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Is the Cycle the Trend? Evidence from the Views of International Forecasters

by John Bluedorn and Daniel Leigh

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Abstract

We revisit the conventional view that output fluctuates around a stable trend by analyzing professional long-term forecasts for 38 advanced and emerging market economies. If transitory deviations around a trend dominate output fluctuations, then forecasters should not change their long-term output level forecasts following an unexpected change in current period output. By contrast, an analysis of *Consensus Economics* forecasts since 1989 suggest that output forecasts are super-persistent—an unexpected 1 percent upward revision in current period output typically translates into a revision of ten year-ahead forecasted output by about 2 percent in both advanced and emerging markets. Drawing upon evidence from the behavior of forecast errors, the persistence of actual output is typically weaker than forecasters expect, but still consistent with output shocks normally having large and permanent level effects.

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Keywords: business cycles, output fluctuations, output persistence, ouput forecast, advanced and emerging markets

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I. INTRODUCTION[1]

The aftermath of the global financial crisis has revived the debate about whether economic output fluctuates around a stable trend. During the period of relative economic stability that preceded the crisis, the conventional view was that output typically returns to its long-term trend level path following shocks—economic contractions tend to be followed by above-normal growth, while lower than normal growth would ensue after accelerations during expansions, keeping the economy roughly on its trend level path. Standard New Keynesian general equilibrium models feature such stable dynamics (for example, Smets and Wouters, 2007). However, the slow recovery from the crisis observed in many advanced economies provoked a rethink, with numerous recent studies suggesting that the long-term costs of output shortfalls are in fact larger than traditionally assumed (see Blanchard, Cerutti, and Summers, 2015; Martin, Munyan, and Wilson, 2015; and Cerra and Saxena, 2017, amongst others). Postulated mechanisms behind such large and persistent costs of recessions include hysteresis and supply shocks playing a dominant role in output fluctuations.

The view that economic fluctuations generally have permanent, rather than transitory, effects is often associated with emerging market and developing economies, which may be subject to more frequent shifts in their economic regimes leading to structural breaks in their output process. In pioneering work, Aguiar and Gopinath (2007) hypothesized that shocks to trend growth are the primary source of fluctuations in emerging markets, pithily summarized as "the cycle is the trend," while advanced economies are more characterized by transitory fluctuations around a stable trend. They compare outputs from dynamic stochastic general equilibrium models calibrated to the Canadian and Mexican economies respectively, finding results consistent with this contrast in the behavior of advanced versus emerging market economy business cycles. However, given recent experience, is the view that the "cycle is the trend" only relevant to emerging market or could it also apply more generally, including to advanced economies, and not only with respect to financial crises or deep recessions?[2]

[1] We are grateful to Laurence Ball, Olivier Blanchard, Jon Faust, Maurice Obstfeld, David Romer, Jiri Slacalek, Jonathan Wright, and numerous IMF seminar participants for helpful comments, and to Patricia Delgado for superb editorial support.

[2] Pagan (1997) and Harding and Pagan (2002) identified the business cycle properties of both advanced and emerging market economies using a nonparametric algorithm motivated by Bry and Boschan (1971), and argued that the evidence across both groups of economies was most consistent with simple models of output growth exhibiting some persistence to shocks. More recently, a number of studies find that output typically fails to recover to its previous trend following severe crises (Cerra and Saxena, 2008; IMF, 2009; and Reinhart and Rogoff, 2009, for example).

(continued…)

Lack of consensus regarding the long-term consequences of economic fluctuations partly reflects methodological difficulties arising from the use of *ex post* data. Studies of output fluctuations estimate univariate time series processes and trends, or identify peaks and troughs and examine the subsequent evolution of output (Campbell and Mankiw, 1987, 1989; Sichel, 1994; and others).[3] These standard approaches have the disadvantage of requiring assumptions regarding the functional form of output dynamics. Such specification choices are challenging, particularly in the presence of structural change. In addition, *ex post* data on output incorporate both the impact of a shock and the accumulation of subsequent economic developments, which may complicate assessing the effects of shocks over long horizons. Small sample sizes exacerbate these challenges, particularly for emerging market economies. Accordingly, most work focuses on a limited number of advanced economies, with little work on comparing the long-term persistence of output across advanced and emerging markets.

This paper proposes a way of dealing with these difficulties, and compares advanced and emerging market business cycles using data on revisions to long-term forecasts made by professional forecasters in real time. We use vintages of long-term forecasts from *Consensus Economics* since 1989 to identify forecasters' perceptions of the persistence properties of GDP in both advanced and emerging markets. Twice a year, the professional forecasters surveyed by *Consensus Economics* provide forecasts for the current and subsequent 5 years for real GDP and other macroeconomic variables, as well as a forecast of average growth over the subsequent 6-10 years. As we explain in Section II, our approach uses these data to compare the revision in current year output level forecasts with revisions to forecasts for the output level in 10 years. If forecasters view fluctuations in output as dominated by purely transitory fluctuations, an unexpected change in output today should bear no relationship to expected cumulative growth over long horizons, since the level of output would be expected to return to its previous long-term path. We test whether forecasters typically expect such a reversion to trend.

