)	0.702*** (0.067)	0.749*** (0.083)	0.607*** (0.097)
External Financial	0.783*** (0.050)	0.774*** (0.040)	0.740*** (0.046)	0.786*** (0.048)	0.804*** (0.036)	0.804*** (0.037)	0.779*** (0.038)	0.809*** (0.038)	0.784*** (0.039)	0.790*** (0.043)	0.715*** (0.053)	0.691*** (0.043)	0.701*** (0.053)
Change in Terms of Trade	0.842 (0.097)	0.943 (0.043)	0.946 (0.066)	0.896** (0.049)	0.940 (0.038)	0.953 (0.049)	0.960 (0.046)	0.936** (0.036)	0.967 (0.055)	0.983 (0.060)	0.969 (0.075)	1.024 (0.091)	0.777 (0.149)
Number of Trading Partners (Log)	0.827 (0.098)												0.768 (0.152)
Financial Openness Index		1.315 (0.364)											
Deposit Money Banks' Assets to GDP			0.988* (0.007)										0.987 (0.011)
Capital Account Openness				0.504 (0.242)									1.183 (1.128)
Credit Booms					0.926 (0.363)								2.289 (1.532)
Current Account Balance to GDP						1.003 (0.007)							0.967 (0.036)
External Debt to GDP							0.999 (0.001)						1.005*** (0.002)
Exchange Rate Stability Index								2.783*** (0.865)					2.410 (1.834)
Public Debt to GDP									0.997 (0.002)				0.992 (0.007)
Sound Monetary Framework										0.925* (0.039)			
Regulatory System											0.907 (0.084)		0.723 (0.144)
Legal System and Property Rights												0.913 (0.081)	1.165 (0.183)
Constant	0.383*** (0.131)	0.566* (0.165)	1.030 (0.322)	0.701 (0.241)	0.359*** (0.088)	0.481*** (0.122)	0.614* (0.169)	0.268*** (0.093)	0.567* (0.170)	0.979 (0.387)	1.181 (0.648)	0.955 (0.471)	3.205 (5.641)
Model Chi-Squared Test	42.95***	45.73***	55.70***	50.31***	39.71***	45.60***	50.82***	61.38***	42.21***	40.44***	43.97***	50.45***	72.65***
Number of Economies	113	116	114	92	115	116	116	114	115	103	103	105	81
Number of Observations	3,044	3,793	3,203	3,292	4,159	4,048	3,880	4,138	3,643	3,353	2,871	2,780	1,699

Source: IMF staff calculations.

Note: Estimations do not include country fixed effects. \*\*\*, \*\*, and \* denote significance at the 1, 5, and 10 percent level, respectively. The coefficients report changes in the odds ratio of persistent accelerations. Value greater (smaller) than 1 indicates increase (decrease) in the odds ratio relative to the unconditional odds. Robust standard errors are reported in parentheses.

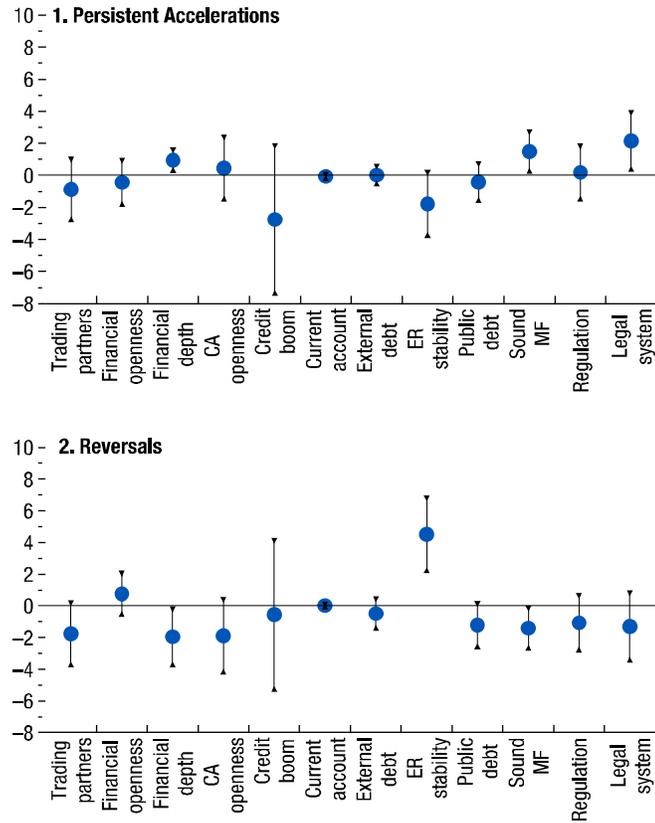
The results suggest that more financial depth, a sound monetary framework, and better quality of institutions significantly increase the odds ratio of a persistent acceleration episode (Table 1). A sound monetary framework and more financial depth also significantly reduce the odds ratio of a reversal episode, whereas lower exchange rate flexibility increases the odds ratio of experiencing a reversal (Table 2). Trade and financial openness and initial conditions in themselves are not found to significantly affect the probability of experiencing a sustained shift in growth—although they may affect how external conditions influence the occurrence of episodes, as explored below.

