BOX 3.2 Implications of rising uncertainty for investment in EMDEs

Political and policy-related uncertainty has increased since the global financial crisis for most EMDEs. EU policy uncertainty has reduced investment in the EU's EMDE trading partners, and domestic policy uncertainty has weighed significantly on investment in Brazil. Global financial market uncertainty (as measured by the VIX) significantly affects EMDE investment.

Elevated macroeconomic and policy uncertainty after the crisis has contributed to weak investment growth in AEs (Kose and Terrones 2015). However, less is known about the implications of uncertainty for EMDEs. This box examines the effects of uncertainty on investment growth by addressing the following questions:

- What are the basic sources of uncertainty?

- How has uncertainty evolved in EMDEs since the 2008-09 crisis?

- How has uncertainty affected investment in EMDEs?

The results suggest a post-crisis rise in political and policy uncertainty in EMDEs and bouts of financial market uncertainty amidst ample global liquidity. Policy uncertainty in the European Union (EU)—including that associated with the Euro Area crisis—has weighed on investment in the EU's EMDE trading partners in Europe and Central Asia. Domestic policy uncertainty has sharply curtailed investment in Brazil.

Basic sources of uncertainty

Although uncertainty is often discussed in policy debates, there is no universally agreed measure of it. This box uses three measures for EMDEs, the United States, as well as the EU.

- *Financial market uncertainty.* Financial market uncertainty is measured by a quarterly financial market volatility measure, which is constructed using the realized standard deviation of daily changes in stock price indexes (Bloom, Bond, and Van Reenen 2007; Bloom 2009; Gilchrist, Sim, and Zakrajsek 2014). The VIX index of implied volatility of the S&P 500 stock market index in the United States is used as an indicator of global financial market volatility.

- *Economic Policy Uncertainty.* The Economic Policy Uncertainty (EPU) Index is a news-based measure to capture policy-related uncertainty developed by Bloom, Baker, and Davis (2016). The EPU index is constructed from counts of terms related to policy

Note: This box was prepared by Jongrim Ha, Raju Huidrom, and Congyan Tan.

FIGURE 3.2.1 Evolution of uncertainty in EMDEs

While financial market uncertainty, defined in terms of stock market volatility, has declined in most EMDEs, policy and political uncertainty increased from the pre-crisis to the post-crisis period for most EMDEs. Generally low post-crisis financial market volatility was interrupted by several bouts of global financial market volatility.

A. Share of EMDEs with higher uncertainty in post-crisis than pre-crisis.
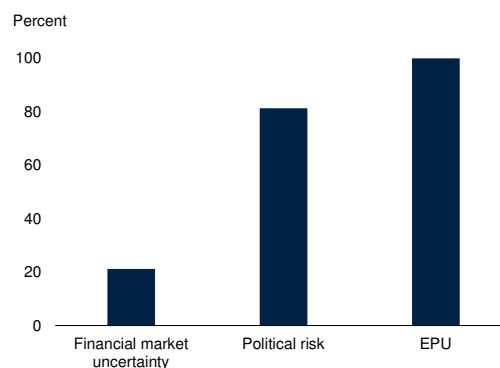
B. Evolution of uncertainty
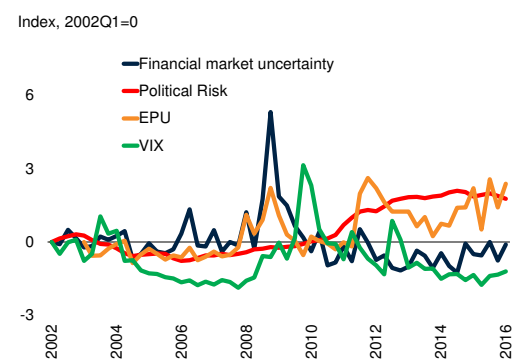
Sources: Baker, Bloom, and Davis (2016); Bloomberg; Haver Analytics; International Country Risk Guide; World Bank estimates.
Notes: 33 countries for measure based on standard deviation of daily stock market changes; 102 countries for ICRG political risk score; and 4 countries (Brazil, China, India, and Russia) for the EPU measure. Financial market uncertainty refers to realized standard deviation of daily changes in stock price changes. Political risk refers to the ICRG political risk index (adjusted such that higher index denotes higher risk).
A. Pre-crisis and post-crisis refer to 2003-08 and 2010-15, respectively. To exclude data for the spike in global financial market uncertainty in the wake of the bankruptcy of Lehman Brothers, pre-crisis average for financial market uncertainty excludes 2008. Last observation is for Q1 2016.
B. All series are normalized to standard deviation of 1.