Our sample spans 38 advanced and emerging market countries for 1989-2017. For each country, we have semiannual forecast revisions, each for a horizon of 10 years. As explained in what follows, our estimates thus use the equivalent of 20 times the number of observations available using conventional approaches with ex-post annual data. We conduct the estimation using panel data techniques for country groups, as well as on a country-by-country basis.

Our baseline results, presented in Section III.A, suggest that forecasters view fluctuations as normally having permanent effects in both advanced and emerging markets. On average, following a 1 percent surprise in current-period output, forecasters adjust the 10-year-ahead

[3] This earlier work is closely related to debates about the permanent income hypothesis and its implications for the relative volatility of consumption and output (Campbell and Deaton, 1989; and Obstfeld, 2004, in international context).

output level (cumulative growth) forecast by about 2 percent in the same direction. Forecasters thus do not typically expect economic contractions to be followed by above-normal growth with output returning to the previous trend. Instead, they expect output growth to slowly converge to its previous long-term rate, with a widening divergence of the output level from its previous path. This result holds both for country groups in a panel-data setting, as well as for 36 of the 38 countries in our sample considered individually.[4] These results suggest that forecasters have long known the results of recent studies on the long-term persistence of output.

Our results hold up to a battery of robustness tests. These include the exclusion of extreme observations, considering positive and negative output shocks separately, time sample splits, and the inclusion of additional control variables. This similarity of how forecasters perceive persistence of fluctuations across countries and economic conditions is striking.

A possible objection to our approach is that forecasters may have a biased view of output persistence, and that perceived persistence differs substantially from actual persistence. We investigate this possibility by conducting forecast efficiency tests in Section III. Even if forecasters have a biased view of persistence, however, our results on their views provide insights into the formation of long-term expectations, an important topic since long-term expectations shape actions. For example, views of long-term output persistence affect assessments of permanent income and profits by households and businesses with consequences for consumption, investment, and asset prices. There has been little research on expectations of output persistence using real-time data, and on the implications for economic modeling.[5]

We investigate whether forecasters have overestimated output persistence—that is, whether the actual long-term impact of revisions to current-period output is smaller than forecasters typically expect—using forecast efficiency tests along the lines of Blanchard and Leigh (2013). We regress the forecast error for the output level in 10 years on the revision to the forecast for current-year output, known at the time the long-term forecast is made. Under rational expectations, forecast errors should be unpredictable based on information known at the time forecasts are made. The coefficient on the revision to current-period output should thus be zero. If, on the other hand, forecasters systematically overestimate the impact of current-period fluctuations, there should be a negative relation between revisions to current-period output and output forecast errors over the subsequent 10 years. In other words, in the latter case, actual long-term output persistence is weaker than forecasters assume. We find limited evidence of this. The coefficient on the revision to current-period output is negative for advanced and emerging

[4] We confirm that the size of current-period output revisions is significantly larger for emerging markets than for advanced markets. The perceived long-term persistence of those fluctuations, however, is similar.

[5] An exception is Krane (2011) who uses professional forecasts to estimate the share of current-period revisions that forecasters attribute to permanent shocks in the United States.

markets. However, the estimate is driven by a small number of extreme values. Based on a trimmed sample, which excludes such outliers, there is little evidence of systematic over-estimation of output persistence is weak.

If we put these results together with our estimates of perceived output persistence, it suggests that an unexpected change in output of 1 percent should change forecasts of output in 10 years by 1-2 percent. Actual persistence could thus be slightly weaker than that perceived in real time, but still consistent with shocks normally having permanent effects in both advanced and emerging markets.

In Section IV, we extend the analysis in four directions. First, we consider how perceived persistence differs for forecast revisions made in periods associated with proxies of supply-side demand-side disturbances. We re-estimate our baseline equation for periods associated with global oil supply price shocks identified following the approach of Kilian (2009) and demand shocks, proxied by shifts in government consumption identified by Auerbach and Gorodnichenko (2012, 2013). Intuitively, in periods featuring proxies for demand shocks, output is perceived as less persistent than in periods featuring proxies for supply shocks. However, in both cases, current-period output fluctuations have a more than one-for-one expected effect on output in 10 years, for both advanced and emerging markets. Similarly, we find that perceived persistence is higher in periods featuring recessions with financial crises than in those featuring other types of recessions. However, the more than one-for-one expected effect holds for both recession samples.

