

# IMF Working Paper

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## Global Shocks and their Impact on Low- Income Countries: Lessons from the Global Financial Crisis

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Research Department, and Strategy, Policy, and Review Department

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Prepared by Andrew Berg, Chris Papageorgiou, Catherine Pattillo, Martin Schindler, Nikola Spatafora, and Hans Weisfeld<sup>1</sup>

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#### Abstract

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This paper investigates the short-run effects of the 2007–09 global financial crisis on growth in (mainly non-fuel exporting) low-income countries (LICs). Four conclusions stand out. First, for many individual LICs, 2009 was not extraordinarily calamitous; however, aggregate LIC output declined sharply because LICs were unusually synchronized. Second, the growth declines are on average well explained by the decline in export demand. Third, if the external environment facing LICs improves as forecast, their growth should rebound sharply. Finally, and contrary to received wisdom, there are few robust relationships between the cross-country growth variation and the policy and structural environment; the main exceptions are reserve coverage and labor-market flexibility.

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## I. INTRODUCTION

The global financial crisis that started in 2007 raises four important questions for low-income countries (LICs). First, what will be the short-run effects on growth in LICs, and what are the key transmission mechanisms? Second, are the effects different from those in middle-income countries (MICs)? Third, how do the effects depend on policies and country characteristics? Finally, how do the answers change when considering the medium- to long-run? This paper focuses on the first three questions; a companion piece (Berg and others, 2010) investigates the medium- and long-run effects of the global crisis on growth in LICs.<sup>2</sup>

There exists a large literature dealing with both the propagation of shocks in the global economy (e.g., IMF, 2007) and the impact of shocks, including in particular terms-of-trade shocks, on growth in developing countries (e.g., Collier and others, 1999; Deaton, 1999; Easterly and others, 1993; Ndulu and O’Connell, 2007; and Raddatz, 2006). Part of this literature investigates how macroeconomic policies in developing countries affect the impact of shocks (e.g., Collier and Goderis, forthcoming). Another strand studies how structural policies affect the impact of shocks (e.g., Collier and Goderis, 2009; and Loayza and Raddatz, 2006). Yet other work investigates the determinants of the recovery from shocks (e.g., Cerra, Panizza, and Saxena, 2009).

Previous research investigating the impact of the 2007–09 crisis has focused mainly on advanced countries and emerging markets (see, for instance, Berglof and others, 2009; Berkmen and others, 2009; Blanchard and others, 2010; Ghosh, Chamon and others, 2009; IMF, 2009a, 2010; Lane and Milesi-Ferretti, 2010; and Rose and Spiegel, 2009a, 2009b). Overall, this literature suggests that, as stated in Blanchard and others (2010), “... different trade and financial exposures, and different growth performances of partners in trade, explain a large portion of the heterogeneity of growth performances across countries during the crisis.” Thus, growth declines tended to be larger in more open countries, in countries that saw larger declines in partner country growth, and in countries that had larger financial exposures, stemming for instance from high credit growth in recent years or high short-term external-financing requirements. In addition, several studies find that faster output growth rates in recent years, a larger share of commodities in overall exports, and higher initial per capita income all led to a worse growth performance in the crisis. Findings concerning the role of reserves and of exchange rate regimes are mixed (see, for instance, Ghosh and others, 2010). Evidence on the role of pre-crisis fiscal deficits and on the effects of fiscal policies during the crisis is weak. In contrast to the above findings, Rose and Spiegel (2009a, 2009b),

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<sup>2</sup> In this paper, LICs are defined as all economies eligible to use the IMF’s concessional financial resources under the Poverty Reduction and Growth Trust (PRGT), as of December 2009. MICs are defined as all non-PRGT-eligible, non-advanced economies.

fail to find any pre-crisis variable that is a robust correlate of the decline in growth since the onset of the crisis.<sup>3</sup>

Only very few studies deal mainly or exclusively with LICs. Drummond and Ramirez (2009) find that the growth effect of the crisis on sub-Saharan Africa is explained mainly by declines in external demand, commodity prices and the terms of trade, and by tighter global financial conditions. IMF (2009b, 2009c) do not conduct formal econometric analyses but find that the crisis affected low-income countries mainly through sharp contractions in export growth, FDI, and remittances inflows, and lower-than-committed aid.

Overall, this paper makes three key contributions. First, it explicitly analyzes the determinants of the impact of the 2007–09 crisis on output growth in LICs and contrasts this with the experience of MICs. Second, it evaluates the impact of both macroeconomic and structural policies. Third, the paper improves on most existing analyses through a more sophisticated modeling of the impact of external shocks (for instance, taking into account asymmetric and threshold effects).<sup>4</sup> Throughout, the analysis takes advantage of the assumption that LICs are small in world markets. Hence, the external demand and terms of trade facing them can be broadly treated as exogenous with respect to their growth. This allows for the sort of analysis of the crisis that would be hard to justify for advanced economies.<sup>5</sup>

Briefly, the empirical analysis yields four important conclusions. First, for many individual LICs, 2009 does not stand out as extraordinarily calamitous. The unusual element was the high degree to which output declines across LICs were synchronized. Second, the sharp growth declines observed in LICs during 2007–09 are on average well explained by the magnitude of the external shocks which they faced over the period, in particular the shocks to external demand—a factor ignored by most of the existing academic literature. Third, and related, if the external environment improves as forecast, growth in LICs is also likely to rebound sharply. Finally, cross-country differences in initial policies and in the structural environment explain only a limited share of the cross-country variation in growth experiences in 2007–09. The two main exceptions are reserve coverage and labor-market flexibility.

The paper is organized as follows. First, it details some key stylized facts characterizing the impact of the 2007–09 financial crisis on LICs. Then, it analyzes the determinants of the impact of the crisis using both cross-country regressions and quartile analysis. Finally, the

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<sup>3</sup> See also Ghosh, Ostry, and Tamirisa (2009) for a broader historical discussion of what vulnerabilities and triggers may cause crises.

<sup>4</sup> See also Dhasmana (2010) for a treatment of the effect of shocks on sub-Saharan Africa that emphasizes asymmetries and nonlinearities.

<sup>5</sup> The sample median size of LICs in 2005, relative to world GDP, was only 0.01 percent, compared to 0.09 percent for MICs and 0.74 percent for advanced countries. In the aggregate, the sample of LICs represented 3.4 percent of 2005 world GDP.

paper places events in 2009 and forecasts for 2010–11 in a historical context, interpreting them using the growth experience of a broad panel of LICs over the past few decades, based on the notion that the crisis can be plausibly understood in terms of the same general mechanisms at work in the past.

The paper focuses on developments in 49 non-fuel-exporting LICs from all world regions. These are all non-fuel exporting LICs for which data were available except transition economies and those with populations smaller than one million. Comparison is made frequently to three other country groups: non-fuel-exporting middle-income countries (MICs), a larger combined group of non-fuel-exporting LICs and MICs, and an even larger group of fuel-exporting and non-fuel-exporting LICs and MICs. Sometimes comparison is made to developments in 20 advanced countries.<sup>6</sup> Appendix 1 lists the countries in the sample, and Appendix 2 describes the data and their sources.

## II. KEY STYLIZED FACTS

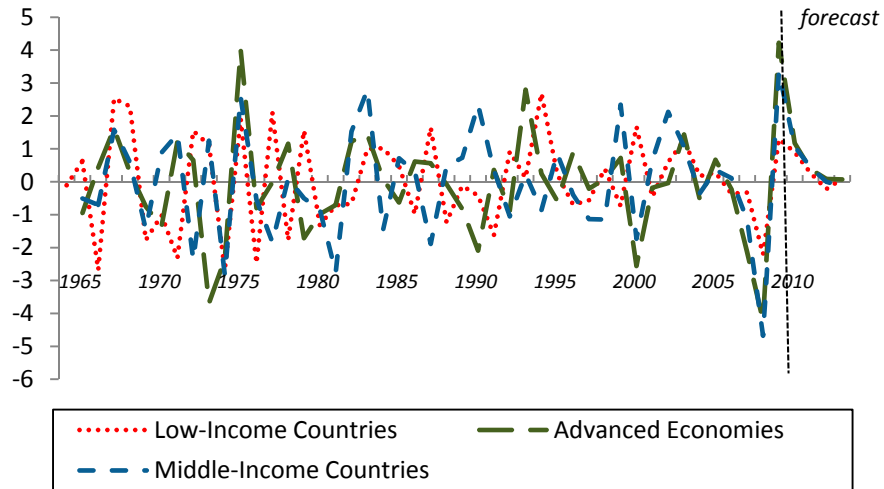
It is useful to start with some stylized facts. First, estimates for 2009 suggest that the crisis has indeed substantially slowed growth in LICs.<sup>7</sup> The impact was smaller than in advanced economies but, for LICs as a group, 2009 nevertheless represented the biggest shock to growth since the 1970s (Figures 1 and 2).

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<sup>6</sup> Classification as a low-income country is based on eligibility for the IMF's Poverty Reduction and Growth Trust. Classification as a middle income country, advanced economy, fuel exporter, and transition economy follows the IMF's *World Economic Outlook*.

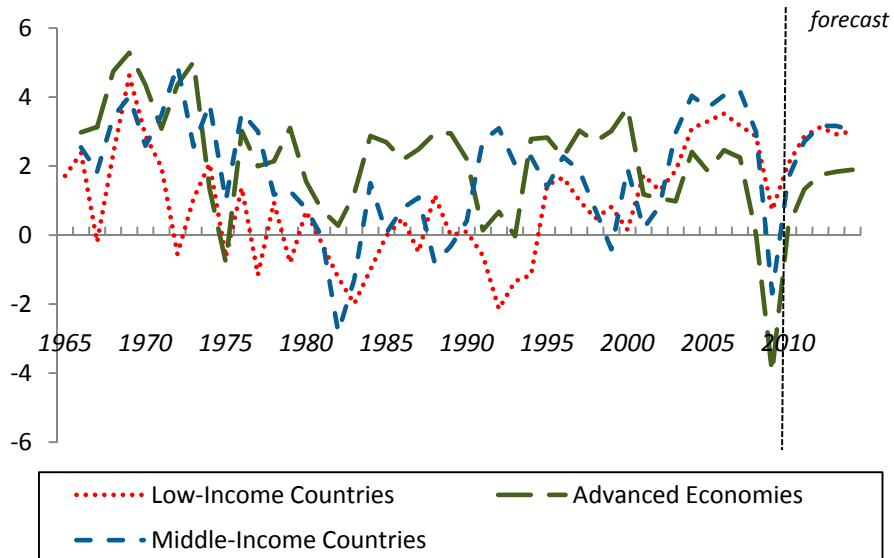
<sup>7</sup> Even though this study focuses on non-fuel-exporting LICs, this section discusses developments in LICs more generally.

Figure 1. Change in Output Growth Rate  
(Percentage points)



Note: For country sample and data sources see appendixes 1 and 2. A vertical line shows where projected values begin.

Figure 2. Output Growth Rate  
(Percentage points)



Note: For country sample and data sources see appendixes 1 and 2. A vertical line shows where projected values begin.

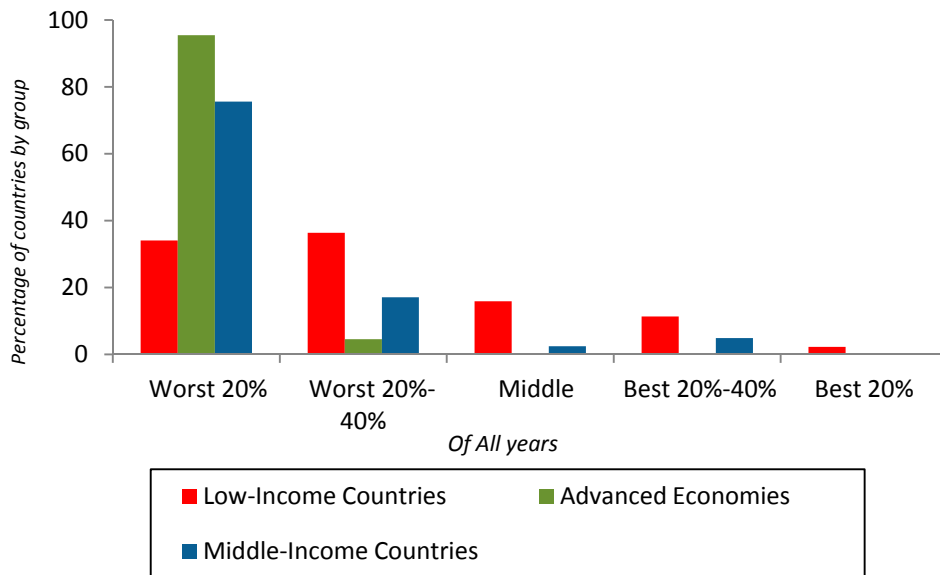


Second, LICs as a group enjoyed relatively rapid growth during the first decade of the 2000s. As a result, even at the trough of the crisis, their average growth rate remained high by historical standards.

Third, and surprisingly, for many individual LICs 2009 does not stand out as an extraordinarily calamitous year. In contrast, for most individual MICs and advanced economies, 2009 saw an extraordinarily deep recession.

Figure 3 is constructed by first computing, for each country, the change in output growth rates between 2007 and 2009.<sup>8</sup> This change is then compared with the entire distribution of annual changes in output growth rates for that country since 1970. For most advanced economies, 2009 clearly ranks among the worst 20 percent of all years in the period (indeed, for many countries, it is the single worst year). For most LICs, in contrast, 2009 does not rank among the worst years. This arises in part because the growth decline in LICs was smaller than in MICs and advanced economies. It also reflects the generally volatile nature of the growth process in many LICs.

Figure 3. Relative Severity of 2009 Output Decline

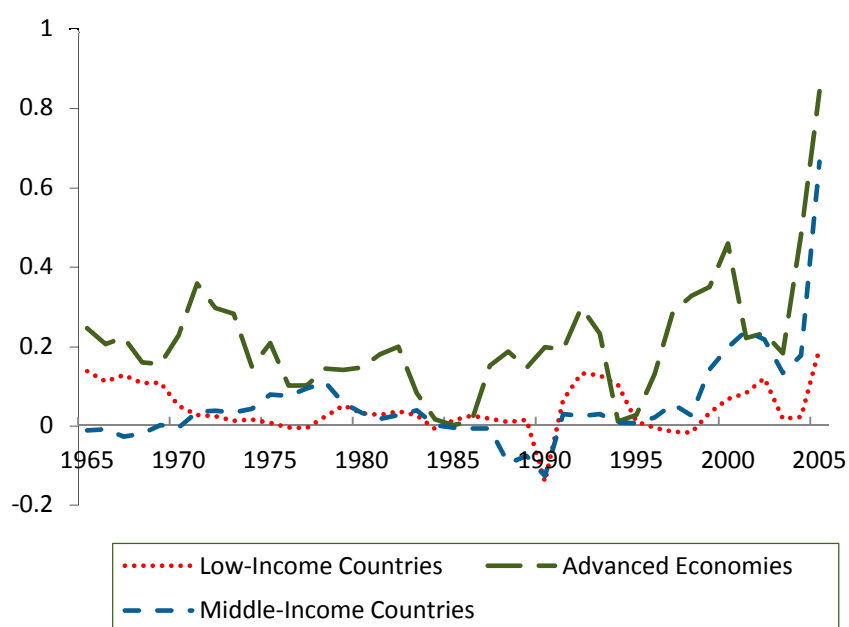


Note: For country sample and data sources see appendixes 1 and 2.