The economic relevance of these results is assessed using equation (3) to compute the marginal effect (that is, the change in the likelihood of a growth episode, in percentage points) when the policy or domestic attribute changes by an amount equivalent to moving from the 25th percentile to the 75th percentile of its sample distribution.<sup>6</sup> The results are reported in Figure 2. A move from the 25<sup>th</sup> to 75<sup>th</sup> percentile of the sample distribution of financial depth, sound monetary framework, and the legal system is associated with an increase in the likelihood of experiencing an acceleration episode of between 0-3 percentage points. With regard to growth reversals, a shift toward more exchange rate flexibility reduces the probability of experiencing a reversal episode.

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<sup>6</sup> In the case of the exchange rate regime, the 25th percentile corresponds to a fully flexible exchange rate regime, while the 75th percentile corresponds to a fixed exchange rate regime.

**Figure 2. Change in the Probability of Occurrence of Growth Episodes (Marginal Effect), 1970–2015**  
(Percentage points)



Source: IMF staff calculations.

Note: Vertical lines denote 90 percent confidence intervals. The figure shows the marginal effect of a given change in each domestic attribute evaluated at its mean. The magnitude of the change corresponds to an increase from the 25th to the 75th percentile of its sample distribution. CA = capital account; ER = exchange rate; MF = monetary framework.

## B. Exploring How the Impact of External Conditions on the Likelihood of Growth Episodes Depends on Policies and Other Domestic Attributes

We next turn to exploring how domestic attributes affect the impact of external conditions on the likelihood of growth episodes. To do so, we modify specification (2) to include interaction terms as follows:

$$\log\left(\frac{\Pr(\text{episode}_{it}=1)}{1-\Pr(\text{episode}_{it}=1)}\right) = \gamma z_{it} + \beta x_{it} + \delta(z_{it} \times x_{it}) + \alpha_i + \epsilon_{it}, \quad (4)$$

in which  $z_{it}$  is one of the three country-specific external conditions;  $x_{it}$  is the moving average between  $t - 3$  and  $t - 1$  of the domestic policy or attribute in question; and  $\alpha_i$  captures time-invariant country fixed effects.

We then use the estimates to derive marginal effects. This is particularly relevant since the coefficient of the interaction term in the nonlinear logit estimation using odds ratios (Equation 4) is not sufficient to infer how the effect of one independent variable depends on the magnitude of another independent variable (Ai and Norton 2003).

More precisely, we examine how shifting each domestic attribute from its 25th percentile (low quality) to its 75th percentile (high quality) within the estimation sample changes the marginal effect of external conditions, which are evaluated at their medians.<sup>7</sup> In all estimation results discussed in this section the marginal effect of the external conditions on the probability of experiencing growth episodes, evaluated at the median of the external condition and the 75th percentile of the domestic attribute, are statistically significant. The bars in Figure 3 correspond to the difference between these two sets of marginal effects, interpreted as the change in the marginal effect of the external condition variable as the domestic attribute improves (in the case of some variables, such as the exchange rate stability index, the credit boom indicator, and the external and public debt variables, the comparison is reversed to represent an improvement in the domestic attribute).

