BOX 1.1 Is the global economy turning the corner?

The year 2018 will likely mark a turning point for the global economy because, for the first time since 2008, the negative global output gap is expected to be closed. Among EMDEs, helped by the recent recovery in commodity markets, and advanced economies, output gaps should approach zero. The closing gaps in major advanced economies would allow a normalization of monetary policy after a decade of exceptional easing. With the anticipated further withdrawal of stimulus by advanced economies, EMDE policymakers need to remain alert to the potential for adverse spillovers even while pursing policies to support strong, sustained growth.

The global financial crisis tipped the global economy into a deep recession that affected first the advanced economies but spread—especially with the subsequent collapse of commodity prices—to emerging market and developing economies (EMDEs). Recoveries have been slow, but by 2018 the global economy is expected to return to its potential for the first time in a decade as the global output gap is expected to be closed. This in turn could mean a continued withdrawal by advanced economies of the extraordinary policy accommodation that was provided during the crisis, with important spillovers to EMDEs through trade and financial linkages.[1]

Against this backdrop, this box addresses three questions.

- Why do we care about the global output gap?

- What are the main challenges associated with the measurement of output gaps?

- How have output gaps evolved since 2000?

Why do we care about the global output gap?

The global output gap captures the difference between the level of actual global output and its "potential," scaled by potential output. A positive global output gap indicates global excess demand, where economies are operating above the level that is sustainable at full employment. Conversely, a negative global output gap indicates weak demand and the presence of global spare capacity. Negative global output gaps can weigh on global inflation and depress global commodity and financial markets, especially in a world where trade and financial flows are highly integrated (Carney 2017b).

The global output gap is relevant for policies at the individual country level, especially so for smaller and more open economies. A negative global output gap could be a sign of weak external demand that may depress import prices and inflation.[2] The existence of a large negative global output gap may amplify the potential benefits from international policy coordination. For example, the G20 commitments to fiscal stimulus in 2009 were founded on a consensus that the global economy had sizable slack in the wake of the financial crisis and that unemployment and deflationary pressures would continue to rise absent coordinated policy action (G20 2009). In contrast, when output gaps are diverging, lack of policy coordination becomes more likely.

Measuring the global output gap: Navigating through the haze

Measuring output gaps at the national level is complex since the output gap is an unobserved variable. This is compounded when doing so at the global level.[3] National output gaps can be estimated using a range of methods.[4]

- *Production function methods* involve the estimation of the aggregate production capacity from factors of production (labor and capital) and measures of total factor productivity.

- *Long-term growth expectations*, such as five-year-ahead growth forecasts from *Consensus Economics*, incorporate expert judgment about long-term growth potential.

[1] Some major central banks have already undertaken or signaled measures to shift their monetary policy stance. For potential implications of changes in advanced-economy monetary policies for emerging market economies, see Arteta et al. (2015, 2016). For a discussion of cross-border spillovers from major advanced and emerging market economies, see Huidrom, Kose, and Ohnsorge (2017).

[2] The evidence is still mixed on the link between the global output gap and domestic inflation. Several studies find that the global output gap is an important determinant of domestic inflation (Borio and Filardo 2007; Eickmeier and Pijnenburg 2013; Auer, Borio, and Filardo 2017; Bianchi and Civelli 2015). Others find little support for the role of the global output gap in driving domestic inflation (Calza 2009; Mishkin 2009; Ihrig et al. 2010; Irena and David 2016).

[3] Only two studies focus on the empirical properties of the global output gap (Tanaka and Young 2008; Gerlach 2011). These studies document the major conceptual issues and measurement challenges, and examine the evolutions of a few measures of the global output gap.

[4] These methodologies are discussed and compared in greater detail in Box 3.1.

BOX 1.1 Is the global economy turning the corner? *(continued)*

- *Statistical filters* include univariate or multivariate filters. Univariate filters decompose quarterly output series into a trend and a cycle. Multivariate filters expand on the univariate filters by ensuring that the resulting output gap estimates are consistent with multiple indicators of domestic demand pressures, such as inflation and unemployment.