<sup>8</sup> The year 2008 is ignored, since for many economies it represented a transitional period, with the crisis having started but its impact not yet fully felt.

As pointed out, 2009 saw the worst growth decline since the 1970s for LICs as a group, but did not represent a particularly bad year for most individual LICs. These two facts can be reconciled by noting that 2009 was different in an important way: output declines within (as well as across) all the main country groups were much more highly synchronized than during any previous year, reflecting the global nature of the crisis (Figure 4). Much of the usual growth volatility in LICs stems from idiosyncratic and domestic shocks (such as wars, weather, policy shocks, and political crises).<sup>9</sup> The synchronization displayed in 2009 was thus highly unusual, even if the size of individual countries' growth shock was not.

Figure 4. Synchronization of Business Cycles: Average Bilateral Correlations of Real GDP Per Capita Growth, 1965–2009



Note: For country sample and data sources see appendixes 1 and 2. Figure is constructed as follows. For each country, the bilateral correlations between its output growth rate and those of other countries in the same analytical group are computed, using a backward-looking 5-year time-window. Then, for each country, these bilateral correlations with all other countries in the same analytical group are averaged. Finally, these average correlations are averaged over all countries in a given analytical group.

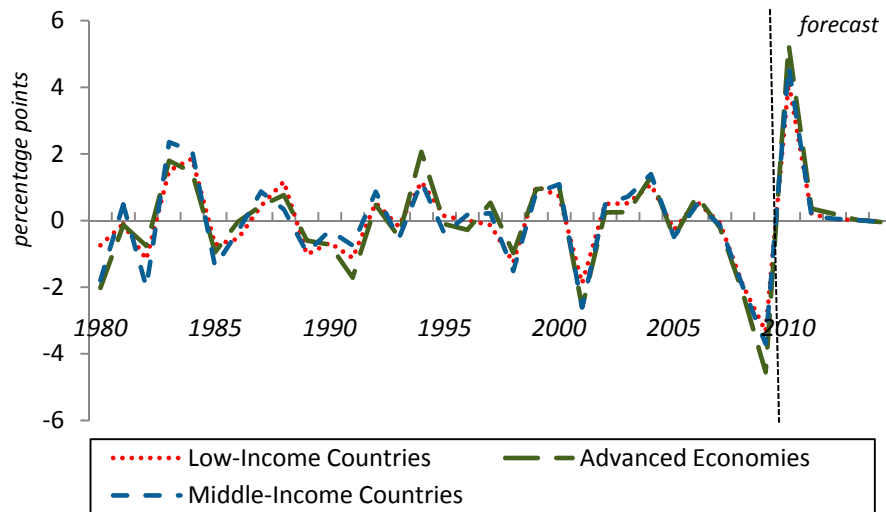
Next, let us turn to some potential drivers of the output decline in LICs. 2009 saw an unusual collapse in *external demand*, both in the aggregate and for most individual economies.<sup>10</sup> As shown in Figure 5, the aggregate decline in external demand growth for advanced economies, for LICs, and for MICs was sharper in 2009 than in any other year in our dataset. Similar

<sup>9</sup> See, for instance, Loayza and others (2007) and Raddatz (2006). That said, there is no clear consensus on the precise sources of growth volatility in LICs, while Koren and Tenreyro (2007) argue that the deeper explanation for growth volatility lies in the structure of production.

<sup>10</sup> Throughout, external demand is defined as the export-weighted average GDP growth in a country's trading partners. It is noteworthy that many existing empirical analyses abstract from the role of external demand, focusing instead on the terms of trade. Ndulu and O'Connell (2007) constitute one exception.

conclusions hold for individual economies within each of the above groups: indeed, for every economy in our sample, 2009 ranked among the worst 5 percent of all years in terms of the change in the growth rate of external demand.

Figure 5. Change in the Growth Rate of External Demand



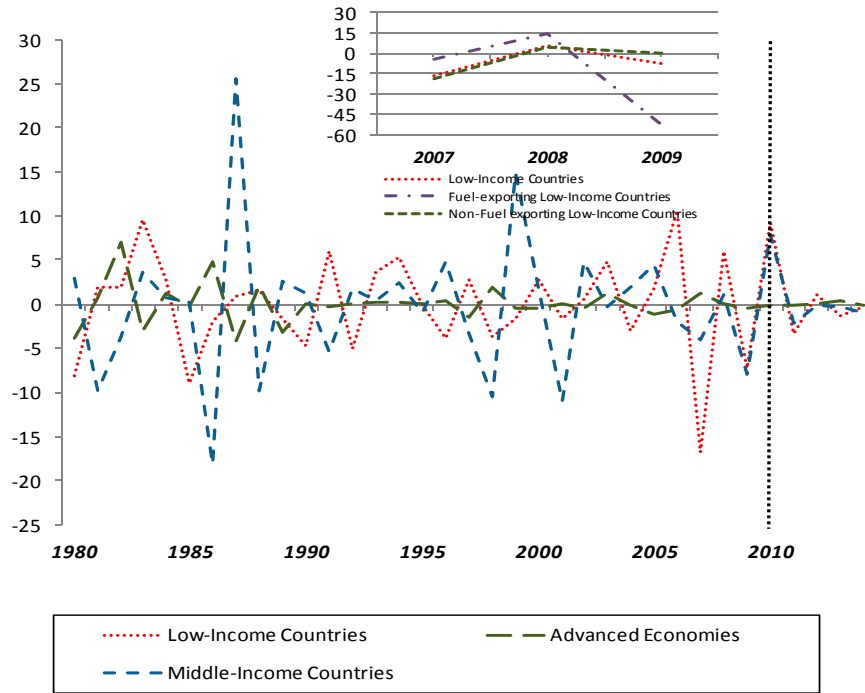
Note: For country sample and data sources see appendixes 1 and 2. A vertical line shows where projected values begin.

While 2009 was a dominant outlier in terms of external demand growth, not just on average but also for most individual countries, it was not entirely unprecedented. Between 2008 and 2009, the mean decline in partner-country GDP growth rates was 3.8 percentage points for non-fuel-exporting LICs, with 34 out of 53 countries facing negative partner-country demand growth. Between 1970 and 2007, there were some 58 instances in which partner-country demand growth fell by at least 3.8 percentage points, and 57 instances of negative partner-country demand growth.

In contrast, when examining the changes in the external terms of trade or in capital inflows, the period 2007–09 does not stand out as exceptionally negative. LICs' overall terms of trade declined, but the declines were concentrated in fuel exporters, while fuel importers saw no decline (Figure 6).<sup>11</sup> Meanwhile, FDI into LICs declined on average by amounts that were large by historical standards but still fairly small relative to GDP (the analysis focuses on FDI because this is the most relevant type of capital inflow for most LICs) (Figure 7).

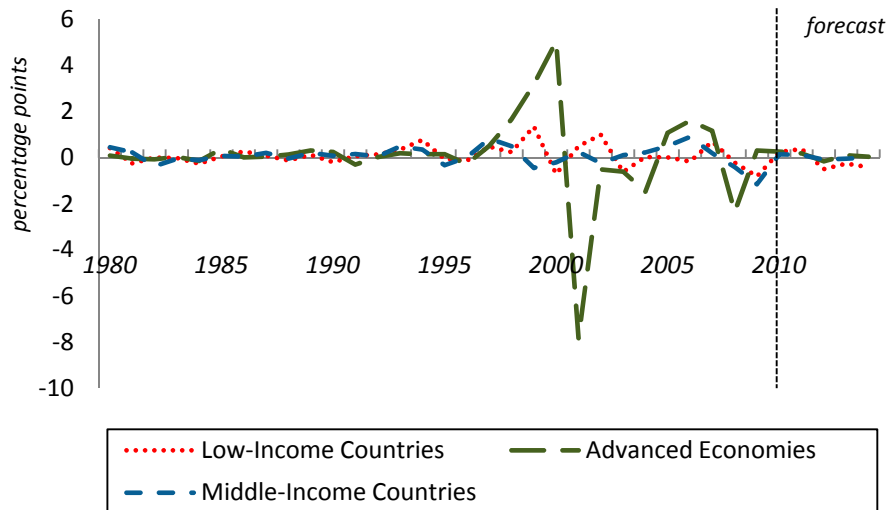
<sup>11</sup> Clearly, aggregating 2008 and 2009 hides much of the action in the terms of trade. Prices for fuel, metals, food, and other commodities generally surged through mid-2008 before falling sharply in the latter part of the period as the global financial crisis gathered steam. However, for non-fuel exporters, the fuel and food price shocks on the whole had opposite and somewhat offsetting macroeconomic effects. This was not true in every country and was also not true of every sub-group of people within countries, so that these shocks had substantial effects on poverty and sometimes on fiscal balances. But in general the growth impact was not major. See IMF (2008a) for Sub-Saharan Africa and IMF (2008b) more broadly.

Figure 6. Change in the Growth Rate of the External Terms of Trade



Note: For country sample and data sources see appendixes 1 and 2. A vertical line shows where projected values begin.

Figure 7. Change in FDI/GDP



Note: For country sample and data sources see appendixes 1 and 2. A vertical line shows where projected values begin.

Before turning to a more formal analysis, it should be stressed that for most LICs, in contrast to most advanced countries and many MICs, the current shock is qualitatively (if not quantitatively) quite familiar. The origin of the crisis lay in the financial sector of advanced economies. Meanwhile, many MICs, particularly the most hard-hit, had tight financial links with advanced countries and balance sheet vulnerabilities, and experienced sharp capital-flow reversals.<sup>12</sup> In contrast, most LICs were (as seen above) hit primarily by sharply lower export demand, to some extent lower capital inflows (notably FDI) and, for fuel exporters, a negative terms-of-trade shock. Thus, many of the channels operating in advanced countries and MICs seem not to apply in most LICs. In turn, this provides greater justification for a historical analysis than might be the case in advanced economies and even MICs.

### III. CROSS-COUNTRY ANALYSIS

As stated above, the major shocks affecting non-fuel-exporting LICs in 2009 were the declines in external demand and, to a lesser extent, capital inflows.<sup>13</sup> Accordingly, one would expect these two factors, as well as openness as a determinant of the importance of external demand, to be positively correlated with the growth decline in LICs. Graphical analysis suggests there was indeed a positive correlation between on the one hand the decline in growth in LICs in 2009, and on the other hand the decline in external demand growth (Figure 8, left-hand panel) and—somewhat more weakly—the degree of pre-crisis openness (Appendix Figure 3.1, left-hand panel). However, somewhat contrary to expectations, the relationship between the growth decline and the change in capital inflows, as proxied by the change in FDI inflows, is less clear (Appendix Figure 3.2, left-hand panel). Further, the relationship between the growth decline and the change in the terms of trade is elusive (Appendix Figure 3.3, left-hand panel).

An important fact to keep in mind is that the 2009 cross-section exhibits very little variation in the growth rate of external demand relative to the range of growth outcomes. As seen in figure 8, which uses identical scaling for both axes, almost all countries faced a decline in external demand growth on the order of 4 to 9 percentage points, while the change in domestic growth varied from +2 to -15 percentage points.<sup>14</sup> This implies both that much of the cross-sectional growth variation in the growth decline reflects other factors and that the effects of the large common external demand shock on the large common growth decline may be hard to pick up in the cross-section.

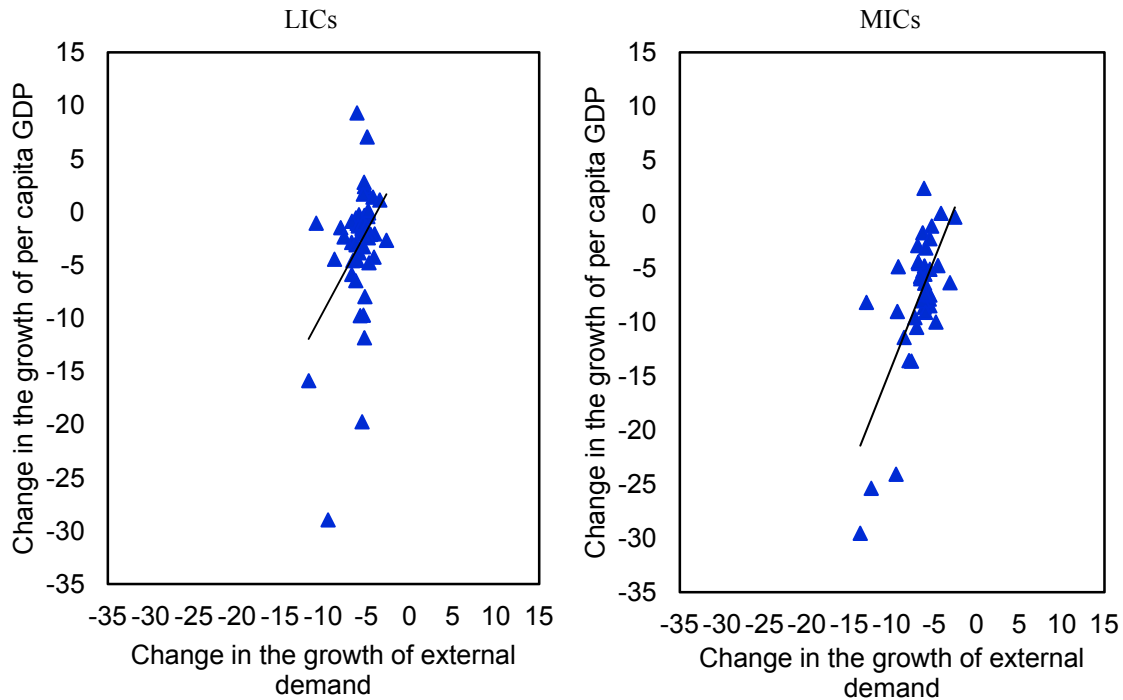
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<sup>12</sup> For a discussion of the experience of both advanced economies and MICs see, for instance, IMF, 2009b, 2009c, 2009d, and 2009e.

<sup>13</sup> The remainder of the paper focuses on 49 non-fuel-exporting LICs. Unless otherwise noted, from here on the term “LICs” refers to non-fuel-exporting LICs.

<sup>14</sup> The above ranges cover the fifth to the ninety-fifth percentiles of all countries.