Second, we conduct a permanent-transitory decomposition of output shocks that forecasters perceive in real time. We adapt the approach of Krane (2011) to our multi-country sample, and assume that revisions to forecasts of output in 10 years only reflect perceived permanent shocks. The difference between these perceived permanent shocks and revisions to current-year output identify the perceived transitory shocks. Based on this decomposition, we find that forecasters attribute more than half of current-period output fluctuations to permanent factors, including those to the long-term growth rate, whose effects cumulate over time.

Third, we compare our results based on *Consensus Economics* forecasts with those obtained using the forecasts of IMF staff published in the IMF *World Economic Outlook*. For the shorter five-year horizon covered by IMF *World Economic Outlook* forecasts, we find similar degrees of perceived persistence as for *Consensus Economics* forecasts.

Finally, we examine forecasts for other macroeconomic time series, and find that the strong degree of persistence forecasters expect for output also holds for business investment and private consumption. Section V concludes by discussing the possible implications of the results for economic policy.

II. ESTIMATION AND RESULTS

To investigate whether forecasters view output as fluctuating around a stable trend, we regress the revision in the forecast for cumulative real GDP growth over years t to t+10 on the revision to the forecast for real GDP growth in year t. We focus on a 10-year horizon, which is sufficient for studying the long-term implications of output fluctuations. If forecasters view fluctuations in output as dominated by transitory fluctuations, an unexpected change in output today should have little effect on forecasts of cumulative growth over 10 years. Following an unexpected reduction in growth in year t, forecasters should revise up growth for subsequent years to ensure that output returns to its previous trend by year t+10. The equation we estimate is:

$$(1) \qquad \text{Forecast Revision of } \Delta Y_{i,t:t+h|t} = \alpha + \beta_h \text{ Forecast Revision of } \Delta Y_{i,t|t} + \varepsilon_{i,t:t+h}$$

where $\Delta Y_{i,t:t+h}$ denotes cumulative growth of real GDP (Y) in economy i over h years—that is $\log(Y_{i,t+h}/Y_{it})$—and the associated forecast revision is $F_t\{\Delta Y_{i,t:t+h}\} - F_{t-1}\{\Delta Y_{i,t:t+h}\}$, where F_t denotes the forecast conditional on the information set available in period t, and F_{t-1} denotes the forecast conditional on the information set available in period t-1. We re-estimate equation (1) for each horizon h up to 10 years. Under the null hypothesis of output fluctuating around a stable trend, the estimate of β_h for the horizon h = 10 years should be zero.

Our data come from the *Consensus Economics* database of professional forecasts. Twice a year since 1989 (in April and October) the professional forecasters surveyed by *Consensus Economics* provide forecasts for the current and subsequent 5 years for real GDP and other macroeconomic variables, as well as a forecast of average growth over the subsequent 6-10 years. This allows us to construct the forecast of cumulative growth over a 10-year horizon. We compute two forecast revisions per year: the revision in the spring of year t from the fall of year t-1, and the revision in the fall of year t from the spring of year t.[6] We estimate equation (1) using OLS, both for panels of economies, and country by country.

Our sample spans the 38 advanced and emerging market countries available in the *Consensus Economics* database of forecasts for 1989-2017. For each country, *Consensus Economics* provides bi-annual forecast revisions, made in April and October, for long-term horizons. The estimates thus use the equivalent of 21,280 annual observations, 20 times the

[6] To compute the revision from the fall of year t-1 to the spring of year t, we assume that the forecast made in the fall of year t-1 for average growth in years t+5 through t+9 extends for the years t+5 through t+10. However, results are robust to limiting the analysis to forecast revisions made in the fall of year t from the spring of year t.

(continued…)

number of observations that would be available using ex-post annual data for this sample.[7] This large number of observations potentially allows us to obtain more precise estimates of persistence than standard approaches based on ex-post data. We conduct the estimation using standard panel data techniques, as well as using country-by-country time-series methods.

A. Baseline results

Figure 1 illustrates our main result on the perceived persistence of real GDP fluctuations. It plots the revision to forecasts of current-period output on the horizontal axis and the corresponding revision to long-term forecasts of the output level (cumulative growth over 10 years) on the vertical axis. Based on the full sample, with data from 1989-2017, the relation has a slope of 1.89 (*t*-statistic = 13.19) and 1.98 (*t*-statistic = 13.87) for advanced and emerging markets, respectively. The hypothesis that the slope coefficient is equal to unity is rejected at the 1 percent level. The sample includes a number of large unexpected revisions to current-period output, some exceeding 10 percent, which, as the chart labels indicate, typically correspond to economic crises such that of Korea in 1998. However, as discussed in what follows, even after removing such outliers, the strong relation holds.