The results confirm the role played by several of these domestic attributes in influencing the marginal effect of external conditions on the likelihood of growth episodes. Regarding integration with the global economy and domestic absorptive capacity, the analysis suggests that demand from trading partners has a stronger growth impact in EMDEs that are de jure more open to international trade. Likewise, a given loosening of external financial conditions is more likely to result in sustained growth when these economies impose fewer restrictions on capital mobility and the domestic financial system is sufficiently developed and sound. In other words, it channels external financing to financially constrained agents while maintaining relatively robust risk management and origination standards that minimize the pitfalls from excessive credit growth.

More specifically, the results shown in Figure 3 (panel 1) on the impact of economic openness and financial depth can be summarized as follows:

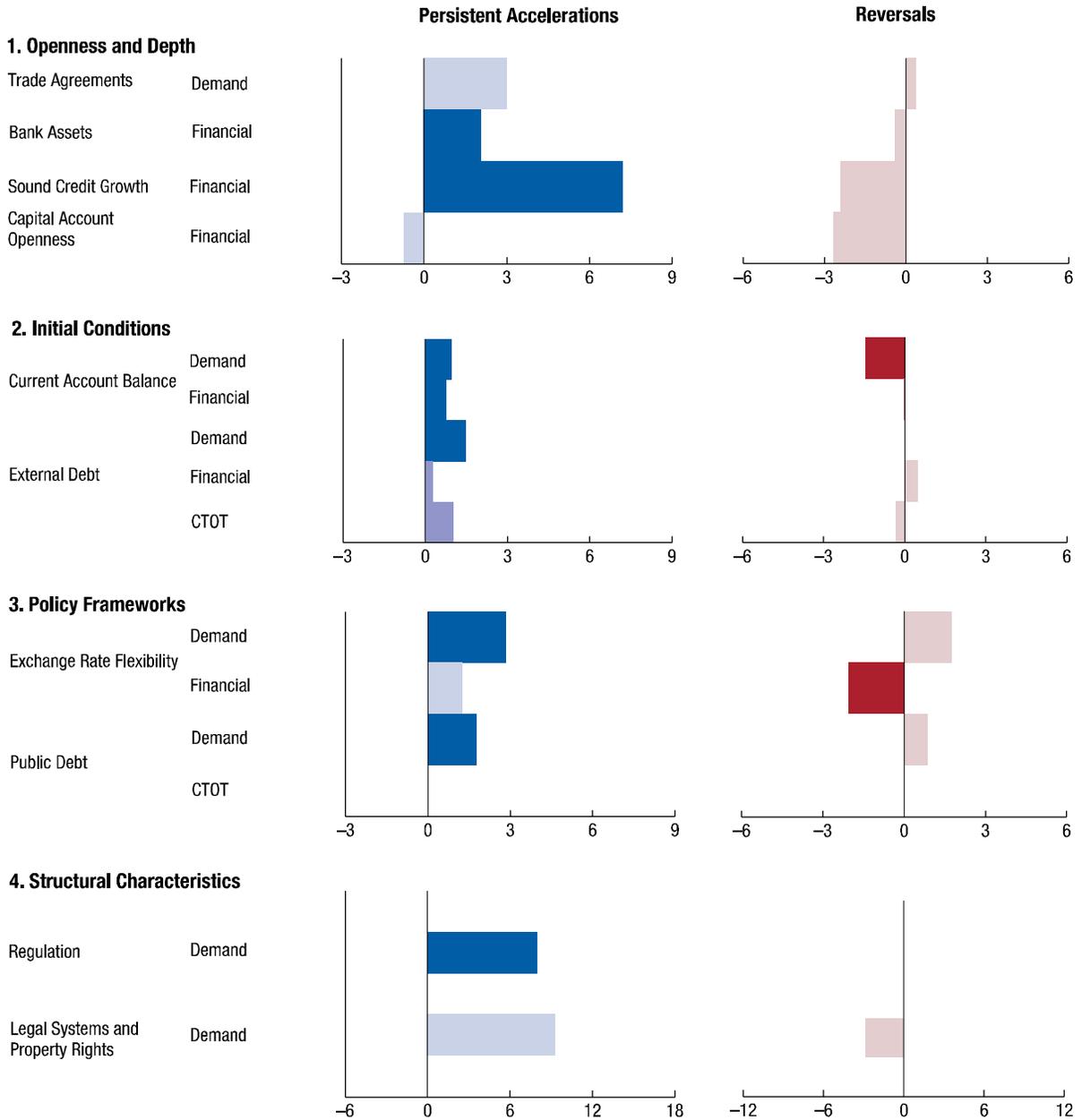
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<sup>7</sup> For a discussion on how to calculate and interpret interaction terms and their marginal effects in a logit model see, for example, Ai and Norton (2003).