Figure 8. External Demand and Per-Capita GDP Growth in Non-Fuel-Exporting LICs and MICs, 2007–09  
(Differences between Growth Rates, in Percentage Points)



Note: For country sample and data sources see appendixes 1 and 2.

It may seem surprising that external demand should be an important determinant of GDP growth in LICs, since LICs are typically viewed as commodity-exporting price-takers in both export and import markets. Thus, most analyses of external shocks, such as Deaton and Miller (1996) and Raddatz (2006), focus on the terms of trade or commodity prices, and abstract from external demand. Among the exceptions are Ndulu and O’Connell (2007) and Drummond and Ramirez (2009). However, at least over short periods of a year or so, even most commodities may not be perfect substitutes. Tobacco from, say, Malawi has its own characteristics and marketing network, so that the demand volume from a particular set of clients may matter for exports and revenues, even given world tobacco prices or Malawi’s terms of trade. Some of this may reflect mismeasurement of the country-specific terms of trade, which are correlated with partner country demand.<sup>15</sup> In any event, this paper opts to let the data speak for themselves. The first important question is how these various effects hold up in a multivariate context.

A more formal cross-country analysis of the 2009 output decline in LICs confirms and extends the above results. As a first step, the cross-country variation in the change in the

<sup>15</sup> The terms of trade variable was taken from the IMF’s *World Economic Outlook* database. It is the ratio of the price deflators of goods exports and goods imports.

annual growth rate of real output per capita between 2007 and 2009 is investigated using OLS regressions.<sup>16</sup> In a second step, a quartiles analysis is conducted to allow for potential nonlinearities. For this, LICs are divided into quartiles based on the magnitude of their growth decline, and the quartiles with the highest and the smallest growth declines are compared in terms of the same explanatory variables employed in the OLS regressions.

The explanatory variables are arranged into two groups: the “main” and the “additional” explanatory variables. The main explanatory variables are the three external shocks discussed in the previous section: the change in external demand, the change in the external terms of trade, and the change in the ratio of FDI to GDP. Both the simultaneous and the lagged values of these shocks are included as is the lagged dependent variable. To capture the country-specific importance of external demand, changes in external demand growth are weighted by the share of exports in GDP. Intuitively, external demand should matter more in countries that depend more strongly on exports. Analogously, changes in terms-of-trade growth are weighted by the share of trade in GDP.<sup>17</sup>

The additional variables include a number of policy-related variables. The goal is to gauge the role of pre-crisis policy conditions in influencing the output effects of the crisis. To some extent, the analysis may also shed light on the output impact of any policy response—for instance, if countries that had greater policy “space” conducted more aggressive countercyclical policies. The additional variables also include certain country characteristics that might reasonably be expected to affect the degree to which an external shock translates into a growth decline. The additional variables are:

- Pre-crisis fiscal policy (fiscal balance and public external debt): inclusion of these variables is motivated by the notion that countries with stronger initial fiscal positions may be better placed to ride out the effects of negative shocks, for instance through greater scope for counter-cyclical expenditures.
- Pre-crisis exchange rate regime and level of reserves: the purpose is to determine whether countries with more flexible exchange rate regimes and/or higher reserve coverage found it easier to adjust to the external shock. Regarding the exchange rate regime, the analysis adopts the Reinhart-Rogoff de facto classification, grouping countries into those with “fixed” versus “floating” exchange rates.<sup>18</sup> Regarding reserves, an indicator variable is defined equal to unity if reserves equal at least three

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<sup>16</sup> The time frame chosen in this paper is 2007-09 because 2007 was the last year in which growth was not affected in a major way by the global crisis.

<sup>17</sup> A specification where external demand was weighted by the share of non-commodity exports in GDP was also investigated. Results were broadly similar.

<sup>18</sup> Ongoing research is examining the robustness of the results using the Ghosh, Ostry, and Tamirisa (2010) dataset. This provides both a de facto and a de jure classification.

months' imports or (depending on the specification) the volume of external liabilities maturing over the coming year, and equal to zero otherwise.<sup>19</sup>

- Pre-crisis external balance and capital inflows (current account balance, FDI inflows, and remittances inflows): inclusion of these variables reflects the intuition that countries with higher pre-existing current accounts may be better placed to absorb external shocks. At the same time, higher initial FDI inflows may create vulnerability to external shocks. The likely impact of higher initial remittances inflows depends on the degree to which these inflows are countercyclical.
- Nature of output growth (ratio of GDP growth during 2004–07 relative to growth during 1990–2007, and rate of growth of credit to the private sector during 2000–07): both measures are designed to reflect fragilities in the growth process, such as possibly unsustainable growth accelerations and growth that relies on an excessive expansion of bank credit.
- Structural country characteristics:
  - Pre-crisis per capita-income, size of commodities exports, size of manufactures exports, and openness: the intuition is that countries with higher pre-crisis per-capita income might be better able to absorb shocks because of larger public and private “buffers;” that countries with different export compositions might be affected differently; and that more open countries might be affected more strongly.
  - Indicators of the degree of structural reform and liberalization (specifically, indicators of labor market, product market, and domestic financial sector liberalization, drawn from Ostry and others, 2009): the intuition is that countries with more liberalized economies may be able to reallocate resources more rapidly and effectively in response to shocks.
  - Indicators of institutional quality (Kaufmann, Kraay, and Mastruzzi, 2009): the idea is that countries benefiting from higher institutional quality should be better able to minimize the output effects of external shocks.

Overall, the analysis enjoyed some success in identifying the determinants of the growth decline in LICs (regression analysis in Table 1 and quartiles analysis in Table 2). A caveat is that owing to small sample size, in the regression analysis the additional variables could only be included one at a time.<sup>20</sup> Hence, no single preferred and encompassing specification including several additional variables could be identified.

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<sup>19</sup> Alternative specifications were tried in which the indicator was based on the ratio of reserves to GDP or on the ratio of reserves to the sum of the current account deficit and short-term external liabilities. The results were broadly similar.

<sup>20</sup> Adding all additional variables simultaneously resulted in very small sample sizes and pronounced parameter instability. The same held true when adding simultaneously those additional variables that had been found significant if added one at a time.



Both the regression analysis and the quartiles analysis find evidence for:

- A positive relationship between the decline in external demand and the decline in domestic growth, as well as between openness and the decline in growth, documenting the importance of external demand and the role it plays for countries with different degrees of openness;<sup>21</sup>
- A positive relationship between the growth of credit to the private sector during the recent years of strong growth (2000–07) and the decline in growth. This result, which mirrors the findings of the literature on the impact of the crisis focused on MICs, suggests that a high degree of credit financing of economic activity made countries more vulnerable to external shocks;
- A negative relationship between labor market flexibility and the decline in growth: countries with more flexible labor markets saw growth decline by less than others. As expected, more flexible labor markets appear to make adjustment to external shocks easier.

Further, the regression analysis finds that a higher pre-crisis share of commodities exports in GDP exports helped reduce the crisis' growth impact on LICs. This may in part reflect the fact that growth in commodity-hungry dynamic emerging markets held up fairly well.

In addition, the quartiles analysis suggests that:

- Countries that saw larger growth declines had more flexible exchange rate regimes. While this finding may seem counter-intuitive, the evidence on the link between exchange rate regimes and the short-run impact of external shocks is unclear (see, for instance, Chinn and Wei, 2008, and Ghosh and others, 2010; in contrast, there is evidence that flexible exchange rates help promote recovery after the initial shock has passed, as discussed in Ramcharan, 2007);
- Countries that experienced larger growth declines had lower initial government external debt. This result runs counter to the intuition that countries with lower debt are better able to adjust to external shocks;
- Countries that saw larger growth declines had higher initial FDI. This finding might reflect the role of openness;
- Countries that suffered larger growth declines had higher initial income per capita;
- Countries that witnessed larger growth declines had greater product market and financial sector flexibility (results not shown owing to space constraints). This result runs counter to the idea that greater flexibility helps adjust to shocks.

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<sup>21</sup> Openness as a stand-alone additional variable is significant only in those regression specifications (not shown) where external demand is not weighted by exports to GDP, and where the terms of trade are not weighted by trade over GDP. In the weighted specification, openness as a stand-alone additional variable loses its significance because the weighting scheme includes openness as an element of the main variables.

Table 1. Cross-Country Regression Analysis

Cross-country OLS with heteroskedasticity-robust standard errors

Dependent variable: growth in real per capita GDP in 2009 - growth in real per capita GDP in 2007

Variables	Estimated Coefficients			
	Non-Fuel-Exporting LICs and MICs	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
I. Main variables:				
Lag change in real per capita growth (2007 - 2005)	-0.02	-0.10	0.29	-0.44 (*)
Change in (terms of trade growth * trade/GDP) (2009-2007)	0.01	-0.02	0.05	0.02
Lag change in (terms of trade growth * trade/GDP) (2009-2007)	-0.05 (*)	0.00	-0.24 *	-0.05 (*)
Change in (external demand growth * exports/GDP) (2009-2007)	2.50 ***	1.89 **	2.43 ***	2.12 ***
Lag change in (external demand growth * exports/GDP) (2009-2007)	3.62 **	1.20	10.29 **	3.67 **
Change in FDI/GDP (2009-2007)	0.53 **	0.29	0.72 **	0.48 **
Lag change in FDI/GDP (2007-2005)	0.33 (*)	-0.10	0.46	0.41 ***
Constant	0.13	0.94	-2.31 (*)	-0.56
Observations	88	48	40	103
R squared	0.44	0.34	0.53	0.38
II. Additional Variables:				
Fiscal policy:				
2007 Fiscal balance/GDP	-0.02	-0.01	-0.39 **	-0.03
2007 Debt/GDP	0.00 **	0.00	0.06 *	0.00 ***
Exchange rate policy and level of reserves:				
2007 Exchange rate regime (higher=more flexible)	-0.14	-0.42	0.58	-0.21
2007 Reserves/months of imports	0.00	0.03	0.06	0.02
2007 Reserves over short external liabilities plus current account deficit	1.11 **	0.17	1.36 *	0.90 (*)
External balance and capital inflows:				
2007 Current account balance/GDP	0.19 **	0.11	0.22 *	0.08
2007 FDI/GDP	-0.29 (*)	-0.33	-0.39	0.11
2007 Remittances/GDP	0.07	-0.02	0.22 **	0.11 (*)
Growth preceding crisis:				
GDP growth in 2004–2007/GDP growth in 1990–2007	-0.04	-0.05	-1.02 *	-0.17
Growth of credit to private sector during 2000–2007	-0.11 ***	-0.09 **	-0.18 ***	-0.12 ***
Structural characteristics:				
2007 GDP per capita	-0.001 ***	-0.001	-0.001 ***	0.00 ***
2007 Commodities exports/GDP	0.37 **	0.33 **	0.50 **	0.18 **
2007 Manufactures exports/GDP	0.14 *	-0.11	0.22 ***	0.13 *
2007 Openness	0.06 **	0.01	0.10 ***	0.04 (*)
2005 Labor market flexibility	11.36 ***	7.42 *	16.69 ***	9.02 *
2007 Institutional quality	-2.83 ***	-2.11	-3.29 **	-2.78 ***

Note: For country sample and data sources see appendixes 1 and 2. Levels of significance indicated as follows: 1% (\*\*\*), 5% (\*\*), 10% (\*), and 20% ((\*)).

Table 2. Cross-Country Quartiles Analysis for Non-Fuel-Exporting LICs

Variables	Countries with small impact on growth (1)		Countries with big impact on growth (2)		Difference (1 - 2)	
	Median	Mean	Median	Mean	Median	Mean
I. "Dependent" Variable						
2007-09 Change in per capita real GDP growth	1.3	2.0	-8.0	-10.2	9.2	12.2 ***
II. Main "Explanatory" Variables						
2005-07 Change in per capita real GDP growth	-0.1	0.4	1.3	0.9	-1.4	-0.4
2007-09 Change in terms-of-trade growth	13.1	14.0	-1.8	0.1	15.0	13.9
2007-09 Change in terms-of-trade growth * trade/GDP	5.4	5.7	-1.3	3.7	6.7	1.9
2007-09 Change in external demand growth	-5.1	-5.0	-5.7	-6.3	0.6	1.3 **
2007-09 Change in external demand growth * exports/GDP	-2.9	-3.6	-6.7	-9.0	3.8	5.4 **
2007-09 Change in FDI as a share of GDP	0.0	-0.7	-1.6	-0.9	1.6	0.2
III. Additional "Explanatory" Variables						
Fiscal policy						
2007 Fiscal balance/GDP	-2.3	-3.1	-1.5	-1.5	-0.8	-1.6
2007 Debt/GDP	59.9	73.4	32.7	34.5	27.2	38.9 *
Exchange rate policy and level of reserves:						
2007 Exchange rate regime	1.0	1.8	3.0	2.7	2.0	0.9 **
2007 Reserves/months of imports	4.1	4.0	3.5	3.8	0.6	0.2
2007 Reserves/(short external liabilities + current account deficit)	1.7	2.0	1.4	1.8	0.4	0.2
External balance and capital inflows:						
2007 Current account/GDP	-7.8	-7.1	-7.8	-9.1	0.0	2.1
2007 FDI/GDP	1.4	3.6	9.2	8.5	-7.7	-4.8 **
2007 Remittances/GDP	6.9	6.7	2.4	6.8	4.6	-0.1
Growth preceding crisis:						
Real per capita GDP growth in 2004-07 relative to 1990-2007	1.1	0.3	1.6	1.2	-0.4	-0.9
Credit growth: Private sector during 2000-2007	2.4	1.7	6.0	7.5	-3.6	-5.8 **
Structural characteristics:						
2007 GDP per capita (US\$)	382	435	940	1088	-558	-653 **
2007 Share of commodities exports in GDP	3.4	6.4	1.1	2.3	2.3	4.1
2007 Share of manufactures exports in GDP	1.6	4.9	5.8	6.1	-4.2	-1.3
2007 Openness (trade / GDP)	49.9	53.9	70.4	77.8	-20.5	-23.8 **
2005 Labor Market Indicator	0.7	0.7	0.6	0.6	-0.1	-0.2 **
2007 Kaufmann, Kraay, and Mastruzzi Institutions Indicator	-0.5	-0.3	0.1	0.1	0.7	0.4

Note: For country sample and data sources see appendixes 1 and 2. Tajikistan, Kyrgyz Republic, and Guinea-Bissau excluded due to data concerns. Unless otherwise noted, ratios, shares and growth rates are in percent and changes in percentage points. Levels of significance indicated as follows: 1% (\*\*\*) , 5% (\*\*) and 10% (\*).

In contrast, the analysis finds no evidence for a relationship between, on the one hand, the domestic growth decline and, on the other hand, changes in terms-of-trade growth, changes in FDI, or the pre-crisis fiscal stance, exchange rate regime, reserves levels, current account balance, remittances, growth accelerations, share of manufactures exports in GDP, and institutional quality. Among other things, small sample size and the influence of idiosyncratic growth determinants may have contributed to these non-results.