Figure 2 provides further evidence that forecasters typically do not expect economic contractions to be followed by above-normal growth, and vice-versa, with output returning to the previous trend. It plots the estimates of the coefficients from equation (1) for horizons $h = 0$ to $h = 5$, for which individual annual forecast revisions are available, and for the long-term horizon, $h = 10$. The results trace the typical expected impulse responses for output following perceived shocks. To clarify the dynamics of output that forecasters typically expect, Figure 2 also reports the results of re-estimating equation (1) with the growth rate of output *in* period $t + h$, rather than cumulative growth from period t to $t + h$, on the left-hand side. We scale the impulse responses by the standard deviation of current-period output revisions for each country group, which confirms that that emerging markets feature, on average, larger shocks to output than advanced markets do. Despite the different size of output innovations, however, for both country groups, forecasters typically expect the growth rate of output to converge slowly to its previous long-term rate, implying a widening divergence of the output level from its previous path over time.

To shed further light on the generality of the result across countries, Table 1 reports estimation results for equation (1) for each country considered individually. The number of data points available per country ranges from 34 to 55. For 36 out of the 38 countries in our sample, the estimates suggest that a 1 percent innovation in real GDP normally increases real GDP by more than 1 percent in 10 years. The range of point estimates runs from 0.92 to 2.59 for

[7] The number of equivalent observations of annual data is computed as 38 × (2017-1989) × 2 × 10 = 21,280.

advanced markets, and from 1.34 to 4.41 for emerging markets. Averaging the country-level estimates using the Pesaran, Shin, and Smith (1999) mean group estimator yields an expected effect averaging 1.78 percent (*t*-statistic = 17.80) for advanced markets and 2.30 percent (*t*-statistic = 13.53) for emerging markets. The larger estimates, on average, for emerging markets is broadly consistent with the notion that emerging market economies feature more permanent shocks than advanced ones, as suggested by AG. However, the ranges of country-level results for the two groups are wide and overlap substantially.[8] Our main conclusion is that forecasters generally expect output fluctuations to have permanent or near-permanent effects for both groups of economies.

B. Robustness

In this section, we test the robustness of the finding that forecasters expect output fluctuations to have permanent effects, focusing on the estimates of equation (1) for the 10-year horizon. We investigate the sensitivity of the results to the exclusion of outliers and changing the sample. We also examine the effects of including control variables, including lagged revisions and country and time fixed effects.

First, we investigate the sensitivity of the results to outliers and changing the sample. To investigate how important very large or small perceived shocks are for the results, we re-estimate the baseline equation after dropping the largest and smallest 5 percent of current-output and long-term output forecast revisions. As Table 2 reports, the results are similar after the removal of outliers, with the estimate of β at the 10-year horizon of 1.57 (*t*-statistic = 19.63) and 1.93 (*t*-statistic = 10.72) for advanced and emerging markets, respectively. Dividing the sample into two equal segments, 1989-2003 and 2004-2017, indicates larger coefficient estimates for 1989-2003. However, even for the 2004-2017 period, the estimates of β are well above unity, and, in the case of emerging markets, statistically indistinguishable from 2. Dividing the sample according to the sign of the perceived current-period output innovations also produces similar results. For both positive (expansionary) and negative (contractionary) output innovations, estimates of β are above unity and statistically indistinguishable from 2 for both advanced and emerging markets.

Second, we consider the sensitivity of the results to controlling for additional variables in equation (1). Perhaps the most obvious starting point is to test the robustness of the results to controlling for time- and country-fixed effects. As Table 2 reports, the results are virtually

[8] Aguiar and Gopinath (2007)'s main estimation results use data for Mexico and Canada to represent the two respective classes of economies. For these two benchmark economies, Table 1 reports results that are broadly consistent with Aguiar and Gopinath. Forecasters view the impact of current-year fluctuations as gradually dissipating over time in Canada, with a coefficient point estimate of 0.92, but having longer-lasting effects for Mexico, with a point estimate of 1.85. A full reconciliation exercise with the results of Aguiar and Gopinath, however, is beyond the scope of this paper.

indistinguishable when such fixed effects are included in the specification. We also address the possibility that current-period output revision are correlated over time, due, for example, to a gradual incorporation by forecasters of news regarding the economy into their projections. Such correlation in current-period output revisions could cause a positive bias to estimates of β. However, when we examine how the results change if the revision to current-period output made in period *t*-1 is added to equation (1), the estimates of β remain close to the baseline.

III. How Closely Do Forecasters' Views of Persistence Fit the Data?

A natural question is whether forecasters typically overestimate output persistence, that is, whether the true long-term impact of perceived shocks is smaller than forecasters typically expect in real time.