**Figure 3. Change in Marginal Effect of External Conditions When Domestic Attributes Improve**  
*(Percentage points)*

The impact of external conditions on the likelihood of growth outcomes is significantly affected by domestic attributes. A mix of policies that protect trade integration, permit exchange rate flexibility, and reduce vulnerabilities associated with external imbalances and high levels of debt can help EMDEs extract the most out of external conditions.



Source: IMF staff calculations.

Note: The figure shows the change in the marginal effect of each external condition when the domestic attribute variable is evaluated at the 75th versus at the 25<sup>th</sup> percentile of its distribution (while holding the external condition variable at its median value). Estimation results have been transformed such that the 75<sup>th</sup> percentile represents more openness, lower levels of external and public debt, and higher exchange rate flexibility. A favorable effect from the change in the domestic attribute is represented by a positive (negative) value in the case of persistent acceleration (reversal) episodes. Solid bars denote difference in marginal effects significant at the 10 percent level. CTOT = commodity terms of trade; EMDEs = emerging market and developing economies.

- Deeper de jure trade integration as captured by the coverage of trade agreements increases the likelihood that supportive external conditions lead to growth accelerations in EMDEs. For instance, when the number of partners with which an economy has free trade agreements increases from the 25th to the 75th percentile in the sample, a 1 percentage point increase in external demand raises the probability of an acceleration by 3 additional percentage points.
- Financial development helps EMDEs benefit from favorable financial conditions. For instance, supportive external financial conditions (an increase in capital inflows to the region of 1 percentage point of GDP) raise the probability of accelerations by 6.6 percent in economies at the 75<sup>th</sup> percentile of financial development compared with 4.5 percent in economies at the 25<sup>th</sup> percentile—and the difference is statistically significant. Deeper financial systems also further reduce, for a given impulse from external financial conditions, the probability of reversals, although by only 1/3 percentage point.
- Sound credit growth—that is, avoiding credit booms—is associated with stronger growth outcomes under favorable external financial conditions.<sup>8</sup> The probability of a persistent acceleration when external financial conditions are supportive is about 7 percent higher when domestic credit has been growing at a healthy pace as opposed to under credit-boom conditions. The marginal effect of external financial conditions on reversals also improves (that is, the probability of the episode decreases further) by 2 1/3 percentage points for economies that avoid excessive credit growth.
- Capital account openness enhances the supportive role of external financial conditions in avoiding reversals: in more open economies, favorable external financial conditions lower the probability of reversals 2½ percentage points more than under restrictive capital account settings. There is a trade-off, though, as the probability of an acceleration *increases less* for economies with more open capital accounts—although the change in the marginal effect is small and not statistically significant.

In terms of initial conditions (Figure 3, panel 2), the results point to the importance of low external imbalances for translating favorable external conditions into positive growth outcomes:

- A low current account deficit significantly increases the marginal effect of external financial conditions on the probability of accelerations by ¾ percentage point, while it has a negligible and statistically insignificant impact on the probability of reversals.

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<sup>8</sup> An economy is considered to have sound credit growth if it has not experienced credit-boom conditions, as defined in Dell’Ariccia and others 2016, during the four years preceding the episode. As noted in Sahay and others (2015), if financial deepening proceeds “too fast” and is poorly regulated and supervised, it can trigger instability by encouraging excessive risk taking.