Regression and quartiles analysis results for non-fuel-exporting MICs and the larger country groupings including both LICs and MICs are broadly similar (Table 1 and Appendix Tables 3.1-3.3). In addition to most of the variables found to be significant for LICs, a few further variables are found to be significant for MICs (not all with the expected sign, however). For instance, in contrast to the findings for LICs, and in line with other research such as IMF (2010), there is evidence that in MICs stronger pre-crisis current account positions and better reserve covers helped reduce the impact of the crisis.

#### **IV. PANEL ANALYSIS**

There are limits to what can be learnt from the cross-section: it contains relatively few observations and, as seen above, along many dimensions there is very little cross-sectional variation in the variables of interest. By exploiting within-country variation, a panel approach can therefore yield additional insights. In what follows, the output decline in LICs is analyzed through a reduced-form panel regression, based on annual data from 1970 onwards, with the growth of real output per capita as the dependent variable.

##### **A. The Role of Non-Policy Variables**

The key independent variables are, again, the three external shocks discussed above: the change in external demand, the change in the external terms of trade, and the change in the ratio of FDI to GDP. Again, both the simultaneous and the lagged values of these shocks are included as is the lagged output growth rate. Other controls include a full set of country- and year-specific fixed effects. The sample is the same as in the previous section.

This minimalist regression (as opposed to a full-blown growth regression with external shocks as additional variables) was adopted because it puts the emphasis in the right place for our purposes. The main shocks of interest, notably to the terms of trade and partner-country demand, are plausibly exogenous to most LICs, which are almost always small in the markets for goods they trade. These shocks may be correlated with other variables that may matter for growth, for instance, the inflation rate or institutional quality. But, again, it is likely that the direction of causality runs from these shocks to the other variables rather than the reverse. Thus, insofar as the shock variables act partly directly and partly through their influence on other variables, both effects are captured by the specification adopted.<sup>22</sup>

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<sup>22</sup> A number of additional specifications were also tried, which included two lags of the external shock variables. In some specifications (not shown) additional lags proved significant; however, the overall results were not clearly an improvement, and this paper therefore opted for simplicity in the reported lag structure.

Can such a minimalist formulation explain outcomes in 2009, particularly if 2009 is left out of the estimation sample? A critical assumption underlying this approach is that the events in 2009 be qualitatively similar to previous experiences. The proof is in the pudding, which will be served below. Some encouragement may be taken, though, in that not only the output declines but also the external demand shocks are not entirely unprecedented, as mentioned above.

The panel analysis yields several important conclusions. First, in LICs, external demand is a significant determinant of output growth. In MICs, and in LICs and MICs together, FDI and (to a lesser extent) the terms of trade are additional significant determinants of output growth, (Table 3). When focusing on the post-1989 sub-period, the impact of external demand broadly increases in both magnitude and statistical significance, likely reflecting increasing openness over time (Table 4).

Table 3. Regression Analysis (Panel GMM): Initial Specification for Output Growth, All Years

	All Non-Fuel Exporters	Non-Fuel- Exporting LICs	Non-Fuel- Exporting MICs	All LICs and MICs
Lagged Growth	0.122*** (0.043)	0.114* (0.067)	0.201*** (0.066)	0.153*** (0.035)
Growth in Terms of Trade	0.014 (0.010)	0.013 (0.011)	0.014 (0.010)	0.020** (0.009)
Lagged Growth in Terms of Trade	0.016* (0.009)	0.012 (0.009)	0.027** (0.012)	0.025*** (0.008)
Growth in External Demand	0.702*** (0.137)	0.403** (0.160)	0.568** (0.286)	0.635*** (0.136)
Lagged Growth in External Demand	0.027 (0.127)	0.020 (0.102)	-0.094 (0.219)	0.220* (0.125)
Change in (FDI / GDP)	0.111*** (0.043)	0.040 (0.045)	0.151*** (0.055)	-0.031 (0.037)
Lagged Change in (FDI / GDP)	0.188*** (0.035)	0.065 (0.042)	0.266*** (0.052)	0.017 (0.047)
Observations	2863	1495	1368	3501
Number of Countries	89	47	42	108

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Table 4. Regression Analysis (Panel GMM): Baseline Specification for Output Growth, Years 1990–2009

	All Non–Fuel Exporters	Non–Fuel-Exporting LICs	Non–Fuel-Exporting MICs	All LICs and MICs
Lagged Growth	0.229*** (0.064)	0.190** (0.086)	0.386*** (0.055)	0.198*** (0.050)
Growth in Terms of Trade	0.009 (0.014)	0.008 (0.014)	0.005 (0.028)	0.013 (0.013)
Lagged Growth in Terms of Trade	0.010 (0.012)	0.007 (0.011)	0.002 (0.030)	0.016 (0.010)
Growth in External Demand	1.072*** (0.151)	0.352** (0.157)	0.960*** (0.204)	1.073*** (0.141)
Lagged Growth in External Demand	-0.104 (0.126)	-0.034 (0.156)	-0.257 (0.183)	0.153 (0.116)
Change in (FDI / GDP)	0.082** (0.037)	0.021 (0.041)	0.112** (0.046)	-0.048 (0.039)
Lagged Change in (FDI / GDP)	0.140*** (0.029)	0.056 (0.046)	0.190*** (0.047)	-0.001 (0.044)
Observations	1,624	853	771	1,984
Number of Countries	89	47	42	108

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

It would be natural to expect that both terms-of-trade and external demand shocks should exert a greater impact in more open economies; the analysis, however, proved inconclusive on this score (Appendix Table 3.4).<sup>23</sup> In the rest of the paper, given our focus on recent events and the reality that the growth process in many countries, including in particular LICs, has changed significantly over time, the results for the post-1989 sub-period are adopted as the baseline.

Second, the data also show clear evidence of asymmetries: adverse shocks reduce growth by more than positive shocks increase growth. For instance, for the full sample, the estimated impact of a below-mean shock to external demand is about one-third larger than the impact of an above-mean shock to external demand, with an even greater differential in MICs

<sup>23</sup> Trade openness is measured here as the ratio of the sum of exports and imports relative to GDP, lagged by one year to diminish endogeneity concerns. The *a priori* more attractive specification, in which external demand is weighted by the share of non-commodity exports in GDP, and the terms of trade by the share of commodity trade in GDP, did not find robust support in the panel, in contrast to the cross-section.

(Table 5). Again, large negative shocks to external demand<sup>24</sup> exert a disproportionately negative impact on output growth (Table 6).<sup>25</sup>

Table 5. Regression Analysis (Panel GMM): Alternative Specification for Output Growth with Asymmetries, All Years

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Lagged Growth	0.121*** (0.043)	0.112* (0.067)	0.198*** (0.065)	0.149*** (0.035)
Growth in Terms of Trade	0.008 (0.013)	0.001 (0.015)	0.030** (0.015)	0.003 (0.012)
Lagged Growth in Terms of Trade	0.017* (0.009)	0.012 (0.009)	0.028** (0.012)	0.024*** (0.008)
Growth in External Demand	0.692*** (0.134)	0.403** (0.158)	0.538* (0.284)	0.622*** (0.133)
Lagged Growth in External Demand	0.021 (0.130)	0.023 (0.105)	-0.100 (0.217)	0.209* (0.126)
Change in (FDI / GDP)	0.139*** (0.049)	0.057 (0.058)	0.172*** (0.053)	-0.006 (0.039)
Lagged Change in (FDI / GDP)	0.344*** (0.074)	0.174* (0.102)	0.417*** (0.047)	0.187*** (0.068)
Growth in Terms of Trade * Indicator (Below Mean TOT Shock)	0.013 (0.017)	0.024 (0.018)	-0.027 (0.037)	0.033** (0.016)
Growth in External Demand * Indicator (Below Mean ED Shock)	0.202*** (0.075)	0.119 (0.114)	0.316** (0.136)	0.111 (0.087)
Lagged Change in (FDI/GDP) * Indicator (Below Mean FDI Shock)	-0.323** (0.147)	-0.199 (0.226)	-0.375*** (0.121)	-0.352** (0.144)
Observations	2,863	1,495	1,368	3,501
Number of Countries	89	47	42	108

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

<sup>24</sup> Large negative shocks to external demand are defined as observations where partner-country demand growth is less than zero. For comparison, the sample mean of partner-country demand growth equals 3.7 percent.

<sup>25</sup> Various alternative specifications were explored, including one which adopted other definitions of negative shocks, such as partner-country growth lying more than one standard deviation below the mean. In general, the coefficient on the interaction between the growth in external demand and the indicator of a large adverse shock proved statistically and economically significant. The specification in Table 6 was adopted because it works reasonably well and is relatively simple.

Table 6. Regression Analysis (Panel GMM): Alternative Specification 2 for Output Growth with Asymmetries, All Years

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Lagged Growth	0.124*** (0.043)	0.115* (0.067)	0.206*** (0.064)	0.154*** (0.035)
Growth in Terms of Trade	0.014 (0.010)	0.008 (0.010)	0.025** (0.010)	0.018* (0.009)
Lagged Growth in Terms of Trade	0.017** (0.009)	0.012 (0.009)	0.026** (0.012)	0.024*** (0.008)
Growth in External Demand	0.570*** (0.145)	0.343** (0.152)	0.388 (0.309)	0.524*** (0.143)
Lagged Growth in External Demand	0.031 (0.127)	0.020 (0.103)	-0.095 (0.218)	0.229* (0.125)
Change in (FDI / GDP)	0.118*** (0.044)	0.048 (0.048)	0.150*** (0.051)	-0.028 (0.037)
Lagged Change in (FDI / GDP)	0.206*** (0.040)	0.095** (0.047)	0.284*** (0.052)	0.024 (0.049)
Large Negative TOT Shock Indicator	0.018 (0.912)	-1.142 (0.772)	1.820 (1.824)	-0.414 (0.845)
Large Negative ED Shock Indicator	-2.795*** (0.992)	-1.139 (0.915)	-4.144** (1.683)	-2.313*** (0.835)
Large Negative Lagged FDI/GDP Shock Indicator	0.481 (0.529)	0.707 (1.043)	0.568 (0.613)	0.248 (0.491)
Observations	2,863	1,495	1,368	3,501
Number of Countries	89	47	42	108

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Third, the regression fits well the average output decline in 2009 in LICs and MICs. In particular, most of this decline is explained by the collapse in external demand. Table 7 illustrates. Here, the (sample-specific) regression coefficients, estimated using the baseline specification and the period through 2007 alone, are combined with the observed 2007 growth, and with the (actual) changes in the independent variables over 2007-09, to calculate the implied “out-of-sample” forecast mean change in output growth over 2007-09. The forecasts closely match the actual growth declines, and the change in external demand accounts for the overwhelming share of the forecast change in output growth. When allowing for asymmetries, the forecast growth declines again come close to the actual outcome, and again the change in external demand accounts for almost all of the forecast change in growth (Appendix Tables 3.5 and 3.6).



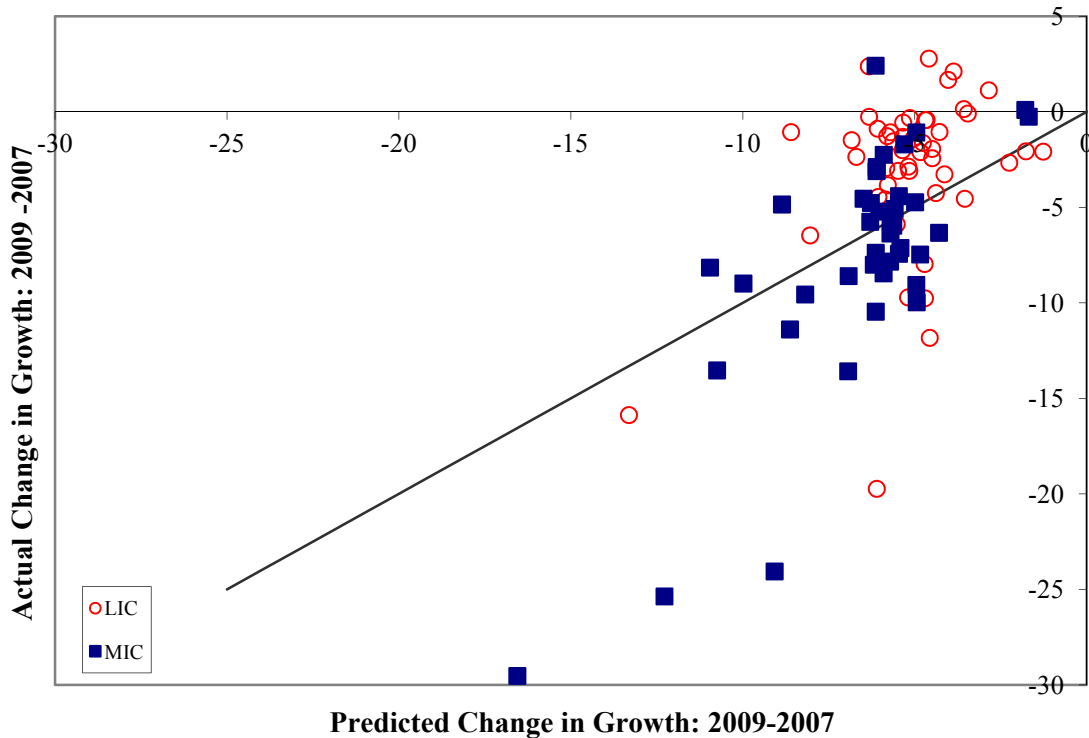
Table 7. Regression Analysis: Fitting the 2009 Output Decline. “Out-of-Sample” 2009 Forecast, Based on Specification in Table 4, and Coefficients Estimated Through 2007

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Actual Mean Growth Difference, 2009 vs. 2007	-5.3	-3.1	-8.1	-5.4
Forecast Mean Growth Difference, 2009 vs. 2007	-6.3	-2.7	-8.6	-7.0
Mean Contribution of Change In:				
Lagged Growth	-0.3	-0.2	-0.7	-0.3
Terms of Trade	0.1	0.1	0.0	0.0
Lagged Terms of Trade	-0.1	0.0	0.0	-0.1
External Demand	-5.9	-2.7	-7.9	-6.3
Lagged External Demand	0.1	0.1	0.7	-0.5
FDI / GDP	-0.1	0.1	-0.2	0.1
Lagged (FDI / GDP)	-0.1	0.0	-0.5	0.0

Note: For country sample and data sources see appendixes 1 and 2.

Next, it is worth examining not the forecast *mean* change but the entire cross-sectional distribution of forecast growth rates, and its relationship to changes in external demand, again based on coefficients estimated using the period through 2007 alone. Specifically, the estimated relationship between the country-specific actual changes in growth rates between 2007 and 2009 and the country-specific forecasts is reasonably tight, and the estimated slope close to unity (Figure 9); when allowing for asymmetries, the results are again very similar. Clearly, the panel analysis does help explain some of the cross-sectional variation in the 2007-09 growth performance. That said, a significant fraction of the cross-country growth differences remains unexplained—perhaps not surprising, given the limited cross-country variance in the external demand shock in 2009. Overall, these results are in line with the findings of the cross-sectional analysis above.