To address this question, we conduct a forecast efficiency test along the lines of Blanchard and Leigh (2013). We regress the forecast error for the level of real GDP (cumulative growth) in 10 years in the future on the revision to current-period real GDP. Under rational expectations, the coefficient on the revision to current-period output known at the time forecasts are made should be zero. If, on the other hand, forecasters systematically overestimate the impact of current-period fluctuations on long-term output, there should be a negative relation between revisions to current-period output and output forecast errors over the subsequent 10 years. In other words, in the latter case, actual long-term output persistence is lower than forecasters expect. We find limited evidence of this.

The equation estimated is:

(2) Forecast Error of $\Delta Y_{i,t:t+10|t} = \kappa + \theta$ Forecast Revision of $\Delta Y_{i,t|t} + \varepsilon_{i,t:t+h}$

where Forecast Error of $\Delta Y_{i,t:t+10|t} = \Delta Y_{i,t:t+10} - F_t\{\Delta Y_{i,t:t+10}\}$; $\Delta Y_{i,t:t+10}$ denotes the actual realization of cumulative growth of real GDP in economy *i* over 10 years; and F_t denotes the forecast conditional on the information set available in period *t*. Output forecast errors thus measure the difference between actual cumulative real GDP growth over years *t* through *t*+10 and the forecast made in year *t*. For each vintage of revisions to current-period output (spring and fall of year *t*), we focus on the forecast error relative to the forecast of the same vintage. The equation estimated is thus identical to equation (1) except that the left-hand side is now the 10-year-ahead output forecast error rather than the revision to the 10-year ahead forecast.[9] Data for

[9] Recall that equation (1) is Forecast Revision of $\Delta Y_{i,t:t+10|t} = \alpha + \beta$ Forecast Revision of $\Delta Y_{i,t|t} + \varepsilon_{i,t:t+10}$, where Forecast Revision of $\Delta Y_{i,t:t+10|t} = F_t\{\Delta Y_{i,t:t+10}\} - F_{t-1}\{\Delta Y_{i,t:t+10}\}$. An estimate of $\beta + \theta$ is obtained by estimating the sum of equations (1) and (3): {Forecast Error of $\Delta Y_{i,t:t+10|t}$ + Forecast Revision of $\Delta Y_{i,t:t+10|t}$}= $\alpha + (\beta + \theta)$ Forecast Revision of $\Delta Y_{i,t|t} + \varepsilon_{i,t:t+10}$.

actual output come from GDS (October 2017 vintage). The last data point available for the 10-year-ahead forecast error is thus for forecasts made in the fall of 2007. Standard errors are corrected for heteroskedasticity and autocorrelation using a Newey and West (1987) procedure with 10 lags. The results are not sensitive to alternative lag length choices.

Table 3 reports our estimation results. Based on the full dataset, we find a negative relation between revisions to current-period output and subsequent growth forecast errors. In the baseline specification, the estimate of θ, the coefficient on the revision to current-period output, is negative for both advanced and emerging markets, respectively. The implication is that long-term output persistence has typically been weaker than expected by forecasters in real time. However, an examination of the data suggests that these results are driven by a small number of extreme values. Figure 3 presents a scatter plot of the underlying data.

Based on a trimmed sample, which excludes extreme values, there is no evidence of negative relation between revisions to current-period output and subsequent growth forecast errors. In particular, re-estimating equation (3) after excluding the largest and smallest 5 percent of the current-period output revisions yields, as Table 3 reports, an estimate of θ that is close to zero and is statistically insignificant.[10]

What do these results imply for actual output persistence? Adding the estimate of θ to the estimate of the perceived persistence parameter, β, from equation (1), based on the same sample as equation (3), yields an estimate of actual long-term output persistence. Estimates of β for the 1989-2007 sample used to estimate equation (3) are 2.55 and 2.04, for advanced and emerging markets, respectively (Table 3). The sum of θ and β—obtained by estimating the sum of equations (1) and (3)—is 1.29 and 0.98, for advanced and emerging markets, respectively, based on the full dataset, and 2.10 and 2.93 for the trimmed sample. In this case, the point estimates are larger for emerging markets than for advanced markets.

Overall, the results provide limited evidence that actual persistence of output over 10 years is weaker than forecasters expect. Once the influence of outliers is accounted for, there is little evidence of forecasters being systematically mistaken regarding output persistence. The results are consistent with perceived shocks normally having permanent effects on the level of output in both advanced and emerging markets, with particularly persistent effects in emerging markets.

[10] To further test the robustness of the results, the estimation is repeated while including country-fixed and time-fixed effects. The estimates of θ remain statistically insignificant.