The marginal effect of better external demand conditions on the likelihood of an acceleration also improves significantly—by 1 percentage point—when the initial current account deficit is low. This finding is consistent with the idea that high current account deficits are often associated with overheating, and thus diminished capacity for further sustained acceleration in growth as external conditions improve. The effect of demand conditions on the probability of reversals also significantly decreases—by 1½ percentage points—when the initial current account deficit is low.

- Lower external debt increases the likelihood of accelerations when terms of trade or external financial conditions improve—by about 1 percentage point and 1/3 percentage point, respectively. It also increases the extent to which improvements in terms of trade reduce the probability of reversals.

The results further suggest that certain policy characteristics help EMDEs experience better growth outcomes for a given impulse from external conditions. In particular, exchange rate flexibility and fiscal discipline appear to have a broadly positive influence on growth outcomes, although their influences vary across specific external conditions and by growth episode (Figure 3, panel 3):<sup>9</sup>

- The exchange rate regime plays an important role in influencing the impact of external demand and financial conditions on the probability of growth episodes. The marginal effect of external demand conditions on the likelihood of episodes of sustained growth significantly improves by 3 percentage points with exchange rate flexibility. The lower impact of positive external demand conditions on the likelihood of sustained growth episodes under less flexible exchange rates could reflect inefficient allocation of resources and low productivity growth as price signals are distorted. The trade-off is that the effect of external demand on the probability of reversals decreases *less* for economies with more flexible exchange rate regimes—although the change is not statistically significant—possibly reflecting that steeper real appreciation under favorable external demand growth already exerts a countervailing force on activity. Turning to financial conditions, the effect of exchange rate flexibility on growth outcomes is unambiguously positive. The effect of external financial conditions on the probability of experiencing a period of sustained growth is about 1¼ percentage points larger under a more flexible exchange rate regime than otherwise, while the probability of a reversal decreases further and significantly by about 2 percentage points.
- Prudent fiscal policy, as proxied by the level of public debt to GDP, also influences the impact of external demand conditions on the probability of growth episodes (see

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<sup>9</sup> While a sound monetary framework in itself has a significant favorable effect on the likelihood of persistent acceleration and reversal episodes (Figure 2), the exercise in this section suggests that it does not meaningfully influence the marginal effect of external conditions on episode probabilities.

also Kumar and Woo, 2015). The marginal effect of external demand conditions on the likelihood of persistent accelerations significantly improves by about 1.8 percentage points when public debt is low.

Other structural characteristics that have been identified in the literature as important for medium-term growth, such as the quality of institutions and property rights (Hall and Jones 1999; Acemoglu, Johnson, and Robinson 2001; Acemoglu and Robinson 2014), are also found to influence the effect of external conditions on the likelihood of favorable growth outturns (Figure 3, panel 4):

- The quality of regulation improves the impact of external demand conditions. The marginal effect of external demand on accelerations increases significantly by 8 percentage points when the quality of regulation improves.
- An improvement in the quality of the legal system and property rights further increases the marginal effect of external demand on accelerations by 9 percentage points and further decreases the probability of reversals by 3 percentage points.<sup>10</sup>

In sum, improvements in all four categories of domestic attributes considered are typically associated with a better growth outturn for a given impulse from external conditions.

#### IV. CONCLUSION

External conditions influence the growth process in emerging market and developing economies through their effect on the probability of persistent growth acceleration and reversal episodes (Gruss, Nabar, and Poplawski-Ribeiro 2018). In particular, a favorable impulse from external demand and financial conditions helps medium-term growth outcomes by making growth accelerations more likely. It also reduces the likelihood of growth reversals.

In this paper we extend the analysis in Gruss, Nabar, and Poplawski-Ribeiro (2018) to consider the role of domestic policies and attributes. We find that certain domestic policies and structural attributes can affect the response of domestic activity to shifts in external conditions (in addition to directly affecting the probability of growth episodes). The analysis suggests that economies with stronger institutions—proxied by higher-quality legal systems and better protection of property rights—are significantly more likely to experience persistent acceleration episodes. The likelihood of experiencing growth reversal episodes, in turn, significantly decreases with the extent of exchange rate flexibility. A sound monetary framework and domestic financial depth are significantly associated with a higher likelihood of persistent acceleration episodes and lower likelihood of growth reversal episodes.