Figure 9. Regression Analysis: Actual vs. Predicted Change in Output Growth, 2007-09  
Based on Specification in Table 4



Note: For country sample and data sources see appendixes 1 and 2.

One striking feature of the regressions and summary results above is that the models perform about as well for LICs as for MICs. Clearly, there are a few major outliers among the MICs where growth fell by more than 20 percentage points, and more generally it is apparent from other evidence that several MICs faced large crises that resulted from financial linkages and collapses and other mechanisms that have no counterpart in our regressions or in LICs (see, for instance, IMF, 2009e). Moreover, the small-country assumption that underlies the regression specification is more problematic in MICs. That said, the simple empirical model presented in this paper, with its focus on partner-country GDP growth, does fairly well in explaining at least the mean effect, as well as a fair amount of the cross-sectional variation, in both LICs and MICs.

What were the channels through which the shocks affected growth? To explore this, the previous regressions were re-estimated with a number of alternative dependent variables, specifically, consumption, investment, government expenditure, and the current account, each expressed as a share of GDP. The results yielded two tentative conclusions. First, consumption responds if anything *less* strongly than overall GDP to shocks (whether to external demand, the terms of trade, or capital inflows), although the differences are often statistically insignificant (Table 8). Second, there is some evidence that investment responds *more* strongly than overall GDP to shocks, particularly to capital inflows (Table 9). Results for government expenditure and the current account were more mixed (Appendix Tables 3.7 and 3.8).

Table 8. Regression Analysis (Panel GMM): Baseline Specification for  
(Consumption / GDP), All Years

	All Non-Fuel Exporters	Non-Fuel- Exporting LICs	Non-Fuel- Exporting MICs	All LICs and MICs
Lagged Consumption/GDP	0.700*** (0.024)	0.781*** (0.047)	0.734*** (0.014)	0.657*** (0.047)
Growth in Terms of Trade	-0.003 (0.015)	-0.016 (0.021)	0.012 (0.009)	-0.005 (0.014)
Lagged Growth in Terms of Trade	-0.014 (0.009)	-0.026** (0.013)	0.004 (0.019)	0.002 (0.013)
Growth in External Demand	-0.212 (0.160)	-0.100 (0.211)	-0.273* (0.166)	-0.220 (0.155)
Lagged Growth in External Demand	-0.028 (0.170)	0.031 (0.196)	-0.345 (0.214)	-0.092 (0.162)
Change in (FDI / GDP)	0.047 (0.063)	0.068 (0.079)	-0.007 (0.119)	0.195** (0.098)
Lagged Change in (FDI / GDP)	-0.221 (0.197)	-0.002 (0.097)	-0.447 (0.345)	-0.146 (0.127)
Observations	2,079	1,112	967	2,514
Number of Countries	83	44	39	100

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Table 9. Regression Analysis (Panel GMM): Baseline Specification for Investment/GDP, All Years

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Lagged (Investment / GDP)	0.174 (0.152)	0.678*** (0.065)	0.051 (0.091)	0.183 (0.150)
Growth in Terms of Trade	-0.001 (0.010)	0.005 (0.011)	-0.023 (0.017)	-0.009 (0.009)
Lagged Growth in Terms of Trade	0.010 (0.010)	0.015* (0.008)	-0.019 (0.013)	0.010 (0.009)
Growth in External Demand	0.236 (0.160)	0.225 (0.181)	0.069 (0.141)	0.233 (0.159)
Lagged Growth in External Demand	0.240* (0.141)	-0.182 (0.171)	0.534*** (0.166)	0.269** (0.134)
Change in (FDI / GDP)	0.266** (0.105)	0.451*** (0.136)	0.054 (0.043)	0.309*** (0.063)
Lagged Change in (FDI / GDP)	0.278*** (0.067)	0.250*** (0.055)	0.162*** (0.056)	0.326*** (0.058)
Observations	2,882	1,499	1,383	3,519
Number of Countries	89	47	42	108

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

On the whole, the data do not allow us to draw firm conclusions about the differences between LICs and MICs with respect to the impact of the shocks on the components of GDP. A partial exception is the current account, which in MICs responds much more clearly to terms-of-trade shocks, suggesting greater consumption smoothing in these countries. In a different vein, the negative response of the current account in MICs to external demand shocks suggests a “when it rains, it pours” story (as in Reinhart and others, 2004): external demand shocks may be correlated with financial conditions in partner countries so that increases in external demand are associated with increased capital inflows.

## B. The Role of Policy

From a policy standpoint, it is clearly important to know which policy actions will dampen or magnify the impact of external shocks. This section examines the issue further, with a focus on the following policy-related variables:

- The exchange rate regime.
- Initial reserve levels, relative to either imports or short-term external liabilities.
- Initial fiscal deficits, or initial debt levels, relative to GDP.
- Structural reform and flexibility.
- Institutional quality.

As a first step, in an effort to find robust results that were not overly dependent on the precise specification, a nonparametric approach was adopted. For each of the above policy variables, two sub-samples were extracted, containing countries in, respectively, the top quartile and the bottom quartile of the distribution of the policy variable. For each sub-sample, the mean change in the growth rate in the aftermath of sharp drops in external demand was computed, and the difference across sub-samples tested for statistical significance. The full results (available upon request) were in general inconclusive, with most differences proving statistically and economically insignificant, or else having counter-intuitive signs that were hard to interpret causally. Table 10 illustrates some selected results.

Table 10. Correlations Between Some Policy Variables and Growth, in the Aftermath of Adverse Shocks to External Demand, From 1989 Onwards

	Growth Difference, After Negative Shock to External Demand, Between Top and Bottom Quartile of All Countries, Ranked By Policy Variable	Standard Error of Growth Difference	Number of Observations
Policy Variable:			
Fixed vs. Floating Exchange Rate Regime	-0.749	0.897	200
High vs. Low Initial Reserves / Imports	-0.734	0.918	99
High vs. Low Initial Fiscal Balance / GDP	-2.849***	0.825	88
High vs. Low Initial Fiscal Debt / GDP	4.566***	1.559	50

Note: "Growth Difference" is measured as the difference in the average (percentage point) change in the growth rate over the year of the adverse shock to external demand and the two following years. The sign convention is that growth under the second-mentioned policy is subtracted from growth under the first-mentioned policy. So, growth in countries with high initial debt is 4.1 percentage points *higher* than in countries with low initial debt. An "adverse shock to external demand" is defined as a reduction in the growth rate of external demand of 2 percentage points or more. Alternative time-windows and thresholds were tried with similar results. "Initial" is defined as referring to the year prior to the negative shock to external demand. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

The above analysis throws out much information by grouping data into quartiles. Further, it ignores the possibility that correlations across determinants may be obscuring what are in fact significant relationships. The role of policy is therefore also examined through alternative panel regression specifications. Specifically, the set of independent variables in section IV is augmented by interacting the shocks to external demand, the terms of trade, and capital flows with the various policy-related variables, one at a time (the policy variables themselves are also included separately as controls). The estimated coefficients on the interaction terms are then analyzed to determine whether specific policies dampen or magnify the impact of external shocks.

Two clear findings are that, in both LICs and MICs, external reserves help buffer the impact of large negative shocks to external demand (Table 11). Again, greater labor market flexibility was broadly associated with a smaller impact of external demand shocks (Table 12), and in particular helped reduce the impact of large negative shocks (Table 13). Most other results were inconclusive, with most interaction terms proving statistically and economically insignificant or displaying counter-intuitive sign patterns.<sup>26</sup>

That said, for many policy variables, including in particular indicators of structural flexibility or institutional quality, it may be reasonable to expect any effect to be revealed only over the medium- to long-run. The issue is addressed further in Berg and others (2010), which indeed finds some evidence that appropriate policies can dampen the medium-run impact of external shocks.

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<sup>26</sup> See, for instance, the results for the impact on output growth of the government fiscal balance (Appendix Table 3.9) or of a fixed exchange rate regime (Appendix Table 3.10).

Table 11. Regression Analysis (Panel GMM): Impact on Output Growth of Reserves, Based on Specification with Asymmetries, All Years

	All Non-Fuel Exporters	Non-Fuel- Exporting LICs	Non-Fuel- Exporting MICs	All LICs and MICs
Lagged Growth	0.108*** (0.041)	0.117** (0.057)	0.191*** (0.070)	0.129*** (0.032)
Growth in Terms of Trade	0.012 (0.011)	0.007 (0.011)	0.029** (0.012)	0.009 (0.010)
Lagged Growth in Terms of Trade	0.019*** (0.007)	0.017** (0.007)	0.025* (0.013)	0.024*** (0.008)
Growth in External Demand	0.313** (0.149)	0.163 (0.124)	0.188 (0.360)	0.249 (0.157)
Lagged Growth in External Demand	-0.008 (0.120)	-0.027 (0.101)	-0.001 (0.176)	0.199 (0.152)
Change in (FDI / GDP)	0.117** (0.051)	0.041 (0.060)	0.160*** (0.059)	-0.019 (0.038)
Lagged Change in (FDI / GDP)	0.212*** (0.055)	0.073 (0.064)	0.290*** (0.062)	0.056 (0.055)
Large Negative TOT Shock Indicator	1.122 (1.338)	0.043 (0.973)	1.157 (2.891)	1.625 (1.095)
Large Negative ED Shock Indicator	-1.544 (1.168)	0.812 (0.850)	-2.961 (1.845)	-1.096 (0.987)
Large Negative Lagged FDI/GDP Shock Indicator	-0.179 (0.829)	0.633 (1.118)	-0.946 (1.109)	-0.669 (0.857)
Reserves / GDP	-0.101 (0.070)	0.008 (0.023)	-0.076 (0.076)	-0.011 (0.033)
(Reserves / GDP) * Indicator (Large Negative TOT Shock)	0.017 (0.022)	0.006 (0.019)	-0.029 (0.072)	0.036** (0.014)
(Reserves / GDP) * Indicator (Large Negative ED Shock)	1.346*** (0.398)	1.436*** (0.552)	1.217** (0.610)	1.264*** (0.332)
(Reserves / GDP) * Indicator (Large Negative FDI Shock)	-0.203 (0.203)	0.024 (0.141)	-0.446* (0.247)	-0.243 (0.206)
Observations	2635	1354	1281	3209
Number of Countries	88	46	42	107

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Table 12. Regression Analysis (Panel GMM): Impact on Output Growth of Labor Market Flexibility, All Years

	All Non-Fuel Exporters	Non-Fuel- Exporting LICs	Non-Fuel- Exporting MICs	All LICs and MICs
Lagged Growth	0.290*** (0.029)	0.292*** (0.099)	0.292*** (0.023)	0.271*** (0.026)
Growth in Terms of Trade	-0.064 (0.053)	-0.082 (0.062)	-0.045 (0.093)	0.022 (0.073)
Lagged Growth in Terms of Trade	-0.007 (0.013)	-0.006 (0.009)	-0.011 (0.027)	0.034*** (0.011)
Growth in External Demand	1.524*** (0.343)	1.229*** (0.245)	1.637*** (0.484)	1.139*** (0.386)
Lagged Growth in External Demand	-0.417*** (0.143)	-0.411*** (0.089)	-0.354 (0.219)	-0.248 (0.158)
Change in (FDI / GDP)	0.164*** (0.056)	0.128*** (0.045)	0.159** (0.078)	-0.012 (0.070)
Lagged Change in (FDI / GDP)	0.221 (0.274)	0.253 (0.302)	0.190 (0.406)	0.041 (0.261)
Labor Market Flexibility	4.308 (3.089)	5.377* (3.080)	4.727 (3.593)	2.978 (3.142)
Growth in Terms of Trade * Labor Market Flexibility	0.110 (0.090)	0.147 (0.107)	0.064 (0.148)	-0.008 (0.110)
Growth in External Demand * Labor Market Flexibility	-1.079** (0.506)	-1.403*** (0.402)	-1.154* (0.590)	-0.573 (0.558)
Lagged Change in (FDI / GDP) * Labor Market Flexibility	-0.055 (0.415)	-0.428 (0.460)	0.025 (0.623)	-0.028 (0.338)
Observations	1,117	406	711	1,335
Number of Countries	50	18	32	61

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.



Table 13. Regression Analysis (Panel GMM): Impact on Output Growth of Labor Market Flexibility, Based on Specification with Asymmetries, All Years

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Lagged Growth	0.298 (0.000)	0.290*** (0.093)	0.310*** (0.024)	0.276*** (0.025)
Growth in Terms of Trade	0.010 (0.000)	0.005 (0.012)	0.015 (0.019)	0.004 (0.010)
Lagged Growth in Terms of Trade	-0.006 (0.000)	-0.007 (0.011)	-0.003 (0.023)	0.029*** (0.009)
Growth in External Demand	0.605 (0.000)	0.444*** (0.150)	0.518 (0.441)	0.522** (0.216)
Lagged Growth in External Demand	-0.390 (0.000)	-0.428*** (0.084)	-0.308* (0.185)	-0.230 (0.144)
Change in (FDI / GDP)	0.155 (0.000)	0.142*** (0.045)	0.145* (0.078)	-0.012 (0.066)
Lagged Change in (FDI / GDP)	0.165 (0.000)	0.005 (0.123)	0.171** (0.072)	0.037 (0.058)
Large Negative TOT Shock Indicator	2.415 (0.000)	-0.578 (2.202)	3.664 (3.407)	3.481** (1.635)
Large Negative ED Shock Indicator	-1.759 (0.000)	1.127 (1.131)	-3.367 (2.441)	-2.004 (1.494)
Large Negative Lagged FDI/GDP Shock Indicator	1.418 (0.000)	1.781 (1.528)	1.964* (1.132)	-0.679 (0.725)
Labor Market Flexibility	1.475 (0.000)	0.182 (2.531)	2.004 (3.639)	1.514 (2.514)
Labor Market Flexibility * Indicator (Large Negative TOT Shock)	-0.002 (0.000)	-0.031 (0.042)	-0.023 (0.107)	0.067*** (0.015)
Labor Market Flexibility * Indicator (Large Negative ED Shock)	1.098 (0.000)	0.423** (0.213)	1.085* (0.561)	0.999** (0.397)
Labor Market Flexibility * Indicator (Large Negative FDI Shock)	0.329 (0.000)	0.310 (0.428)	0.617** (0.304)	-0.167 (0.172)
Observations	1,117	406	711	1,335
Number of Countries	50	18	32	61

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

## V. GROWTH FORECASTS

Given the above broad understanding of what drove 2009 outcomes in LICs (including in particular the changes in the external demand facing them), what can be expected over the next year or two? Again, the small-country assumption for LICs makes it possible to produce such a forecast, conditioning on forecasts for the driving variables that are independent of outcomes in LICs. Specifically, the estimated coefficients from the historical regression are combined with the IMF *World Economic Outlook (WEO)* forecasts for the independent variables and the observed 2009 output growth to produce implied growth forecasts for the period 2010–11.