IV. EXTENSIONS

A. Proxies for demand and supply shocks

We consider how perceived persistence differs for forecast revisions made in periods associated with proxies of supply-side and demand-side disturbances. Our proxy of supply shocks is a series of global oil supply shocks, calculated by extending the VAR identification approach of Kilian (2009) (see IMF, 2012, for further details). The shocks are defined on a half-yearly basis and matched contemporaneously with the associated forecast vintage over the period 1988-2012. Aggregate demand shocks are measured by differences between ex-post government consumption and ex-ante forecasts of government consumption following Auerbach and Gorodnichenko (2012, 2013). For both supply and demand shock proxies, we focus on large shocks, defined as those that are greater than 1.67 standard deviations of the full sample standard deviation. Any period featuring both large supply and demand shock proxies is excluded. We re-estimate equation (1) for the resulting samples of large supply and demand shocks, for the long-term (h = 10) horizon.

The results, reported in Table 4, are consistent with forecasters viewing demand shocks as having less persistent effects than supply shocks. The estimates of β are substantially larger in periods associated with the supply shock proxies. In fact, for advanced economies, the equality of the cumulative forecast output response to demand versus supply shocks can be rejected. However, even in the case of periods associated with demand shock proxies, output fluctuations have a more than one-for-one expected effect on output in 10 years, with estimates of β above 1, for both advanced and emerging markets.[11]

To contribute to the literature regarding the aftermath of recessions, we also re-estimate equation (1) for periods associated with recessions. We define recessions as periods in which the forecast of current-period real GDP growth is negative. Following the approach of recent studies, we distinguish between recessions associated with financial crises and other types of recessions, based on the hypothesis that financial crises have greater supply-side implications, including through their disruptive effect on credit supply. We define periods associated with financial crisis as those occurring within 3 years of the start of a banking crisis, as identified in Laeven and Valencia (2013). The results, reported in Table 4, are consistent with the view that recessions coincident with financial crises feature more persistent output effects. For recessions without a financial crisis, forecasters still expect super-persistence, with estimates of β above 1, but to a lesser degree. In the case of emerging markets, the estimate of β for such recessions is not significantly different from unity, implying that forecasters expect permanent, but not super-

[11] This result is consistent with the findings of Fatas and Summers (2017) who use IMF staff forecast errors to investigate the effects of fiscal consolidation implemented in 2010-11, finding negative effects on real GDP (compared with initial IMF staff forecasts) five years later.

persistent, effects. That said, there is a statistically significant difference between the forecast output responses of emerging markets to recessions with crises versus those without. Overall, these results suggest that professional forecasters have long known the findings from recent studies on the persistent effects of recessions, including those not associated with financial crises.[12]

B. Permanent-transitory decomposition

Next, to shed further light on perceived output persistence for different countries, we conduct a permanent-transitory decomposition of output shocks perceived in real time. We adapt the approach of Krane (2011) to a multi-country context. We assume that revisions to forecasts of output in 10 years only reflect perceived permanent shocks. The difference between these perceived permanent shocks and revisions to current-year output then identifies the perceived transitory shocks for each country. We use this identification to compute the share of shocks to current-period output that forecasters attribute to permanent factors.

We assume that, for each country i, forecasters perceive output in period t, Y_{it}, as the sum of a permanent component, P_{it}, and a transitory component, C_{it}. We assume that shocks to the transitory component, u_{it}, are mean zero, uncorrelated with shocks to P_{it}, and return to zero over time. Shocks to the permanent component, include one to the long-term level, e_{it}, and one to the long-term growth rate, w_{it}. In the long-term, output growth converges to $\Delta Y_{i,LT}$. Following Krane's (2011) notation, forecast revisions for each horizon, h, reflect these permanent and transitory shocks that forecasters perceive, as follows:

$$
\begin{aligned}
&h = 0: \quad \text{Forecast Revision of } Y_{i,t|t} &&= w_{it} + e_{it} + u_{it};\\
&h < R: \quad \text{Forecast Revision of } Y_{i,t+h|t} &&= (h+1)\, w_{it} + \theta_h\, e_{it} + \rho_h\, u_{it};\\
&h \geq J: \quad \text{Forecast Revision of } Y_{i,t+h|t} &&= (h+1)\, w_{it} + \theta_R\, e_{it}.
\end{aligned}
\tag{3}
$$

where Forecast Revision of $Y_{i,t+h\,|t} = Y_{t-1} + \Sigma_{k\leq h}$ {Forecast Revision of $\Delta Y_{i,t+k|t}$}, so that the revision to the *level* of GDP in period $t+h$ equals the revision to cumulative growth over that horizon. With forecasts available through year $t+10$, we set period $J = 10$ years; and $R = J - 1 = 9$ years. The effect of the transitory shock, C_t, on output in period J and beyond is assumed to be zero, so that $\rho_h = 0$ for $h \geq J$. After R periods, we assume that the permanent level shock to output, e_t, is fully absorbed, so that $\theta_h = \theta_R$ for all $h \geq R$. We assume that the revision to the forecast for long-term growth, w_t, equals the revision to the forecast of average growth from years $t+6$ through $t+10$ reported in the *Consensus Economics* dataset. Over a period of h years, such revisions to long-term growth thus cumulate to $(h + 1)\, w_{it}$.