The use of any of these methods presents tradeoffs and the appropriate choice usually depends on the purpose at hand. The *production function* approach, in principle, captures the supply-side drivers of long-term growth, but in practice relies on estimates and projections of these underlying factors that are themselves subject to considerable measurement error. The resulting output gaps are not necessarily consistent with other indicators of domestic demand pressures. *Long-term growth expectations* may reflect additional information to complement models but may also rest on biased judgments on the part of the forecasters. *Univariate filters* for GDP growth essentially involve a moving average of actual past growth. While their calculation is possible even in data-poor environments, they tend to correlate closely with actual growth. As a result, the filter will likely underestimate both the true extent of output losses stemming from unemployment and the associated disinflationary pressure.[5]

Multivariate filters are sensitive to model specification, and in practice can be heavily influenced by financial and commodity market cycles. They do, however, have the advantage of being consistent with multiple indicators of demand pressures. Since they incorporate additional information, they tend to be less susceptible to the end-point problem. Given their ability to capture multiple dimensions of cycles, the analysis in the rest of this box relies on the results from the multivariate filter.

Database and methodology. The sample includes 15 advanced economies (AEs) and 23 emerging market and developing economies (EMDEs) with quarterly data over the period 2000-16. The countries in the sample together accounted for about 85 percent of global GDP, on average, since 2000. National output gaps of each country are estimated using nine different methods.[6] National output gaps are then aggregated into a global output gap using GDP weights.[7] Group- and region-specific output gaps are similarly aggregated.

Results from different methods. While different methods produce broadly consistent trends in national output gaps in the majority of countries and periods, they also show sizable variation across these measures in some periods (Figure 1.1.1). Output gap estimates during 2008-09 illustrate this variation. All estimates pointed to negative output gaps but with a wide range. In EMDEs, the estimated gaps for these years from different methodologies vary from -0.1 to -0.9 percent.

How have global output gaps evolved?

Following the global slowdown in 2001-02, the recovery in advanced economies in the first half of the 2000s was accompanied by narrowing negative global output gaps (Figure 1.1.2). Although growth slowed in EMDEs in the early years of the decade with recessions in Mexico and Turkey and the legacies of the late 1990s Asian financial crisis, by mid-decade the estimates for EMDEs as well as for advanced economies indicated positive gaps. At their 2007 peak, estimated output gaps for both groups were at a positive 2-3 percent.

The global financial crisis of 2008-09 led to significant economic slack in the majority of countries and a wide global output gap (captured unanimously by all methodologies). During 2010-2014, the global output gap remained large and only narrowed during 2015-17 to be statistically indistinguishable from zero. There were substantial differences in the output gaps of different country groups and regions.

Advanced economies. Even well after the global financial crisis, output gaps in most advanced economies remained negative, averaging about -1 percent of potential GDP during 2011-16. By 2015, the gap had narrowed, and was statistically indistinguishable from zero. In 2018, the output gap for advanced economies is expected to turn slightly positive.

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[5] Statistical filters also suffer from end-point problems and large revisions after data updates which tend to be most pronounced at cyclical turning points (Coibion, Gorodnichenko, and Ulate 2017).

[6] These include five univariate filters (Hodrick-Prescott, Baxter-King, Christiano-Fitzgerald, Butterworth filters, and the unobserved components model), the multivariate filter, the production function approach and two expectations-based measures (five-year-ahead *World*

Economic Outlook and *Consensus* forecasts). Details of the methodologies are provided in Annexes 1 and 2.

[7] The estimated weighted average global output gap is broadly consistent with a global output gap estimated directly using global variables, such as GDP-weighted average global GDP, median global inflation, labor force-weighted average employment and oil prices.

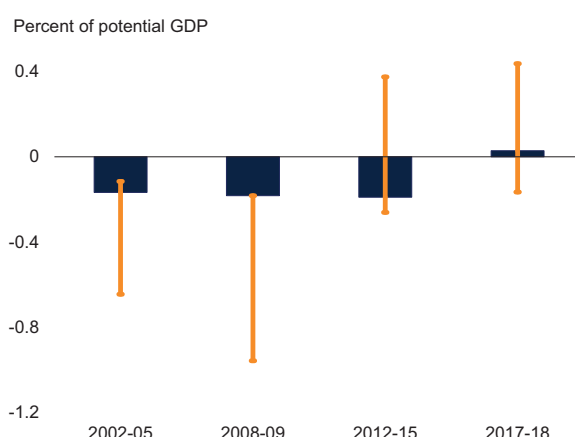## BOX 1.1 Is the global economy turning the corner? *(continued)*