Overall, these model-based growth forecasts imply that growth will rebound strongly after 2009: see Table 14 for forecasts based on the baseline regression.<sup>27</sup> Both for the full sample and for LICs and MICs separately, the forecast recovery is driven entirely by the expected pick-up in external demand growth. That said, it is important to remember that considerable uncertainty attaches to the central forecasts.

Table 14. Growth Forecasts, Average for 2010–11,  
Expressed Relative to 2009 Growth Levels, Based on Specification in Table 4 and  
Coefficients Estimated Through 2009

	All Non-Fuel Exporters	Non-Fuel- Exporting LICs	Non-Fuel- Exporting MICs	All LICs and MICs
Model Forecast Mean Growth Difference	5.2	1.4	4.9	4.9
Mean Contribution of Change In:				
Lagged Growth	-0.5	-0.2	-1.2	-0.4
Terms of Trade	0.0	0.0	0.0	0.0
Lagged Terms of Trade	0.0	0.0	0.0	0.0
External Demand	5.5	1.6	5.5	5.5
Lagged External Demand	0.2	0.0	0.5	-0.2
(FDI / GDP)	0.1	0.0	0.2	-0.1
Lagged (FDI / GDP)	-0.1	-0.1	0.0	0.0

Note: For country sample and data sources see appendixes 1 and 2.

<sup>27</sup> See Appendix Table 3.11 for forecasts that allow for asymmetric responses.

## VI. CONCLUSIONS

The empirical analysis in this paper yields four important conclusions. First, for many individual LICs, 2009 does not stand out as an extraordinarily calamitous year. The unusual element was the high degree to which output declines across LICs were synchronized.

Second, the sharp growth declines observed in LICs during 2007-09 are on average well explained by the magnitude of the external shocks which they faced over the period, including in particular the shocks to external demand—a factor ignored by most of the existing academic literature.

Third, and related, if the external environment improves as forecast, growth in LICs is also likely to rebound sharply.

Finally, cross-country differences in initial policies and in the structural environment explain only a limited share of the cross-country variation in growth experiences in 2007-09. The two main exceptions are reserve coverage and labor-market flexibility (perhaps as a proxy for broader flexibility).

That said, two important caveats stand out. First, any effects of policy would be easier to detect if the policy environment could be measured better and if the analysis could on this basis control not just for initial policy space but for the policy response itself. Second, this analysis, based on annual data and focusing on short-run responses to external shocks, is not well placed to investigate the medium- to long-run impact of the crisis and how this is affected by structural and institutional characteristics. That topic is more fully analyzed in Berg and others (2010).

## References

- Berg, A., C. Papageorgiou, C. Pattillo, and N. Spatafora, 2010, “The End of an Era? The Medium- and Long-term Effects of the Global Crisis on Growth in Low-Income Countries,” *IMF Working Paper* 10/205 (Washington: International Monetary Fund).
- Berglof, E., Y. Kormiyenko, A. Plekhanov, and J. Zettelmeyer, 2009, “Understanding the Crisis in Emerging Europe” (London: European Bank for Reconstruction and Development).
- Berkmen, P., G. Gelos, R. Rennhack, and J. Walsh, 2009, “The Global Financial Crisis: Explaining Cross-Country Differences in the Output Impact,” *IMF Working Paper* 09/280 (Washington: International Monetary Fund).
- Blanchard, O., M. Das, and H. Faruquee, 2010, “The Initial Impact of the Crisis on Emerging Market Countries,” *mimeo* (Washington: International Monetary Fund).
- Cerra, V., U. Panizza, and S. Saxena, 2009, “International Evidence on Recovery From Recessions,” *IMF Working Paper* 09/183 (Washington: International Monetary Fund).
- Chinn, M. D. and S.-J. Wei, 2008, “A Faith-Based Initiative: Does a Flexible Exchange Rate Really Facilitate Current Account Adjustment?” *NBER Working Paper* 14420 (Cambridge, Massachusetts: National Bureau of Economic Research).
- Collier, P., and B. Goderis, 2009, “Structural Policies for Shock-prone Developing Countries,” *Oxford Economic Papers*, Vol. 61, pp. 703–726.
- , forthcoming, “Does Aid Mitigate Shocks?,” *Review of Development Economics*.
- Collier, P., W. Gunning, and Associates, 1999, “Trade Shocks in Developing Countries” (Oxford: Clarendon).
- Deaton, A., 1999, “Commodity Prices and Growth in Africa,” *Journal of Economic Perspectives*, Vol. 13, pp. 23–40.
- Deaton, A. and R. Miller, 1996, “International Commodity Prices, Macroeconomic Performance and Politics in Sub-Saharan Africa,” *Journal of African Economies*, Vol. 5, pp. 99-191.
- Dhasmana, A., “Threshold Effects of Foreign Reserve Holdings in Developing Countries,” *mimeo* (Bangalore: Indian Institute of Management).

- Drummond, P., and G. Ramirez, 2009, “Spillovers from the Rest of the World into Sub-Saharan African Countries,” *IMF Working Paper* 09/155 (Washington: International Monetary Fund).
- Easterly, W., M. Kremer, L. Pritchett, and L. H. Summers, 1993, “Good Policy or Good Luck? Country Growth Performance and Temporary Shocks,” *Journal of Monetary Economics*, Vol. 32, pp. 459-483.
- Ghosh, A., M. Chamon, C. Crowe, J. Kim, and J. Ostry, 2009, “Coping with the Crisis: Policy Options for Emerging Market Countries,” *IMF Staff Position Note* 09/08 (Washington: International Monetary Fund).
- Ghosh, A., J. Ostry, and N. Tamirisa, 2009, “Anticipating the Next Crisis,” *Finance and Development*, September (Washington: International Monetary Fund).
- Ghosh, A., J. Ostry, and C. Tsangarides, 2010, “Exchange Rate Regimes and the Stability of the International Monetary System,” *IMF Occasional Paper* 270 (Washington: International Monetary Fund).
- International Monetary Fund, 2007, *World Economic Outlook, April 2007: Decoupling the Train? Spillovers and Cycles in the Global Economy* (Washington: International Monetary Fund).
- , 2008a, *Regional Economic Outlook, October 2008: Sub-Saharan Africa* (Washington: International Monetary Fund).
- , 2008b, “Food and Fuel Prices—Recent Developments, Macroeconomic Impact, and Policy Responses,” *IMF Policy Discussion Paper* (Washington: International Monetary Fund).
- , 2009a, “Review of Recent Crisis Programs,” *IMF Policy Paper* (Washington: International Monetary Fund).
- , 2009b, “The Implications of the Global Financial Crisis for Low-Income Countries,” *IMF Policy Discussion Paper* (Washington: International Monetary Fund).
- , 2009c, “The Implications of the Global Financial Crisis for Low-Income Countries—An Update,” *IMF Policy Discussion Paper* (Washington: International Monetary Fund).
- , 2009d, *Regional Economic Outlook, October 2009: Sub-Saharan Africa* (Washington: International Monetary Fund).

- , 2009e, *World Economic Outlook, October 2009* (Washington: International Monetary Fund).
- , 2010, “How Did Emerging Markets Cope in the Crisis?” (Washington: International Monetary Fund).
- Kaufman, D., A. Kraay, and M. M. Mastruzzi, 2009, “Governance Matters VIII: Governance Indicators for 1996–2008,” *World Bank Policy Research*, June 2009.
- Koren, M., and S. Tenreyro, 2007, “Volatility and Development,” *Quarterly Journal of Economics*, Vol. 122(1), pp. 243–87.
- Lane, P. R., and G-M. Milesi-Ferretti, 2010, “The Cross-Country Incidence of the Global Crisis,” paper prepared for the IMF/BOP/PSE Conference “Economic Linkages, Spillovers and the Financial Crisis,” Paris, January.
- Loayza, N., and C. Raddatz, 2006, “The Structural Determinants of External Vulnerability,” *World Bank Economic Review*, Vol. 21(3), pp. 359–87.
- Loayza, N., R. Rancière, L. Servén, and J. Ventura, 2007, “Macroeconomic Volatility and Welfare in Developing Countries: An Introduction,” *World Bank Economic Review*, Vol. 21(3), pp. 343–57.
- Ndulu, B., and S. O’Connell S., 2007, “Policy Plus: African Growth Performance, 1960–2000,” in *The Political Economy of Economic Growth in Africa, 1960–2000*, by Ndulu, B., S. O’Connell, R. Bates, P. Collier, C. Soludo, J-P. Azam, A. Fosu, J.W. Gunning, and D. Njinkeu (Cambridge, UK: Cambridge University Press).
- Ostry, J., A. Prati, and A. Spilimbergo, 2009, “Structural Reforms and Economic Performance in Advanced and Developing Countries,” *IMF Occasional Paper 268* (Washington: International Monetary Fund).
- Raddatz, C., 2006, “Are External Shocks Responsible for the Instability of Output in Low-Income Countries?,” *Journal of Development Economics*, Vol. 84(1), pp. 155–187.
- Ramcharan, R., 2007, “Does the Exchange Rate Regime Matter for Real Shocks? Evidence from Windstorms and Earthquakes,” *Journal of International Economics*, Vol. 73(1), pp. 31–47.
- Reinhart, C., G. Kaminsky, and C. Vegh, 2004, “When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies,” *NBER Macroeconomics Annual 2004*, pp.11-53 (Cambridge, Massachusetts: National Bureau of Economic Research).

- Rose, A., and M. Spiegel, 2009a, "Cross-Country Causes and Consequences of the 2008 Crisis: Early Warning," *NBER Working Papers* 15357, (Cambridge, Massachusetts: National Bureau of Economic Research).
- , 2009b, "Cross-Country Causes and Consequences of the 2008 Crisis: International Linkages and American Exposure," *NBER Working Papers* 15358 (Cambridge, Massachusetts: National Bureau of Economic Research).

### Appendix 1. Country Sample

The sample comprises 49 non-fuel-exporting LICs, 6 fuel-exporting LICs, 42 non-fuel-exporting MICs, 13 fuel-exporting MICs, and 22 advanced countries as listed below.

	<b>Non-fuel Exporting LICs</b>	<b>Fuel Exporting LICs</b>	<b>Non-fuel Exporting MICs</b>	<b>Fuel Exporting MICs</b>	<b>Advanced Countries</b>
1	Afghanistan	Angola	Argentina	Algeria	Australia
2	Albania	Azerbaijan	Belarus	Ecuador	Austria
3	Bangladesh	Chad	Bosnia & Herzegovina	Gabon	Belgium
4	Benin	Congo, Rep.	Botswana	Iran, Islamic Rep.	Canada
5	Bolivia	Nigeria	Brazil	Kazakhstan	Denmark
6	Burkina Faso	Sudan	Bulgaria	Kuwait	Finland
7	Burundi		Chile	Libya	France
8	Cambodia		China	Oman	Germany
9	Cameroon		Colombia	Russian Fed.	Greece
10	Central African Republic		Costa Rica	Saudi Arabia	Ireland
11	Congo, Dem. Rep. of		Croatia	Turkmenistan	Israel
12	Côte d'Ivoire		Dominican Republic	United Arab Emirates	Italy
13	Eritrea		Egypt, Arab Rep.	Venezuela, RB	Japan
14	Ethiopia		El Salvador		Netherlands
15	Gambia, The		Estonia		New Zealand
16	Georgia		Guatemala		Norway
17	Ghana		Hungary		Portugal
18	Guinea		Indonesia		Spain
19	Guinea-Bissau		Jamaica		Sweden
20	Haiti		Jordan		Switzerland
21	Honduras		Latvia		United Kingdom
22	India		Lebanon		United States
23	Kenya		Lithuania		
24	Kyrgyz Rep.		Malaysia		
25	Lao PDR		Mauritius		
26	Lesotho		Mexico		
27	Madagascar		Morocco		
28	Malawi		Namibia		
29	Mali		Panama		
30	Mauritania		Paraguay		
31	Moldova		Peru		
32	Mongolia		Philippines		
33	Mozambique		Poland		
34	Myanmar		Romania		
35	Nicaragua		South Africa		
36	Niger		Swaziland		
37	Pakistan		Syrian Arab Republic		
38	Papua New Guinea		Thailand		
39	Rwanda		Tunisia		
40	Senegal		Turkey		
41	Sierra Leone		Ukraine		
42	Sri Lanka		Uruguay		
43	Tajikistan				
44	Tanzania				
45	Togo				
46	Uganda				
47	Uzbekistan				
48	Vietnam				
49	Zambia				