BOX 3.2 Implications of rising uncertainty for investment in EMDEs *(continued)*

uncertainty appearing in newspapers in each country. This measure is available for four EMDEs: Brazil, China, India, and Russia.

- *Political uncertainty.* Political uncertainty is measured by the political risk rating developed by the Political Risk Services Group's (PRS) International Country Risk Guide (ICRG). The rating simply summarizes expert judgment on each economy's political environment. As used here, a higher value of the index reflects greater political risk. For the four EMDEs with available data, the ICRG risk scores are positively correlated with the EPU Index, suggesting overlap between political risk and policy uncertainty.

Evolution of uncertainty in EMDEs since the 2008-09 crisis

In most EMDEs, political and policy uncertainty were higher post-crisis (2010-2015) than pre-crisis (2003-2008), as indicated by the ICRG-based political uncertainty and EPU-based policy uncertainty measures (Figure 3.2.1). Political risk increased in more than four-fifths of EMDEs and policy uncertainty increased in all four major EMDEs for which data are available. In contrast, financial market volatility, as measured by the standard deviation of domestic stock market indexes, declined in most EMDEs, reflecting exceptionally accommodative monetary policies and record-low interest rates globally. The generally low post-crisis financial market volatility was disrupted by several bouts of global financial market uncertainty. The VIX, which in normal circumstances tends to fluctuate in the 10-30 range, surged to above 40 basis points during periods of intense market concerns about the future of the Euro Area (March-June 2010 and May-September 2011) and about the stability of Chinese equity markets and growth prospects (July-August 2015).

Impact of uncertainty on investment in EMDEs

To assess the effects of uncertainty on investment during 1998Q1-2016Q2, a series of vector autoregressive models were estimated for 18 EMDEs. Two sources of uncertainty were distinguished: domestic and global. Global financial market uncertainty was captured by the VIX. Global policy uncertainty was captured by the EPU for the United States and the EU. Domestic policy uncertainty was captured by the EPU for Brazil. Details of the estimation are presented in Annex 3.1B.

- *Global financial market uncertainty.* Global financial market uncertainty shocks, as measured by spikes in

FIGURE 3.2.2 Financial market uncertainty and investment in EMDEs

Rising global financial market uncertainty, as captured by the VIX, reduces EMDE investment. Accommodative monetary policy by major central banks has reduced financial market uncertainty.

A. Investment response to a 10 percent increase in the VIX
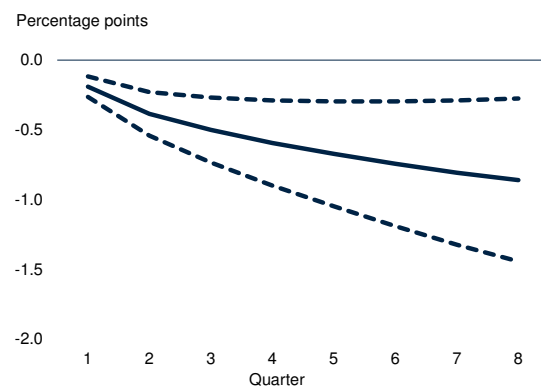
B. Contribution of the VIX to EMDE investment growth
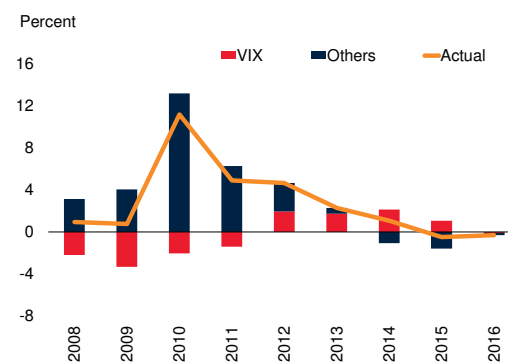
Sources: Bloomberg, Haver Analytics, World Bank estimates.
Note: Vector autoregressions are estimated with sample for 1998Q1-2016Q2. The model includes, in this order, the VIX, MSCI Emerging Markets Index (MXEM), J.P.Morgan Emerging Markets Bond Index (EMBIG), aggregate real output and investment growth in 18 EMDEs with G7 real GDP growth, U.S. 10-year bond yields, and MSCI World Index as exogenous regressors and estimated with two lags. Estimates for 2016 are based on the first half in 2016 (annualized).
A. Shows cumulative responses of EMDE investment to a 10 percent increase in the VIX. Solid lines indicate the median responses and the dotted lines indicate 16-84 percent confidence intervals.
B. Indicates historical decomposition to EMDE investment. "Others" indicates other EMDE and global factors, including stock and bond price index.

