The Short- and Long-Run Effects of the 2007–09 Global Financial Crisis on Growth in Low-Income Countries

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IMF

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Introduction

Key questions:

- How will crisis affect growth in Low-Income Countries (LIC) in the short run?
- How will crisis affect growth in LIC in the medium to long run?
- Are the effects different in the Middle-Income Countries (MIC)?
- How do the effects depend on policies and country characteristics?
Outline of Presentation

- A few key facts to keep in mind about the crisis
- What can we say about cross-sectional outcomes in 2009?
- Can we learn more from a panel, that is, using history as a guide to what happened in 2009 and what will happen in the future?
- Medium-run growth: should we fear more persistent output declines that cannot be captured by these approaches, given the historical frequency of structural breaks in the growth process?
Output Growth Rate

Year

Low-Income Countries
Middle-Income Countries
Advanced Economies
Key Fact: Severity of 2009 Recession

- **Low-Income Countries**
  - Worst 20%: 34
  - Worst 20%-40%: 36
  - Middle: 16
  - Best 20%-40%: 11
  - Best 20%: 2

- **Middle-Income Countries**
  - Worst 20%: 76
  - Worst 20%-40%: 17

- **Advanced Economies**
  - Worst 20%: 95

Of all years
Key Fact: Output Synchronization

Average Bilateral Correlations of Real GDP per Capita Growth

Graph showing the average bilateral correlations of real GDP per capita growth from 1969 to 2009, with categories for Advanced, LIC, and MIC.
Key Fact: Collapse in External Demand

Change in Growth Rate of External Demand

Year

Percentage points

Low-Income Countries

Middle-Income Countries

Advanced Economies
Little Change in the Terms of Trade

Change in Growth Rate of Terms of Trade (non-fuel-exporters)
Cross-Country Analysis: Output and External Demand, 2007-09
Cross-Country Analysis: Output and Terms of Trade, 2007-09
Cross-Country OLS Regression: Baseline

Regress decline in GDP growth on three key external shock variables (external demand, terms of trade, and FDI) and their lags, for a sample of 49 LIC.

Key findings:
- A larger decline in external demand growth is significantly associated with a larger growth decline.
- A larger decline in FDI/GDP is significantly associated with a larger growth decline.
- No significant impact from changes in the terms of trade.
Cross-Country Analysis: Role of Policy

Associated with smaller growth decline:
- Higher reserves / (short-term liabilities + current account deficit)

Associated with a larger growth decline:
- Larger credit boom in preceding years.
- More flexible exchange rate regime.
- Higher initial level of FDI.
- Higher per capita income.
- Smaller share of commodities exports in GDP.

Other variables (incl. initial fiscal balance, fiscal debt, current account balance, remittances, openness) not significantly associated with magnitude of growth decline.
Panel Analysis

Next step: panel GMM regression, using annual data.

- On Left-Hand Side: Output Growth Rate.

- On Right-Hand Side: Change in External Demand, in Terms of Trade, and in lagged FDI / GDP.

- Other controls: country- and year-specific fixed effects; lagged output growth rate.
Panel GMM Analysis: Baseline Specification for Output Growth

<table>
<thead>
<tr>
<th></th>
<th>All Non–Fuel-Exporters</th>
<th>LIC</th>
<th>MIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lagged Growth</td>
<td>0.246***</td>
<td>0.187**</td>
<td>0.376***</td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td>(0.086)</td>
<td>(0.046)</td>
</tr>
<tr>
<td>Growth in Terms of Trade</td>
<td>0.017*</td>
<td>0.017*</td>
<td>0.026</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.030)</td>
</tr>
<tr>
<td>Growth in External Demand</td>
<td>0.681***</td>
<td>0.575***</td>
<td>0.894***</td>
</tr>
<tr>
<td></td>
<td>(0.112)</td>
<td>(0.175)</td>
<td>(0.149)</td>
</tr>
<tr>
<td>Lagged Change in (FDI / GDP)</td>
<td>0.107***</td>
<td>0.024</td>
<td>0.141***</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.047)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>Observations</td>
<td>1698</td>
<td>929</td>
<td>769</td>
</tr>
<tr>
<td>Number of Countries</td>
<td>89</td>
<td>49</td>
<td>40</td>
</tr>
</tbody>
</table>

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.
Panel Analysis: Fitting the 2007-09 Output Decline

Actual vs. Predicted Change in Output Growth, 2007-09
Panel Analysis: Growth and External Demand, 2007-09

LIC and MIC Non-Fuel Exporting Countries

Orthogonalized Growth Difference

External Demand Growth: 2009-2007 Difference

-30 -20 -10 0 10

-12 -10 -8 -6 -4 -2

Belarus, Moldova, Georgia, Latvia, Lithuania, Guinea, Togo, Syrian Arab Republic, Senegal, Jordan
The Role of Policy

Examine the role of policy through alternative specifications, where impact of shocks to external demand, terms of trade, or capital flows is interacted with:

- Exchange Rate Regime
- Initial Reserve Levels
- Initial Deficits or Debt Levels
- Indicators of Structural Reform & Flexibility (external trade, labor & product markets, financial markets)
- Institutional Quality