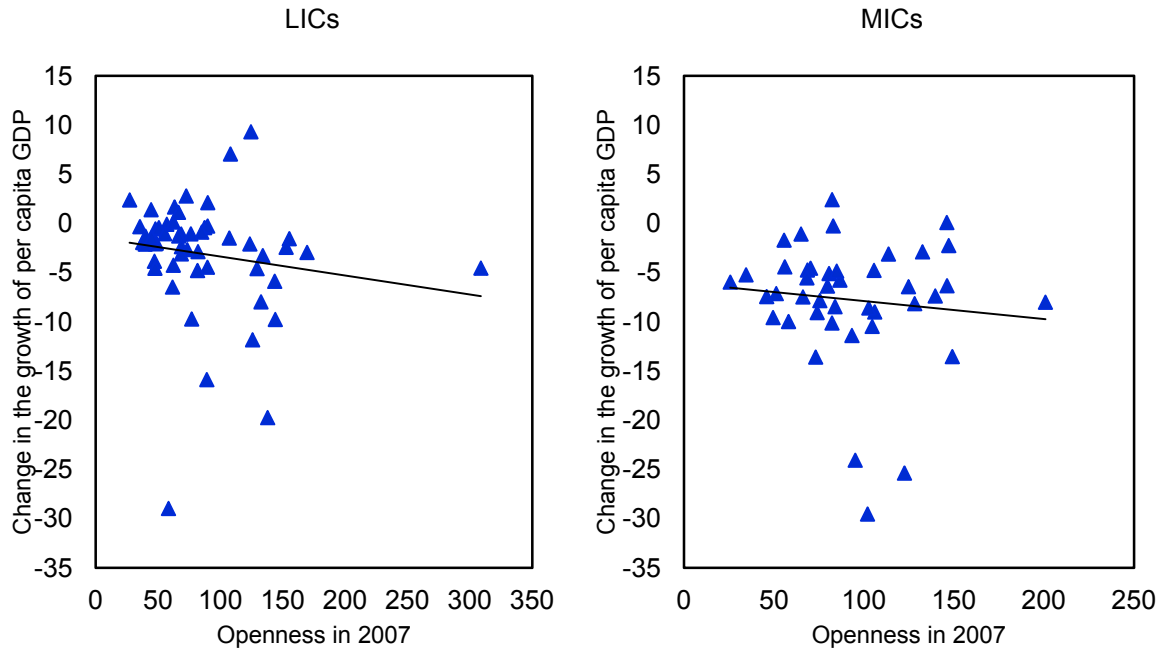
## Appendix 2. Data Sources

Variable	Description	Coverage	Source
Real per capita growth	Growth rate of real GDP per capita	1950-2014	World Economic Outlook (WEO)
External demand growth	Real GDP growth in partner countries, weighted by export shares	1965-2015	Global Economic Environment (GEE)
FDI	Gross FDI inflows	1950-2014	World Economic Outlook (WEO)
Terms of trade	Goods terms of trade	1950-2014	World Economic Outlook (WEO)
Trade	Exports of goods + Imports of goods	1950-2014	World Economic Outlook (WEO)
Exports	Exports of goods and services	1950-2014	World Economic Outlook (WEO)
Fiscal Balance	Central government balance	1950-2014	World Economic Outlook (WEO)
Debt	Central government external gross debt	1978-2014	World Economic Outlook (WEO)
Exchange rate regime	Exchange rate regime: 1-6 scale, where 1 signifies a fixed exchange rate regime and 6 a fully flexible regime	1970-2007	Reinhart-Rogoff data base
Reserves	Year end stock of reserves	1950-2014	International Financial Statistics (IFS) and World Economic Outlook (WEO),
Openness	(Exports of goods and services + Imports of goods and services) divided by GDP	1950-2014	World Economic Outlook (WEO)
Current Account	Current account	1950-2014	World Economic Outlook (WEO)
Remittances	Gross remittances inflows	1967-2009	Balance of Payments (BOP) and World Economic Outlook (WEO)
Private sector credit	Domestic credit to private sector as percent of GDP	1960-2007	World Development Indicators (WDI)
GDP per Capita (US\$)	Nominal GDP per capita in US dollars	1950-2014	World Economic Outlook (WEO)
Commodities exports	Commodities exports	1962-2007	World Development Indicators (WDI) and World Economic Outlook (WEO)
Manufactures exports	Manufactures exports	1962-2007	World Development Indicators (WDI) and World Economic Outlook (WEO)
Labor market structural reforms indicator	Structural reforms: labor index, 0-1 scale, where 1 indicates a higher degree of liberalization	1981-2005	Structural Reforms database of IMF (Research Department)
Kaufmann, Kraay, and Mastruzzi institutions indicator	Kaufmann, Kraay, and Mastruzzi institutions indicator	1996-2008	Kaufmann-Kraay-Mastruzzi Worldwide Governance Indicators World Bank
Consumption	Final consumption expenditures	1955-2014	World Economic Outlook (WEO)
Investment	Gross capital formation	1950-2014	World Economic Outlook (WEO)
Government Expenditure	Central government expenditure and net lending	1950-2014	World Economic Outlook (WEO)

### Appendix 3. Additional Results

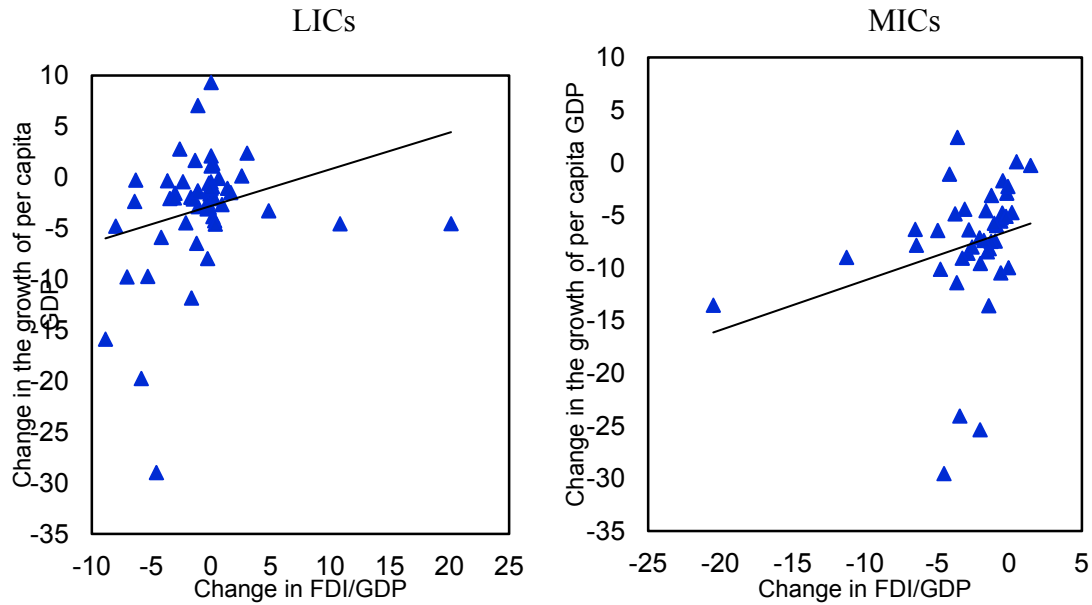
This appendix provides some further results referred to in the text.

Figure 3.1. Openness and Per Capita GDP Growth in Non-Fuel-Exporting LICs and MICs, 2007-09 (Openness in Percent; Change in Growth of Per-Capita GDP is Difference of Growth Rates in Percentage Points)



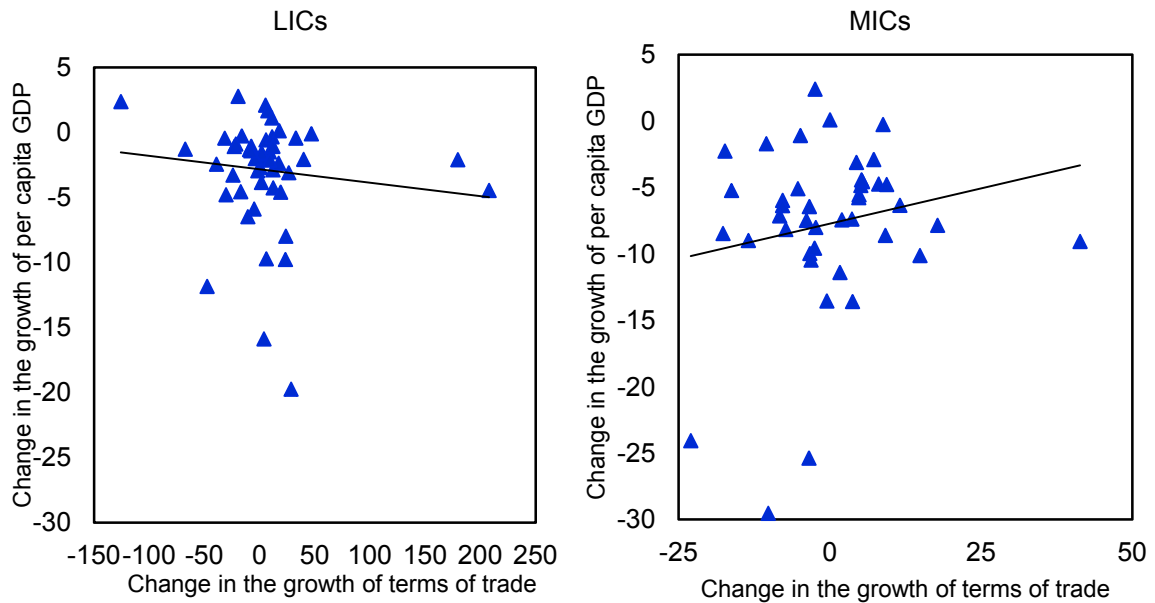
Note: For country sample and data sources see appendixes 1 and 2.

Figure 3.2 FDI Inflows and GDP Growth in Non-Fuel-Exporting LICs and MICs, 2007-09  
 (Change in FDI/GDP is Differences between Ratios, in Percentage Points; Change in Growth of Per-Capita GDP is Difference of Growth Rates in Percentage Points)



Note: For country sample and data sources see appendixes 1 and 2.

Figure 3.3 Terms of Trade and GDP Growth in Non-Fuel-Exporting LICs and MICs, 2007-09  
 (Differences between Growth Rates, in Percentage Points)



Note: For country sample and data sources see appendixes 1 and 2.

Table 3.1 Cross-Country Quartiles Analysis for Non-Fuel-Exporting MICs

Variables	Countries with small impact on growth (1)		Countries with big impact on growth (2)		Difference (1 - 2)	
	Median	Mean	Median	Mean	Median	Mean
I. "Dependent" Variable						
2007-09 Change in per capita real GDP growth	-2.0	-1.8	-11.4	-15.2	9.4	13.4 ***
II. Main "Explanatory" Variables						
2005-07 Change in per capita real GDP growth	1.3	1.8	1.8	1.5	-0.5	0.3
2007-09 Change in terms-of-trade growth	3.8	2.8	2.2	6.7	-1.7	3.9
2007-09 Change in terms-of-trade growth * trade/GDP	1.6	1.4	-0.4	-0.1	-2.0	-1.4
2007-09 Change in external demand growth	-6.1	-5.7	-7.9	-8.5	1.7	2.8 ***
2007-09 Change in external demand growth * exports/GDP	-6.7	-6.6	-3.7	-5.0	-3.0	-1.6
2007-09 Change in FDI as a share of GDP	-0.9	-1.3	-3.3	-4.2	2.4	3.0
III. Additional "Explanatory" Variables						
Fiscal policy						
2007 Fiscal balance/GDP	-2.2	-2.2	-0.7	-0.5	-1.5	-1.7
2007 Debt/GDP	49.4	58.7	29.1	27.2	20.3	31.6 *
Exchange rate policy and level of reserves:						
2007 Exchange rate regime	2.0	2.0	3.0	2.3	1.0	0.3
2007 Reserves/months of imports	7.6	8.2	5.0	4.9	2.6	3.3 **
2007 Reserves/(short external liabilities + current account deficit)	1.9	5.6	0.8	2.3	1.1	3.3
External balance and capital inflows:						
2007 Current account/GDP	-1.4	-1.0	-7.6	-10.5	6.1	9.4 ***
2007 FDI/GDP	4.3	4.8	6.9	8.1	-2.6	-3.3
2007 Remittances/GDP	2.5	4.8	1.6	2.2	0.9	2.6
Growth preceding crisis:						
Real per capita GDP growth in 2004–07 relative to 1990–2007	1.3	1.5	2.0	4.5	-0.7	-3.0
Credit growth: Private sector during 2000–2007	1.3	1.4	8.2	10.6	-6.9	-9.2 **
Structural characteristics:						
2007 GDP per capita (US\$)	2726	3659	7850	7822	-5124	-4163 ***
2007 Share of commodities exports in GDP	3.9	4.7	2.4	3.3	1.5	1.4
2007 Share of manufactures exports in GDP	17.6	20.8	18.5	16.9	-0.8	3.9
2007 Openness (trade / GDP)	62.3	67.0	67.4	72.8	-5.1	-5.8
2005 Labor Market Indicator	0.7	0.7	0.6	0.6	-0.1	-0.2 **
2007 Kaufmann, Kraay, and Mastruzzi Institutions Indicator	-0.5	-0.3	0.1	0.1	0.7	0.4

Note: For country sample and data sources see appendixes 1 and 2. Levels of significance indicated as follows: 1% (\*\*\*), 5% (\*\*) and 10% (\*).

Table 3.2 Cross-Country Quartiles Analysis for Non-Fuel-Exporting LICs and MICs

Variables	Countries with small impact on growth (1)		Countries with big impact on growth (2)		Difference (1 - 2)	
	Median	Mean	Median	Mean	Median	Mean
I. "Dependent" Variable						
2007-09 Change in per capita real GDP growth	-0.3	0.8	-10.1	-13.6	9.9	14.4 ***
II. Main "Explanatory" Variables						
2005-07 Change in per capita real GDP growth	0.2	0.7	1.8	1.4	-1.6	-0.7
2007-09 Change in terms-of-trade growth	5.8	4.9	-0.8	4.7	6.6	0.1
2007-09 Change in terms-of-trade growth * trade/GDP	2.5	2.1	-0.7	1.1	3.2	0.9
2007-09 Change in external demand growth	-5.3	-5.4	-7.2	-7.9	1.9	2.5 ***
2007-09 Change in external demand growth * exports/GDP	-3.5	-4.0	-7.0	-8.2	3.4	4.2 *
2007-09 Change in FDI as a share of GDP	0.0	-0.6	-3.3	-4.3	3.3	3.8 ***
III. Additional "Explanatory" Variables						
Fiscal policy						
2007 Fiscal balance/GDP	-2.7	-2.8	-0.7	-0.8	-2.0	-2.0 *
2007 Debt/GDP	53.5	69.4	27.6	25.7	25.9	43.7 ***
Exchange rate policy and level of reserves:						
2007 Exchange rate regime	2.0	2.0	3.0	2.3	1.0	0.3
2007 Reserves/months of imports	5.1	5.6	4.6	5.4	0.5	0.1
2007 Reserves/(short external liabilities + current account deficit)	1.9	5.0	0.8	2.0	1.0	3.0
External balance and capital inflows:						
2007 Current account/GDP	-2.5	-4.0	-7.3	-7.6	4.9	3.6
2007 FDI/GDP	2.2	3.7	7.6	8.4	-5.4	-4.7 ***
2007 Remittances/GDP	6.8	7.2	2.2	4.3	4.6	2.9
Growth preceding crisis:						
Real per capita GDP growth in 2004–07 relative to 1990–2007	1.3	0.9	1.8	3.2	-0.5	-2.4
Credit growth: Private sector during 2000–2007	2.0	1.9	8.2	9.4	-6.2	-7.5 ***
Structural characteristics:						
2007 GDP per capita (US\$)	493	1019	5302	5433	-4808	-4414 ***
2007 Share of commodities exports in GDP	3.4	6.1	2.3	4.4	1.1	1.7
2007 Share of manufactures exports in GDP	2.3	4.7	16.6	18.1	-14.3	-13.4 ***
2007 Openness (trade / GDP)	53.6	53.4	79.8	84.0	-26.1	-30.6 ***
2005 Labor Market Indicator	0.7	0.7	0.6	0.6	0.1	0.1 *
2007 Kaufmann, Kraay, and Mastruzzi Institutions Indicator	-0.9	-0.9	-0.2	-0.1	-0.7	-0.8 ***

Note: For country sample and data sources see appendixes 1 and 2. Tajikistan, Kyrgyz Republic, and Guinea-Bissau excluded due to data concerns. Unless otherwise noted, ratios, shares and growth rates are in percent and changes in percentage points. Levels of significance indicated as follows: 1% (\*\*\*), 5% (\*\*) and 10% (\*).