FIGURE 1.1.1 Output gap estimates

The trends in the estimates of the output gap from different methodologies are broadly similar. For example, they signal the same timing of peaks and troughs. However, at times the point estimates show considerable differences, even in sign.
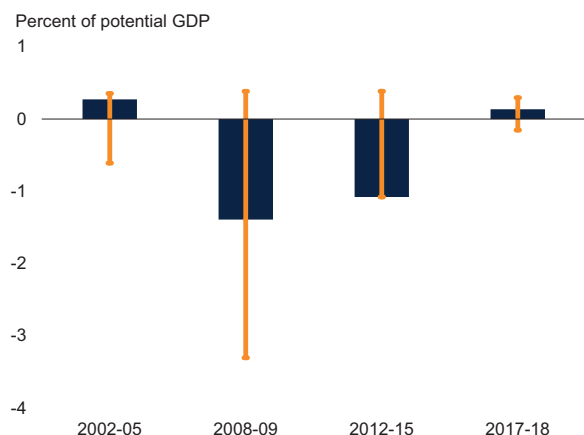
A. Coincidence of signs of output gaps

Percent of country-year pairs	PFA (Funda-mentals)	MVF	HP	BK	CF	BW	Exp. (WEO)	Exp. (CF)
PFA (Fundamentals)								
MVF	73							
HP	65	76						
BK	70	79	92					
CF	58	63	74	76				
BW	61	73	91	88	82			
Exp. (WEO)	65	64	59	64	55	56		
Exp. (CF)	76	69	63	67	58	61	84	
Alt. (WEO)	70	76	74	76	64	72	69	72

B. Global output gap estimates (range across methodologies)

Percent of potential GDP

C. Advanced economies output gap estimates (range across methodologies)

Percent of potential GDP

D. EMDE output gap estimates (range across methodologies)

Percent of potential GDP

Source: World Bank staff estimates.

Notes: Global, regional, and group output gaps are calculated using constant 2010 U.S. dollar GDP as weights. The sample includes 15 advanced economies (Australia, Canada, Denmark, Finland, France, Germany, Italy, Japan, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States) and 23 EMDEs (Argentina, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Hungary, India, Indonesia, Kazakhstan, Malaysia, Mexico, Peru, Poland, Romania, Russia, Serbia, South Africa, Thailand, Turkey, and Vietnam). 2018 data is forecast.
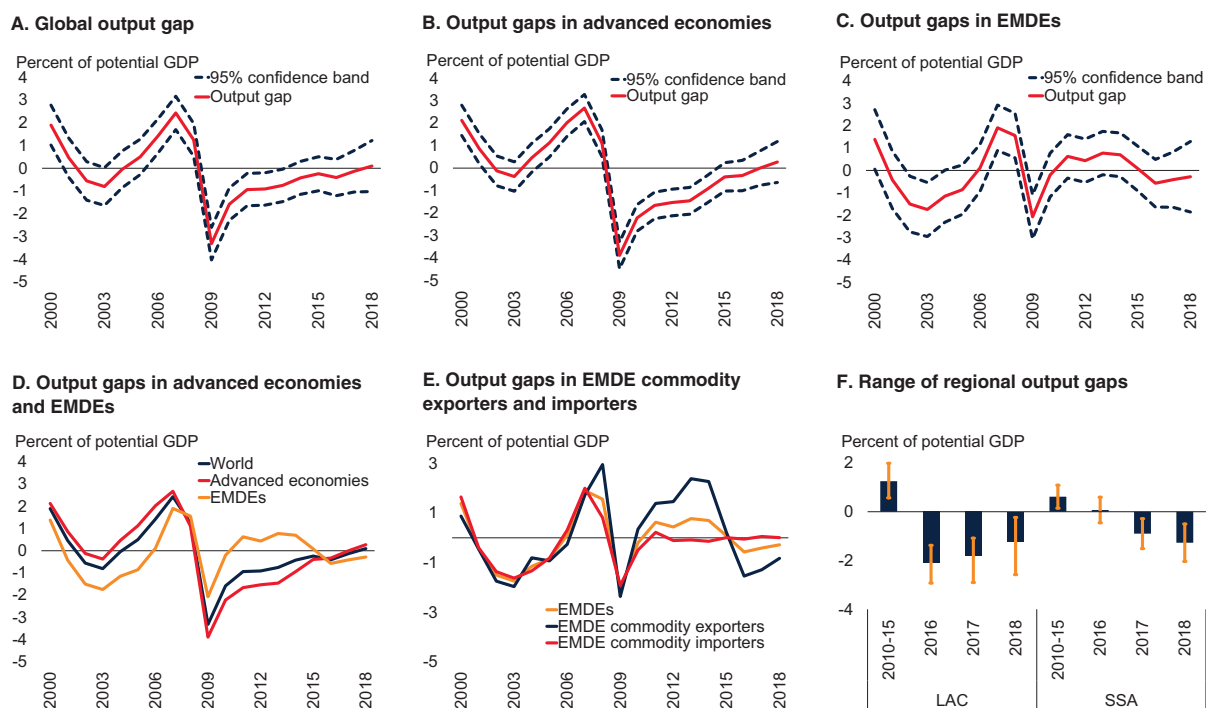
A. Table shows the share of country-year pairs during 2000-16 in which two different measures of output gap have the same signs. Red represents greater than 80 percent, orange represents 60-80 percent, and yellow represents 50-60 percent. "Exp. (WEO)" stands for five-year-ahead WEO expectations, "Exp. (CF)" stands for five-year-ahead Consensus forecast, "Alt. (WEO)" stands for output gap from WEO.