[12] See Howard, Martin, and Wilson (2011), Blanchard, Cerutti, and Summers (2015), Martin, Munyan, and Wilson (2011), and Cerra and Saxena (2017), among others.

To assess the share of permanent shocks, $w_{it} + e_{it}$, in current-period output shocks, we estimate the parameters in the system of equations (2). We subtract the (observed) shock to the long-term growth rate, w_{it}, from the observed revision to current-period $Y_{i,t|t}$, which yields $u_{it} + e_{it}$. Next, we subtract $(J + 1)$ w_{it} from the revision to $Y_{i,t+J|t}$ to yield θ_R e_{it}. To estimate θ_R, we regress $u_{it} + e_{it}$ on θ_R e_{it}. This allows us to recover the shocks e_{it} = {Forecast Revision of $Y_{i,t+J|t} - (J + 1)$ w_{it}} / θ_R; and u_{it} = (Forecast Revision of $Y_{i,t|t} - w_{it} - e_{it}$). Finally, based on the recovered shocks u_{it} and e_{it}, we estimate ρ_h and θ_h by estimating the equation Forecast Revision of $Y_{i,t+h|t} - (h + 1)$ $w_{it} = \theta_h$ $e_{it} + \rho_h$ u_{it} for each horizon h. Sample variances and covariances then allow us to construct the share of the variance of the revisions to current-period output attributable to permanent shocks: Var($e_{it} + w_{it}$) / Var($u_{it} + e_{it} + w_{it}$).

Table 5 reports the results of the permanent-transitory decomposition of output shocks that forecasters perceive in real time for each group of economies. It reports the estimated variance of the total revisions to current-period output, Var (Forecast Revision of $Y_{i,t|t}$), which equals the variance of the sum of the permanent and transitory shocks, Var($u_{it} + e_{it} + w_{it}$). It also shows the variance of each underlying perceived shock along with bootstrapped standard errors in parentheses (based on 1,000 replications). Since the forecasters' revisions to the overall current-period output level, as well as to the long-term growth rate, are observed, the estimates of their variances are reported without standard errors.

The results suggest that forecasters view permanent shocks as dominating current-period output fluctuations. The variance of the perceived permanent level shock, Var(e_{it}), is more than double the size of the variance of the transitory shock, Var(u_{it}). The share of the variance of the revisions to current-period output that forecasters attribute to permanent shocks, Var($e_{it} + w_{it}$) / Var($u_{it} + e_{it} + w_{it}$), is more than half. The ratio is 61 percent (t-statistic = 8.71) for advanced markets, comparable to what Krane (2011) found for the United States. It is 59 percent (t-statistic = 7.38) for emerging markets. Note that the effects of shocks to the long-term growth rate, w_{it}, cumulate over time, and thus contribute more to the variance of revisions to long-term output than to the variance of current-period output revisions. Overall, these estimates are consistent with the earlier results that forecasters expect output fluctuations to have permanent effects for both groups of economies.

C. Alternative source of forecasts

Since views on output persistence are not necessarily the same for different groups of forecasters, we next compare our baseline results for the *Consensus Economics* dataset with results based on forecasts prepared by the International Monetary Fund (IMF) staff. To ensure comparability of the results with our baseline approach, we focus on IMF staff forecasts made for the 38 economies available from the *Consensus Economics* dataset. The forecasts are taken from the IMF *World Economic Outlook* (WEO) published in the spring and fall of each year (usually in

April and October) over 1990-2017. The WEO forecasts are only available for years *t* through *t* + 5, however, so an assessment of perceived persistence over the longer (10-year) horizon available from *Consensus Economics* is not possible. We re-estimate equation (1) for the WEO forecasts up to horizon *h* = 5.

The results indicate a remarkable similarity in the persistence of output perceived by the two groups of forecasters. For both groups, as Figure 4 reports, an unexpected change in current-period output normally changes the forecast of the output level in 5 years by more than one-for-one. The perceived persistence of output fluctuations is, in both cases, particularly strong for emerging market economies.

D. Persistence of other time series

Finally, since the persistence of different macroeconomic time series could be different, we compare our baseline results for output with those for consumption and investment. We re-estimate equation (1) while replacing the output forecast revisions with *Consensus Economics* forecast revisions for private consumption and business investment, inflation, and interest rates. The corresponding estimates of β for the 10-year horizon, reported in Table 6, indicate that forecasters perceive private consumption to be more persistent than output, and business investment to be less persistent than output, particularly in the case of advanced markets. At the same time, as Figure 5 reports, the absolute size of perceived shocks to current-period business investment is, on average, 2-3 times larger than those for current-period output, for both advanced and emerging markets, which is which is not surprising given the volatility of this component of GDP.