Table 3.3 Cross-Country Quartiles Analysis for All LICs and MICs

Variables	Countries with small impact on growth (1)		Countries with big impact on growth (2)		Difference (1 - 2)		
	Median	Mean	Median	Mean	Median	Mean	
I. "Dependent" Variable							
2007-09 Change in per capita real GDP growth	-0.3	0.9	-11.2	-13.8	10.9	14.8	***
II. Main "Explanatory" Variables							
2005-07 Change in per capita real GDP growth	0.2	0.3	1.6	1.0	-1.4	-0.7	
2007-09 Change in terms-of-trade growth	1.4	0.7	-2.4	-4.1	3.8	4.9	
2007-09 Change in terms-of-trade growth * trade/GDP	1.5	-0.1	-1.6	-4.5	3.1	4.4	
2007-09 Change in external demand growth	-5.3	-5.4	-6.8	-7.7	1.5	2.3	***
2007-09 Change in external demand growth * exports/GDP	-4.0	-5.0	-7.0	-9.5	3.0	4.5	**
2007-09 Change in FDI as a share of GDP	-0.1	-0.8	-2.9	-3.5	2.8	2.7	**
III. Additional "Explanatory" Variables							
Fiscal policy							
2007 Fiscal balance/GDP	-1.9	9.6	0.2	1.6	-2.1	8.0	
2007 Debt/GDP	45.5	62.7	16.8	22.0	28.7	40.7	***
Exchange rate policy and level of reserves:							
2007 Exchange rate regime	2.5	2.1	3.0	2.3	0.5	0.2	
2007 Reserves/months of imports	5.3	7.2	5.2	7.6	0.1	-0.4	
2007 Reserves/(short external liabilities + current account deficit)	2.0	4.8	0.8	3.8	1.2	1.0	
External balance and capital inflows:							
2007 Current account/GDP	-1.6	8.7	-6.3	-2.4	4.6	11.1	
2007 FDI/GDP	2.3	4.5	7.2	7.2	-4.9	-2.7	
2007 Remittances/GDP	7.7	7.4	1.6	3.0	6.1	4.4	**
Growth preceding crisis:							
Real per capita GDP growth in 2004–07 relative to 1990–2007	1.3	0.8	2.1	4.1	-0.8	-3.3	**
Credit growth: Private sector during 2000–2007	2.4	3.6	9.8	9.3	-7.3	-5.8	*
Structural characteristics:							
2007 GDP per capita (US\$)	548	1151	5477	5916	-4929	-4765	***
2007 Share of commodities exports in GDP	5.1	10.5	2.4	7.1	2.7	3.4	
2007 Share of manufactures exports in GDP	2.2	4.4	16.5	17.1	-14.3	-12.8	***
2007 Openness (trade / GDP)	55.2	55.4	79.8	80.7	-24.6	-25.3	***
2005 Labor Market Indicator	0.7	0.7	0.6	0.6	-0.1	-0.1	
2007 Kaufmann, Kraay, and Mastruzzi Institutions Indicator	-0.9	-0.9	-0.2	-0.2	0.7	0.7	***

Note: For country sample and data sources see appendixes 1 and 2. Tajikistan, Kyrgyz Republic, and Guinea-Bissau excluded due to data concerns. Unless otherwise noted, ratios, shares and growth rates are in percent and changes in percentage points. Levels of significance indicated as follows: 1% (\*\*\*), 5% (\*\*) and 10% (\*).

Table 3.4 Regression Analysis (Panel GMM): Alternative Specification for Output Growth, All Years

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Lagged Growth	0.178*** (0.058)	0.129* (0.078)	0.325*** (0.058)	0.171*** (0.041)
Growth in Terms of Trade * Lagged Trade Openness	-0.014*** (0.005)	-0.001 (0.005)	0.017 (0.011)	-0.020 (0.053)
Lagged Growth in Terms of Trade * Lagged Trade Openness	-0.025*** (0.007)	-0.007 (0.006)	0.001 (0.023)	-0.004 (0.049)
Growth in External Demand * Lagged Trade Openness	0.875*** (0.258)	0.225 (0.203)	2.021*** (0.420)	-0.001 (0.005)
Lagged Growth in External Demand * Lagged Trade Openness	-0.573*** (0.177)	-0.122 (0.153)	-0.685* (0.380)	-0.007 (0.007)
Change in (FDI / GDP)	0.172*** (0.043)	0.148** (0.073)	0.136** (0.062)	0.278 (0.224)
Lagged Change in (FDI / GDP)	0.167*** (0.042)	0.023 (0.072)	0.217*** (0.053)	-0.136 (0.170)
Observations	2,156	1,058	1,098	2,580
Number of Countries	85	43	42	102

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Table 3.5 Regression Analysis: Fitting the 2009 Output Decline. "Out-of-Sample" 2009 Forecast, Based on Specification with Asymmetries in Table 5 and Coefficients Estimated Through 2007

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Actual Mean Growth Difference, 2009 vs. 2007	-5.3	-3.1	-8.1	-5.4
Forecast Mean Growth Difference, 2009 vs. 2007	-4.8	-2.8	-4.3	-4.5
Mean Contribution of Change In:				
Lagged Growth	-0.2	-0.1	-0.4	-0.2
Terms of Trade	0.0	0.0	0.1	0.0
Lagged Terms of Trade	-0.1	-0.1	-0.1	-0.1
External Demand	-3.7	-2.3	-2.4	-3.4
Lagged External Demand	-0.1	-0.1	0.0	-0.6
FDI / GDP	-0.2	0.0	-0.3	0.1
Lagged (FDI / GDP)	-0.2	0.1	-0.8	-0.1
Terms of Trade * Indicator (Below Mean TOT Shock)	0.0	0.1	0.0	-0.1
External Demand * Indicator (Below Mean ED Shock)	-0.4	-0.3	-0.7	-0.2
Lagged (FDI / GDP) * Indicator (Below Mean FDI Shock)	0.1	-0.1	0.3	0.1

Note: For country sample and data sources see appendixes 1 and 2.

Table 3.6. Regression Analysis: Fitting the 2009 Output Decline. “Out-of-Sample” 2009 Forecast, Based on Specification with Asymmetries in Table 6, and Coefficients Estimated Through 2007

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Actual Mean Growth Difference, 2009 vs. 2007	-5.3	-3.1	-8.1	-5.4
Forecast Mean Growth Difference, 2009 vs. 2007	-6.5	-3.7	-6.9	-6.1
Mean Contribution of Change In:				
Lagged Growth	-0.2	-0.1	-0.4	-0.2
Terms of Trade	0.1	0.1	0.1	0.0
Lagged Terms of Trade	-0.1	-0.1	-0.1	-0.1
External Demand	-2.4	-1.4	-0.8	-2.4
Lagged External Demand	-0.2	-0.1	-0.1	-0.7
FDI / GDP	-0.2	0.0	-0.2	0.1
Lagged (FDI / GDP)	-0.1	0.0	-0.6	0.0
Large Negative TOT Shock Indicator	0.0	0.0	0.0	0.0
Large Negative ED Shock Indicator	-3.4	-2.3	-4.7	-2.9
Large Negative Lagged FDI/GDP Shock Indicator	0.0	0.1	0.0	0.1

Note: For country sample and data sources see appendixes 1 and 2.

Table 3.7. Regression Analysis (Panel GMM): Baseline Specification for Government Expenditure/GDP, All Years

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Lagged (Government Expenditure/GDP)	0.573***	0.703	0.644***	0.684***
	(0.095)	(0.000)	(0.119)	(0.077)
Growth in Terms of Trade	-0.004	-0.005	0.011	-0.006
	(0.003)	(0.000)	(0.009)	(0.005)
Lagged Growth in Terms of Trade	0.004	0.006	0.000	0.006
	(0.007)	(0.000)	(0.014)	(0.010)
Growth in External Demand	0.126	0.269	0.034	0.566
	(0.160)	(0.000)	(0.113)	(0.418)
Lagged Growth in External Demand	-0.289	-0.287	-0.197	-0.327
	(0.260)	(0.000)	(0.418)	(0.251)
Change in (FDI / GDP)	0.002	0.046	-0.048	0.111
	(0.036)	(0.000)	(0.061)	(0.080)
Lagged Change in (FDI / GDP)	0.072	-0.011	0.157**	0.070
	(0.047)	(0.000)	(0.064)	(0.048)
Observations	2,689	1,406	1,283	3,310
Number of Countries	82	42	40	100

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.



Table 3.8. Regression Analysis (Panel GMM): Baseline Specification for Current Account/GDP, All Years

	All Non-Fuel Exporters	Non-Fuel- Exporting LICs	Non-Fuel- Exporting MICs	All LICs and MICs
Lagged (Current Account/GDP)	0.809*** (0.002)	0.811*** (0.003)	0.733*** (0.066)	0.809*** (0.003)
Growth in Terms of Trade	0.003 (0.002)	0.002 (0.002)	0.001*** (0.000)	0.003* (0.001)
Lagged Growth in Terms of Trade	-0.003 (0.003)	-0.004 (0.004)	0.000 (0.000)	-0.002 (0.001)
Growth in External Demand	-0.149 (0.138)	-0.231 (0.209)	-0.005*** (0.001)	-0.122 (0.115)
Lagged Growth in External Demand	0.179 (0.168)	0.276 (0.249)	0.002 (0.001)	0.146 (0.137)
Change in (FDI / GDP)	-0.003 (0.002)	-0.010 (0.007)	0.000 (0.002)	-0.005*** (0.002)
Lagged Change in (FDI / GDP)	-0.001 (0.003)	-0.002 (0.006)	-0.001 (0.001)	-0.003* (0.002)
Observations	2,923	1,499	1,424	3,562
Number of Countries	88	46	42	107

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Table 3.9. Regression Analysis (Panel GMM): Impact on Output Growth of Central Government Fiscal Balance, All Years

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Lagged Growth	0.081* (0.041)	0.065 (0.067)	0.164** (0.072)	0.120*** (0.037)
Growth in Terms of Trade	0.014 (0.008)	0.015* (0.009)	0.016* (0.009)	0.014 (0.010)
Lagged Growth in Terms of Trade	0.021** (0.009)	0.022*** (0.008)	0.014 (0.012)	0.032*** (0.008)
Growth in External Demand	0.793*** (0.152)	0.159 (0.142)	0.896*** (0.241)	0.556*** (0.131)
Lagged Growth in External Demand	-0.088 (0.157)	-0.073 (0.103)	-0.136 (0.246)	0.018 (0.154)
Change in (FDI / GDP)	0.109** (0.048)	-0.010 (0.053)	0.172*** (0.057)	-0.042 (0.040)
Lagged Change in (FDI / GDP)	0.196*** (0.044)	-0.011 (0.060)	0.275*** (0.059)	0.008 (0.046)
Lagged (Government Fiscal Balance / GDP)	-0.150 (0.099)	0.102 (0.074)	-0.254** (0.113)	-0.186*** (0.060)
Growth in Terms of Trade * Lagged (Government Fiscal Balance / GDP)	-0.001 (0.002)	0.000 (0.002)	-0.000 (0.001)	-0.001 (0.001)
Growth in External Demand * Lagged (Government Fiscal Balance / GDP)	0.027 (0.020)	-0.025 (0.020)	0.051* (0.027)	0.014 (0.011)
Lagged Change in (FDI / GDP) * Lagged (Government Fiscal Balance / GDP)	-0.000 (0.003)	0.004 (0.003)	-0.002 (0.006)	0.003 (0.002)
Observations	2575	1357	1218	3,151
Number of Countries	82	42	40	99

Note: A positive government fiscal balance denotes a budget surplus. Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Table 3.10. Regression Analysis (Panel GMM): Impact on Output Growth of a Fixed Exchange Rate Regime, All Years

	All Non-Fuel Exporters	Non-Fuel- Exporting LICs	Non-Fuel- Exporting MICs	All LICs and MICs
Lagged Growth	0.093** (0.044)	0.083 (0.075)	0.169 (0.000)	0.126*** (0.038)
Growth in Terms of Trade	0.026 (0.019)	0.022 (0.017)	0.015 (0.000)	0.018 (0.018)
Lagged Growth in Terms of Trade	0.019** (0.009)	0.012 (0.011)	0.030 (0.000)	0.021*** (0.008)
Growth in External Demand	0.664 (0.435)	0.723** (0.359)	0.213 (0.000)	0.729* (0.399)
Lagged Growth in External Demand	0.042 (0.152)	-0.028 (0.098)	0.053 (0.000)	0.148 (0.140)
Change in (FDI / GDP)	0.066 (0.043)	-0.002 (0.038)	0.121 (0.000)	-0.034 (0.041)
Lagged Change in (FDI / GDP)	0.164 (0.112)	-0.256 (0.222)	0.293 (0.000)	0.155 (0.116)
Lagged (Government Fiscal Balance / GDP)	0.620 (1.467)	0.666 (1.468)	-0.468 (0.000)	1.348 (1.239)
Growth in Terms of Trade * Fixed Exchange Rate Regime	-0.013 (0.022)	-0.011 (0.021)	-0.000 (0.000)	-0.004 (0.020)
Growth in External Demand * Fixed Exchange Rate Regime	-0.090 (0.413)	-0.419 (0.333)	0.293 (0.000)	-0.171 (0.369)
Lagged Change in (FDI / GDP) * Fixed Exchange Rate Regime	0.003 (0.112)	0.339 (0.225)	-0.025 (0.000)	-0.155 (0.125)
Observations	2,300	1,129	1,171	2,766
Number of Countries	88	46	42	107

Note: Regressions include a full set of country- and year-specific fixed effects. Robust standard errors in parentheses. \*\*\*, \*\*, and \* denote statistical significance at, respectively, the 1 percent, 5 percent, and 10 percent level. For country sample and data sources see appendixes 1 and 2.

Table 3.11. Growth Forecasts, Average for 2010–11, Expressed Relative to 2009 Growth Levels, Based on Specification with Asymmetries in Table 7 and Coefficients Estimated Through 2009

	All Non-Fuel Exporters	Non-Fuel-Exporting LICs	Non-Fuel-Exporting MICs	All LICs and MICs
Model Forecast Mean Growth Difference	4.1	2.1	4.2	3.1
Mean Contribution of Change In:				
Lagged Growth	-0.3	-0.1	-0.6	-0.3
Terms of Trade	0.0	0.0	-0.1	0.0
Lagged Terms of Trade	0.1	0.1	0.1	0.0
External Demand	3.6	1.9	3.1	3.2
Lagged External Demand	0.0	0.0	0.2	-0.3
(FDI / GDP)	0.2	0.1	0.3	0.0
Lagged (FDI / GDP)	-0.2	-0.2	0.0	-0.1
Terms of Trade * Indicator (Negative TOT Shock)	0.0	0.0	0.0	0.1
Growth in External Demand * Indicator (Negative ED Shock)	0.7	0.3	1.3	0.4
Lagged (FDI / GDP) * Indicator (Negative FDI Shock)	0.1	0.1	0.0	0.1

Note: For country sample and data sources see appendixes 1 and 2.