B. -D. Blue bars denote multivariate filter-based estimates. Vertical orange lines indicate range of all six filter-based estimates. The five univariate filters (HP, BK, CF, BW, UCM), the multivariate filter (MVF), and the production function approach (PFA). "HP" stands for Hodrick-Prescott filter, "BK" stands for Baxter-King filter, "CF" stands for Christiano-Fitzgerald filter, "BW" stands for Butterworth filter, "UCM" stands for unobserved components model.

BOX 1.1 Is the global economy turning the corner? *(continued)*

FIGURE 1.1.2 Global and group-specific output gaps

The global financial crisis of 2008-09 opened up a considerable degree of slack in the majority of countries. Post-crisis, a wide divergence in output gaps emerged between advanced economies, which were at the center of the crisis, and EMDEs as well as between commodity-exporting and importing EMDEs.

A. Global output gap

B. Output gaps in advanced economies

C. Output gaps in EMDEs

D. Output gaps in advanced economies and EMDEs

E. Output gaps in EMDE commodity exporters and importers

F. Range of regional output gaps

Source: World Bank staff estimates.
Notes: Output gaps calculated using multivariate filter. Global, regional, and group output gaps are calculated using constant 2010 U.S. dollar GDP as weights. The sample includes 15 advanced economies (Australia, Canada, Denmark, Finland, France, Germany, Italy, Japan, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States) and 23 EMDEs (Argentina, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Hungary, India, Indonesia, Kazakhstan, Malaysia, Mexico, Peru, Poland, Romania, Russia, Serbia, South Africa, Thailand, Turkey, and Vietnam). 2018 GDP is forecast.
A. -C. Dashed lines are 95 percent confidence interval bounds computed from the Kalman smoother state variances. Global lower and upper bounds are obtained as GDP-weighted averages of individual country lower and upper bounds.
E. "EMDE commodity exporters" include Argentina, Bolivia, Brazil, Chile, Colombia, Indonesia, Kazakhstan, Malaysia, Peru, Russia, and South Africa. "EMDE commodity importers" include China, Hungary, India, Mexico, Poland, Romania, Serbia, Thailand, Turkey, and Vietnam.
F. Blue bars denote multivariate filter-based estimates. Vertical orange lines indicate one standard deviation error bands. LAC = Latin America and the Caribbean, SSA = Sub-Saharan Africa.

EMDEs. Output gaps in EMDEs varied widely between commodity-exporting and importing EMDEs (Figures 1.1.2 and 1.1.3).