**BOX 3.2 Implications of rising uncertainty for investment in EMDEs** *(continued)*

FIGURE 3.2.3 **Policy uncertainty and investment in EMDEs**

Elevated policy uncertainty in Europe set back investment in ECA. Policy uncertainty has been a significant cause of the investment slump in Brazil since 2013.
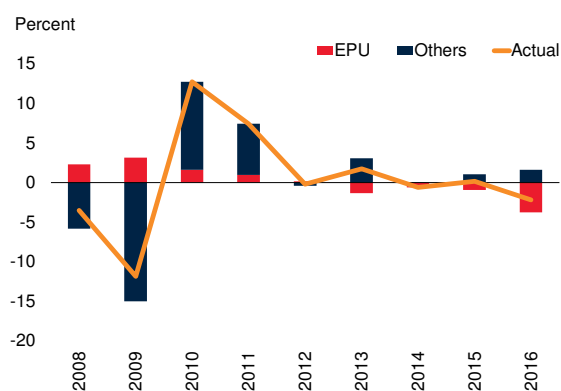
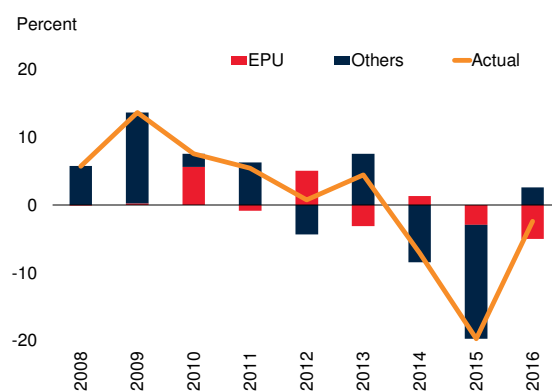**A. ECA investment response to 10 percent increase in EU policy uncertainty**
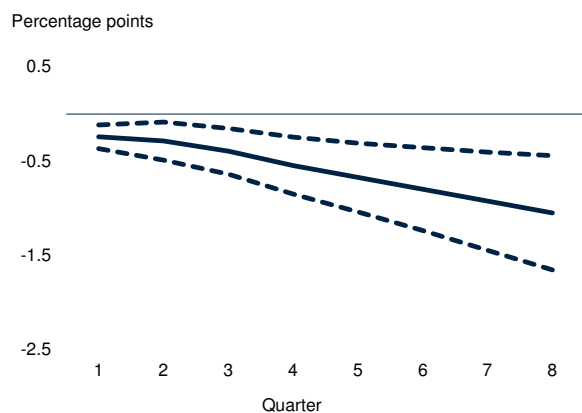
B. Investment response to 10 percent increase in policy uncertainty in Brazil
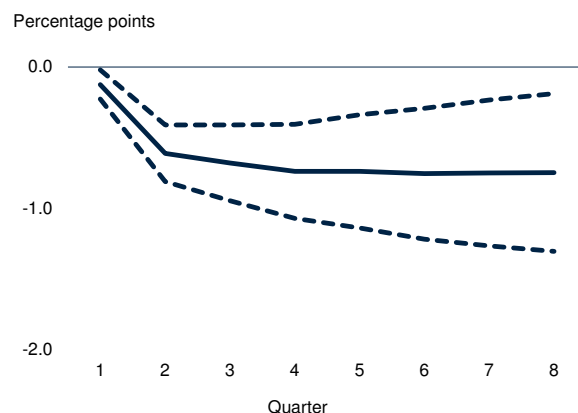
C. Contribution of EU policy uncertainty to ECA investment growth

D. Contribution of domestic policy uncertainty to Brazil's investment growth

Sources: Bloomberg, Haver Analytics, World Bank estimates.
A.C. Vector autoregressions are used for estimation on a sample of aggregate EMDE variables for 1998Q1-2016Q2. The model includes the EPU for the Euro Area, emerging market stock price (Euro Area) index, emerging market bond index, aggregate real output and investment growth in 6 ECA countries, with G7 real GDP growth, U.S. 10-year bond yields, and MSCI World Index as exogenous regressors and estimated with two lags.
B.D. Country-specific autoregressions are estimated for Brazil for 1998Q1-2016Q2. The model includes the domestic EPU, domestic stock market index, domestic short-term interest rates, and real output and investment growth, with G7 real GDP growth and VIX as exogenous controls and estimated with two lags.
A.B. Show cumulative responses of investment to a 10 percent policy uncertainty shock in the Euro Area and Brazil. Solid lines indicate median responses. Dotted lines indicate the 16-84 percent confidence intervals. Figures C. and D. indicate historical decomposition to investment growths in ECA and Brazil, respectively. Estimates for 2016 are based on the first half in 2016 (annualized).

the VIX, significantly reduced EMDE investment, in line with findings of earlier studies (Carrière-Swallow and Céspedes 2013). Specifically, a 10 percent increase in the VIX reduced average EMDE investment growth by about 0.6 percentage point within a year (Figure 3.2.2). Financial market

uncertainty was the key source of the slowdown in EMDE investment growth in 2008-09. Bouts of global financial market uncertainty (such as during the Euro Area crisis, the 2013 Taper Tantrum, and the 2016 Brexit) also weighed on EMDE investment.