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<sup>10</sup> These effects possibly reflect that better institutions are also associated with better (fiscal) policy frameworks (Rajkumar and Swaroop 2008, Lledo and Poplawski-Ribeiro 2013).

Emerging market and developing economies are likely to face a less benign external environment than during long stretches of the post-2000 period. But they can get the most out of a weaker growth impulse from external conditions by strengthening their institutional framework and adopting a policy mix that protects trade integration; permits exchange rate flexibility; and ensures vulnerabilities stemming from high current account deficits and external debt, as well as high public debt, are contained.

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## ANNEX

### DATA SOURCES

**Annex Table 1. Data Sources**

Indicator	Source
Banking Crisis Indicator	Laeven and Valencia 2013
Bilateral Cross-Border Bank Claims	Bank for International Settlements
Capital Account Openness	Quinn 1997; Aizenman, Chinn, and Ito 2010
Capital Inflows	IMF, Financial Flows Analytics database
Capital Stock	Penn World Tables 9.0
Commodity Terms of Trade	Gross 2014
Commodity Export Weights	United Nations Commodity Trade Statistics (Comtrade) Database; IMF, World Economic Outlook database
Credit Boom Episodes	Dell'Ariccia and others 2016
Current Account Balance	IMF, World Economic Outlook database
Deposit Money Banks' Assets Ratio to GDP (Percent)	World Bank, World Development Indicators database
Employment	Penn World Tables 9.0
Exchange Rate Stability Index	Aizenman, Chinn, and Ito 2010
Export Value of Goods (Bilateral)	IMF, Direction of Trade Statistics database
External Debt Liabilities as a Share of GDP	Lane and Milesi-Ferretti 2007
Free Trade Agreements by Year of Signature of Agreement	DESTA, Free Trade Area database; October 2016 <i>World Economic Outlook</i>
Free Trade Agreements Coverage	WTO Regional Trade Agreements Database; October 2016 <i>World Economic Outlook</i>
Human Capital	Penn World Tables 9.0
Legal System and Property Rights Quality Index	Gwartney, Hall, and Lawson 2016
Nominal GDP	IMF, World Economic Outlook database
Nominal Interest Rate	IMF, World Economic Outlook database
Oil Price in U.S. Dollars	IMF, Global Assumptions database
Polity Score (Combined)	Polity IV/Transparency International
Population	Penn World Tables 9.0; United Nations Population database
Public Debt as a Share of GDP	Mauro and others 2013; IMF, World Economic Outlook database
Real GDP at Constant National Prices	IMF, World Economic Outlook database; Penn World Tables 9.0
Real GDP in Purchasing Power Parity Terms	Penn World Tables 9.0
Real Domestic Absorption	Penn World Tables 9.0
Regulation Quality Index	Gwartney, Hall, and Lawson 2016
Sound Monetary Framework	Gwartney, Hall, and Lawson 2016
Tariffs	UNCTAD, Trade Analysis Information System; WTO Tariff Download Facility; IMF, Structural Reforms database; October 2016 <i>World Economic Outlook</i>

Source: Authors' compilation.

Note: DESTA = Design of Trade Agreements database; UNCTAD = United Nations Conference on Trade and Development; WTO = World Trade Organization.

### Annex Table 2. Sample of Emerging Market and Developing Economies Included in the Analyses

Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Democratic Republic of the Congo, Republic of Congo, Costa Rica, Côte d'Ivoire, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Gabon, The Gambia, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Hong Kong SAR, Hungary, India, Indonesia, Islamic Republic of Iran, Iraq, Israel, Jamaica, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Kyrgyz Republic, Lao P.D.R., Latvia, Lebanon, Lesotho, Liberia, Lithuania, FYR Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Serbia, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, Sudan, Swaziland, Syria, Taiwan Province of China, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirates, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe

Source: IMF staff compilation.

Note: The classification of emerging market and developing economies includes economies considered emerging markets before 1996.