• For commodity exporters (accounting for two-thirds of EMDEs), the slide in commodity prices since the first quarter of 2011 and, especially, the sharp drop in oil prices in mid-2014, as well as weaknesses among their major trading partners, led to an unwinding of their large positive output gaps. By 2016, their gaps had turned negative (below -1 percent), on average, and are expected to remain marginally negative (-0.8 percent) in 2018.
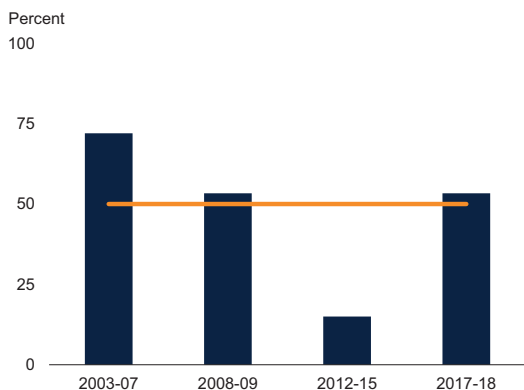
• By contrast, wide negative output gaps emerged among the commodity-importing EMDEs during the global financial crisis and narrowed quickly in the post-crisis rebound. With EMDEs growth remaining steady during 2011-17 at around potential growth, their gaps remained near zero during this period.

• Output gaps in EMDE regions broadly reflected the prevalence of commodity exporters in each region. Notwithstanding a gradual narrowing, LAC and SSA (represented in the sample by South Africa)—two regions with large commodity-exporting economies— are expected to have sizable (and statistically

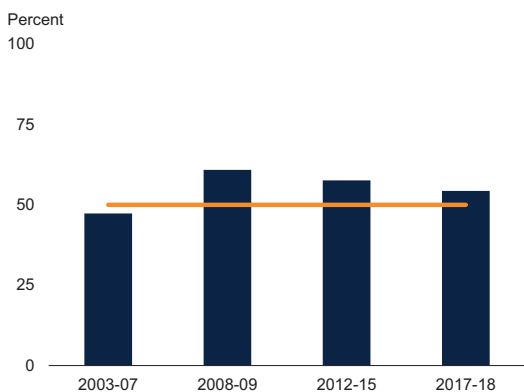**BOX 1.1 Is the global economy turning the corner?** *(concluded)*

FIGURE 1.1.3 Output gap synchronization

The majority of advanced economies had positive output gaps pre-crisis and negative output gaps post-crisis. In EMDEs, there was greater heterogeneity.

A. Share of economies with positive output gaps: Advanced economies

B. Share of economies with positive output gaps: EMDEs

Source: World Bank staff estimates.
Notes: Output gaps calculated using multivariate filter approach. The sample includes 15 advanced economies (Australia, Canada, Denmark, Finland, France, Germany, Italy, Japan, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States) and 23 EMDEs (Argentina, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Croatia, Hungary, India, Indonesia, Kazakhstan, Malaysia, Mexico, Peru, Poland, Romania, Russia, Serbia, South Africa, Thailand, Turkey, and Vietnam). 2018 GDP is forecast.

significant) negative output gaps in 2017 and 2018. Elsewhere, output gaps have been near zero.

Heterogeneity in output gaps. Common shocks and cyclical spillovers through cross-country linkages can generate homogeneity and comovement in output gaps. Since 2000, output gaps in the advanced economies have been less diverse than in EMDEs. Excepting the years of the 2001-02 U.S. recession and the 2011 Euro Area crisis, at least two thirds of advanced economies had output gaps of the same sign. In contrast, in the large majority of years since 2000, around half of EMDEs had positive output gaps (Figure 1.1.3). This heterogeneity among EMDEs has largely reflected the divergences between commodity-exporting and -importing economies.

Implications for EMDEs

Output gap measures are subject to uncertainty as reflected in large variations across methods and wide confidence bands. Policymakers need to account for this uncertainty when assessing and implementing cyclical policies.

That said, for the first time in a decade, the global output gap is expected to approximately close in 2018, with important implications for EMDEs. On the one hand, the expected closing of the global output gap signals a return to health of the world economy after a prolonged period of weak growth, which holds the promise of favorable spillovers to EMDEs, including through trade channels. However, it also means that the coming years may witness an unprecedented shift in the stance of cyclical policies among the advanced economies, with an attendant risk of missteps or disorderly financial market adjustments. This underscores the importance for EMDEs to continue to focus on measures to enhance prospects for strong, sustained growth, but also the need for measures to ensure the resilience of their domestic financial markets and broader macroeconomic policy frameworks in the face of external shocks.