So far, results inconclusive.
## Growth Forecasts: Average for 2010–2011, Relative to 2009 Growth

<table>
<thead>
<tr>
<th></th>
<th>All Non–Fuel-Exporters</th>
<th>LIC</th>
<th>MIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WEO Forecast Mean Growth Difference</strong></td>
<td>4.5</td>
<td>2.9</td>
<td>6.3</td>
</tr>
<tr>
<td><strong>Model Forecast Mean Growth Difference</strong></td>
<td>3.2</td>
<td>1.8</td>
<td>2.8</td>
</tr>
<tr>
<td><strong>Mean Contribution of Change In:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lagged Growth</td>
<td>-0.2</td>
<td>-0.1</td>
<td>-0.4</td>
</tr>
<tr>
<td>Terms of Trade</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>External Demand</td>
<td>3.3</td>
<td>1.9</td>
<td>2.8</td>
</tr>
<tr>
<td>Lagged (FDI / GDP)</td>
<td>0.1</td>
<td>0.0</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Medium- to Long-Run Effects

- Low-income countries as a group have enjoyed relatively rapid growth in recent years. Since 1995, for example, sub-Saharan Africa has grown faster than developed countries, after many years of poor average performance.

- If the current shock has longer-run implications (that is, if it knocks countries off a track of solid medium-long-term growth), then it will be a much greater disaster.
History Has Not Been Kind

- In principle, a temporary negative shock to external demand or the terms of trade in a standard neoclassical growth model would be followed by a reasonably quick reversion.

- However, history is not optimistic that LIC can uniformly escape global shocks without absorbing long-lasting damages both on growth and welfare.

- There is also an emerging empirical literature that points to growth nonlinearities, growth accelerations, and growth decelerations.

- So, important to consider not only the short-run implications of the crisis and policy responses, but also the risks to medium-run growth and how to sustain it.
1. **Impulse Response**: We employ impulse response function analysis as in Cerra and Saxena (2008).

### Impulse response of output loss in LIC to TOT shock

**Response of Change in Loss Output to Terms of trade LICs**

- **Graph**: Shows the percentage deviation from baseline trend over years after the shock.
- **Note**:
  1. Number of countries: 77; Number of observations: 3648
  2. Crisis episode was calculated using left tail of the distribution
  3. Macroeconomics Studies Division IMF

### Impulse response of output loss in LIC to ED shock

**Response of Change in Loss Output to External Demand LICs**

- **Graph**: Shows the percentage deviation from baseline trend over years after the shock.
- **Note**:  
  1. Number of countries: 77; Number of observations: 3648
  2. Crisis episode was calculated using left tail of the distribution
  3. Macroeconomics Studies Division IMF
2. **Growth regressions**: A second exercise employs 5-year panel growth regressions as an alternative approach to investigating the impact of TOT, ED and FDI shocks on medium-term per capita GDP growth.

\[
\text{GDP(growth)} = a_0 + a_1 \text{lagGDP(growth)} + a_2 \text{TOT} + a_3 \text{ED} + a_4 \text{FDI} + \eta
\]

### Panel GMM w/ time effects

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Entire Time Period</th>
<th>Before 1990</th>
<th>After 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>PRGF-NF</td>
<td>NPRGF-NF</td>
</tr>
<tr>
<td>Lagged Growth</td>
<td>-0.209***</td>
<td>-0.167**</td>
<td>-0.237**</td>
</tr>
<tr>
<td></td>
<td>(0.066)</td>
<td>(0.077)</td>
<td>(0.095)</td>
</tr>
<tr>
<td>Growth in Terms of Trade</td>
<td>0.123***</td>
<td>0.115*</td>
<td>0.111**</td>
</tr>
<tr>
<td></td>
<td>(0.047)</td>
<td>(0.064)</td>
<td>(0.053)</td>
</tr>
<tr>
<td>Growth in External Demand</td>
<td>2.603***</td>
<td>1.960***</td>
<td>3.419***</td>
</tr>
<tr>
<td></td>
<td>(0.606)</td>
<td>(0.736)</td>
<td>(0.786)</td>
</tr>
<tr>
<td>Lagged Change in (FDI / GDP)</td>
<td>0.631***</td>
<td>0.221</td>
<td>1.010***</td>
</tr>
<tr>
<td></td>
<td>(0.187)</td>
<td>(0.222)</td>
<td>(0.270)</td>
</tr>
<tr>
<td>Observations</td>
<td>529</td>
<td>281</td>
<td>248</td>
</tr>
<tr>
<td>Number of country code</td>
<td>88</td>
<td>48</td>
<td>40</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses:

*** p<0.01, ** p<0.05, * p<0.1
3b. Pre-crisis debt, and exchange rate regime vs. post-crisis growth

Change in debt over GDP and GDP average annual growth, 5 years before and after Terms-of-Trade shock

Change in debt over GDP and GDP average annual growth, 5 years after External demand shock

Exchange-rate regime and GDP average annual growth before and after 5 years Terms-of-Trade shock

Exchange-rate regime and GDP average annual growth before and after 5 years External demand shock
3a. **Growth breaks:** Use Berg, Ostry and Zettelmeyer (2010) to identify growth decelerations (sustained periods of slow growth) in LIC, and trace TOT and ED shocks before and after.