**Annex Table 3. Persistent Acceleration Episodes**

Economy	Year
Albania	1995
Algeria	2000
Argentina	2003
Armenia	2000
Azerbaijan	2003
Belarus	1999, 2002
Benin	1977
Bosnia	1995
Botswana	1970, 1986, 1994, 2003
Bulgaria	2003
Burkina Faso	1994
Cambodia	2003
Cameroon	1970, 1976
Chad	2000
Chile	2002
China	1980, 2000
Colombia	2004
Costa Rica	2003
Czech Republic	2003
Dominican Republic	1994, 2004
Ecuador	1970
Egypt	2004
Estonia	2002, 2010
Ethiopia	2003
Ghana	2008
Honduras	2003
Hong Kong SAR	1976, 2003
Hungary	1997
India	1993, 2002
Indonesia	1988, 2002
Jordan	1975, 2001
Korea	1982
Lao P.D.R.	1979
Lesotho	1987, 2005
Lithuania	2002
FYR Macedonia	2003
Malawi	2005
Malaysia	2002
Mali	1974
Mauritius	1973, 1985
Mozambique	1994
Myanmar	1993, 1998
Namibia	2002
Nigeria	2000
Oman	1975
Pakistan	2002
Panama	2003
Paraguay	2000, 2009
Peru	2003
Philippines	2003
Poland	1995, 2003
Rwanda	1975, 2003
Sierra Leone	2009
Singapore	1977, 1986, 2003
Slovak Republic	2003
Slovenia	1995
Sri Lanka	1976, 1990, 2003
Sudan	1997
Swaziland	1985
Syria	1972, 1993
Taiwan Province of China	1984
Tanzania	2000
Thailand	1986, 2002
Trinidad and Tobago	1996, 2001
Tunisia	1995
Turkey	2002
Turkmenistan	2004
Uzbekistan	2003
Vietnam	1975, 1981

Source: Gruss, Nabar, and Poplawski-Ribeiro (2018)

Annex Table 4. Reversal Episodes

Economy	Year
Albania	1988
Algeria	1985
Angola	1976, 1989
Argentina	1980, 1999
Bahrain	1981, 2006
Bangladesh	1971
Bolivia	1981
Brazil	1989
Bulgaria	1989
Burkina Faso	1981
Burundi	1992
Cameroon	1985
Central African Republic	1970, 1978, 2000, 2010
Chad	1977, 1991
Chile	1971
Democratic Republic of the Congo	1974, 1989
Republic of Congo	1986
Costa Rica	1980
Croatia	2009
Côte d'Ivoire	1979, 1989, 1999
El Salvador	1978
Ethiopia	1973, 1982, 1988
Gabon	1978, 1983, 1997
The Gambia	1984
Ghana	1973, 1979
Guatemala	1982
Guinea	1989
Guinea-Bissau	1978, 1997
Haiti	1981, 1990, 2000
Honduras	1981
Hungary	1988
Iran	1976, 1984
Iraq	1980, 1987
Jamaica	1975, 1996, 2007
Jordan	1986
Kenya	1990
Kuwait	1979, 1986, 1998, 2007
Lebanon	1987
Lesotho	1980
Liberia	1979, 1989, 2003
Madagascar	1973, 1979, 1990, 2009
Malawi	1980, 1999
Mauritania	1979
Mexico	1983
Mongolia	1989
Mozambique	1981
Myanmar	1985
Namibia	1981
Nicaragua	1976, 1985
Niger	1971, 1982
Nigeria	1979
Oman	2010
Panama	1985
Paraguay	1983, 1996
Peru	1980, 1987
Philippines	1981
Poland	1979, 1988
Qatar	1979
Rwanda	1985, 1990
Saudi Arabia	1980, 1994
Senegal	1976, 1989
Sierra Leone	1994
Slovenia	2009
South Africa	1982
Sudan	1978
Syria	1985, 2010
Tanzania	1979
Togo	1972, 1979, 1989, 1998
Trinidad and Tobago	1982
Uganda	1976
United Arab Emirates	1984, 2005
Uruguay	1981, 1999
Venezuela	1979, 1998
Zambia	1970, 1976, 1990
Zimbabwe	1974, 1983, 2001

Source: Gruss, Nabar, and Poplawski-Ribeiro (2018)