- *Global policy uncertainty.* Policy uncertainty in major
  AEs could also generate significant spillovers to EMDE
  investment. Policy uncertainty in the EU had an
  especially sizable impact on investment in EMDEs in
  Europe and Central Asia: a 10 percent increase in EU
  policy uncertainty reduces their investment growth by
  0.6 percentage point within a year (Figure 3.2.3).
  During the Euro Area crisis in 2010-12, EU policy
  uncertainty may have reduced investment growth in
  EMDEs in Europe and Central Asia by 0.6-1.3
  percentage points with a certain time lag.

- *Domestic policy uncertainty.* For those EMDEs for which
  the EPU is available, domestic policy uncertainty also
  appears to have been accompanied by significantly lower
  investment: a 10 percent increase in Brazil's EPU may
  have reduced investment growth by around 0.8
  percentage point within a year.

Conclusion

The post-crisis rise in political and policy uncertainty
in most EMDEs has contrasted with a decline in financial
market uncertainty amidst benign global financing
conditions until late 2016. Low global financial market
uncertainty has supported EMDE investment. In contrast,
increased policy uncertainty in the EU has significantly
reduced investment in EMDEs in Europe and Central Asia.

pullback in productive investment of
multinational companies, which account for one-
third of global trade. Capital expenditures
(excluding mergers and acquisitions) by the 5,000
largest multinationals shrank in both 2014 and
2015 (UNCTAD 2016).

The global trade slowdown is not only a symptom,
but also a transmission mechanism that propagates
the slowdown in investment across countries
(Freund 2016). Trade can facilitate more efficient
allocation of capital goods and, thus, improve
aggregate productivity which, in turn, would
encourage investment (Mutreja, Ravikumar, and
Sposi 2014).

Slower capital accumulation. Among OECD
countries, the post-crisis slowdown in potential
growth to a large extent reflects the slowing pace
of capital deepening (Ollivaud, Guillemette, and

Turner 2016; Hall 2016). Similarly, slowing
capital accumulation weighs on potential growth
in EMDEs.[7]

Weaker productivity growth. In addition to
slowing capital accumulation, weak investment
growth is associated with slower total factor
productivity growth, as investment is often critical
to the adoption of new, productivity-enhancing
technologies.[8] Among AEs, a steady productivity
growth slowdown was underway even before the
global financial crisis. Possible drivers include
structural change towards lower-productivity
services, caused partly by demand shifts related to
population ageing, a lack of transformative
innovations, and slower technology diffusion.[9]
Weaker investment growth may partly account for
the slowdown in total factor productivity growth
in EMDEs, from 2.2 percent in 2010 to -0.2
percent in 2015.[10] The productivity slowdown was
most pronounced in commodity-exporting
EMDEs and those EMDEs with the slowest
investment growth (Figure 3.14). Weaker total
factor productivity growth would also be reflected
in slower labor productivity growth—the key
driver of long-term real wage growth and
household income growth (Blanchard and Katz
1999; Feldstein 2008).

Slower income catch-up. Weak investment
growth in EMDEs is both a symptom and a
source of slowing pace of catch-up to AE income
levels. Specifically, by reducing potential growth
in EMDEs relative to AEs, it slows the pace of
catch-up in per-capita incomes. In 2015, the
difference in investment growth between EMDEs
and AEs reached its lowest level since the early
2000s. If weakness in investment growth persists

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[7]If investment growth is assumed to remain as low as in 2015 (3.3
percent), 2020 potential growth would be about two-thirds of
potential growth in the pre-crisis investment growth scenario.

[8]Gollop, Fraumeni, and Jorgenson (1987); Griliches (1988);
Jorgenson (1991); Colecchia and Schreyer (2002); Bourreau,
Cambini, and Dogan (2012); and OECD (2016a).

[9]Brynjolfsson and McAfee (2011); Cowen (2011); Gordon
(2012); Bailey, Manyika, and Gupta (2013); McGowan and Andrews
(2015); Andrews, Criscuolo, and Gal (2015); and OECD (2016a).

[10]TFP is calculated as residual from the growth-accounting
framework in Didier et al. (2015). The slowdown happened despite
some evidence of somewhat faster cross-country technology
absorption from countries at the productivity frontier (Comin and
Ferrer 2013; IFC 2016a).