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**GDP per Capita and Terms-of-trade (Growth Rates)**

- Growth Downturns
- SSA

**Note:**
- Number of countries on which the average is based are 15
- Number of observations on which the average is based are 19
- Macroeconomics Studies Division IMF

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**GDP per Capita and External demand (Growth Rates)**

- Growth Downturns
- SSA

**Note:**
- Number of countries on which the average is based are 13
- Number of observations on which the average is based are 17
- Macroeconomics Studies Division IMF
3b. Growth breaks: GDP growth decelerations (sustained periods of slow growth) vs. large permanent TOT and ED shocks.

**Growth downbreaks Vs. Persistent Terms-of-Trade shock**

**Growth downbreaks Vs. Persistent External demand shock**

**Source:** IMF staff calculations.

**Note:** The left panel plots the number of GDP growth downbreaks in a large sample of low-income countries (excluding transition economies) during the periods leading up to, and following, a large persistent terms of trade shock (year t+0 on the horizontal axis). A large persistent TOT shock is defined as the worst 10 percent of the distribution of all TOT shocks, measured as the difference of the average 3 year TOT growth before and after period t. The right panel is the same, except that the shock is to external demand, measured as partner country real growth weighted by export shares.
Message from MR-LR analysis

- Since the current crisis affected LIC primarily through a shock to External Demand rather than the Terms of Trade ...

- ... this implies a low probability that many LIC will see an end to the period of strong growth they enjoyed prior to the crisis.

- Still, shocks to External Demand are often associated with persistent output losses ...

- ... which highlights the need for vigilance and prudent policy to protect pre-crisis growth trends.
Thank You
## Cross-Country OLS: LHS: change in per capita GDP growth, 2009 vs. 2007

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag change in real per capita growth (2007-05)</td>
<td>-0.19</td>
<td></td>
</tr>
<tr>
<td>Change in (terms of trade growth * trade/GDP) (2009-07)</td>
<td>-0.01</td>
<td>Larger decline in external demand growth associated with larger growth decline</td>
</tr>
<tr>
<td>Lag change in (terms of trade growth * trade/GDP) (2009-07)</td>
<td>-0.01</td>
<td>Larger decline in external demand growth associated with larger growth decline</td>
</tr>
<tr>
<td>Change in (external demand growth * exports/GDP) (2009-07)</td>
<td>1.67**</td>
<td>Larger decline in FDI/GDP associated with larger growth decline</td>
</tr>
<tr>
<td>Lag change in (external demand growth * exports/GDP) (2009-07)</td>
<td>1.47</td>
<td>Larger decline in FDI/GDP associated with larger growth decline</td>
</tr>
<tr>
<td>Change in FDI/GDP (2009-2007)</td>
<td>0.37*</td>
<td></td>
</tr>
<tr>
<td>Lag change in FDI/GDP (2007-2005)</td>
<td>-0.12</td>
<td></td>
</tr>
</tbody>
</table>
Past and Current Global Crises: Effects on World and LIC

GDP per capita growth in past and current crises

TOT and ED growth in LIC in past and current crises
**Debt Crises**

**Figure 1**

**Argentina**

**Brazil**

**Chile**

**Mexico**

**Figure 2. Protracted Civil Wars**
and Charles Plosser 1982) and for serial correlation in growth rates.\textsuperscript{1} We control for country fixed
effects, which \textit{F}-tests indicate are present.\textsuperscript{2} We estimate an AR(4), as we find insignificant coeffi-
cients beyond the fourth lag. We estimate the model on all of the available data from 190 countries
over the period 1960 through 2001. We then extend the estimation equation to include the current
and lagged impacts of the shock. Thus, we estimate the following model:

\begin{equation}
g_{it} = a_i + \sum_{j=1}^{4} \beta_j g_{i,t-j} + \sum_{s=0}^{4} \delta_s D_{i,t-s} + \varepsilon_{it},
\end{equation}

where \( g \) is the percentage change in real GDP and \( D \) is a dummy variable indicating a financial
or political crisis. The impulse response functions to each crisis type are shown with a one-
standard-error band drawn from a thousand Monte Carlo simulations.
Figure A1: Histograms showing annual growth 5 years after the shock

Medium-run growth relative to pre-crisis trend
Source of crisis: External demand drop - prgf countries

Medium-run growth relative to pre-crisis trend
Source of crisis: Terms-of-trade drop - prgf countries

Note: Macroeconomics Studies Division IMF
Figure A2: Growth around periods TOT and ED growth decelerations

**GDP per Capita and Terms-of-trade (Growth Rates)**

PRGF countries - Berg et. al.

Note 1: Number of countries on which the average is based are 3
Note 2: Number of observations on which the average is based are 4

**GDP per Capita and External demand (Growth Rates)**

PRGF countries - Berg et. al.

Note 1: Number of countries on which the average is based are 34
Note 2: Number of observations on which the average is based are 39
Thank You