We also investigate the perceived long-term persistence of inflation and interest rates, which should, in principle, be stationary. We adapt equation (1) for the forecasts of CPI inflation and long-term nominal government bond yields. The corresponding estimates of β, reported in Table 6, suggest that forecasters expect the effects of a 1 percentage point unexpected current-period change in each variable to fade over time, reaching 0.1-0.3 percentage point in 10 years. Results for interest rates are only available for advanced markets. For advanced markets, the point estimate of β for inflation is half as large as for emerging markets, supporting the notion of better anchored long-term inflation expectations, on average, during 1989-2017.

V. Conclusion

For a wide range of advanced and emerging market economies, we find that professional forecasters have, over the past three decades, viewed shocks to current-period output as normally having permanent effects. Our examination of professional forecasts for 38 countries for 1989-2017 suggest that a 1 percent shock to current-period output has typically changed the

forecast of output in 10 years by about 2 percent. Our approach, based on real-time forecast revisions, deals with a number of challenges faced by conventional approaches based on ex-post data. It avoids the need to specify and estimate a functional form for output, and uses the equivalent of 20 times more observations than would be available using annual ex-post data, resulting in estimates with tight standard errors.

Our findings suggest that professional forecasters have long known the results emerging from recent studies on output persistence and slow recoveries from recessions. We find little evidence of professional forecasters having believed, over the past three decades, that output typically grows faster following recessions to converge with its pre-recession path, as implied by conventional models. Moreover, our examination of forecast errors provides little evidence that forecasters are systematically mistaken about persistence. The results suggest that, while actual ex-post output persistence may be weaker than forecasters expect, it is still consistent with current-period shocks normally having permanent effects on the level of output.

Finally, our results provide evidence, albeit of a suggestive nature, that both hysteresis effects and supply-side factors contribute to the strong perceived persistence of output. Our finding that forecasters assign a dominant role to permanent factors in explaining current-period shocks is consistent with a strong role for supply effects. The “cycle is the trend” view proposed by Aguiar and Gopinath (2007) for understanding emerging market business cycles may thus also apply to advanced economies, even if to lesser extent. However, our finding of strong perceived persistence during periods associated with proxies of demand shocks or recessions not associated with financial crises, is consistent with hysteresis effects. Further research is needed to identify and model the shock processes and mechanisms underpinning the strong degree of actual and perceived persistence in economic activity.

References

Aguiar, Mark, and Gita Gopinath, 2007, "Emerging Market Business Cycles: The Cycle Is the Trend." *Journal of Political Economy*. Vol. 115, No. 1, pp. 69–102.

Auerbach, Alan, and Yuriy Gorodnichenko, 2012, "Measuring the Output Responses to Fiscal Policy," *American Economic Journal: Economic Policy*. Vol. 4, No. 2, pp. 1–27.

Auerbach, Alan, and Yuriy Gorodnichenko, 2013, "Output Spillovers from Fiscal Policy." *American Economic Review*, Vol. 103, pp. 141–46.

Blanchard, Olivier J., and Daniel Leigh, 2013, "Growth Forecast Errors and Fiscal Multipliers," *American Economic Review,* Vol. 103, pp. 117–20.

Blanchard, Olivier, Eugenio Cerutti, and Lawrence Summers, 2015. "Inflation and Activity - Two Explorations and their Monetary Policy Implications," *NBER Working Paper* No. 21726, November.

Bry, Gerhard and Charlotte Boschan, 1971, *Cyclical Analysis of Time Series: Selected Procedures and Computer Programs*, New York, NBER.

Campbell, John and Angus Deaton, 1989, "Why is Consumption So Smooth?", *Review of Economic Studies*, Vol. 56, pp. 357-374.

Campbell, John Y., and N. Gregory Mankiw, 1987, "Are Output Fluctuations Transitory?" *The Quarterly Journal of Economics,* Vol. 102, No. 4, pp. 857–80.

Campbell, John Y., and N. Gregory Mankiw, 1989, "International Evidence on the Persistence of Economic Fluctuations," *Journal of Monetary Economics,* Vol. 23, pp. 319-33.

Cerra, Valerie, and Sweta Saxena, 2008, "Growth Dynamics: The Myth of Economic Recovery." *American Economic Review*, Vol. 98, No. 1, pp. 439–57.

Cerra, Valerie, and Sweta Saxena, 2017, "Booms, Crises, and Recoveries: A New Paradigm of the Business Cycle and Its Policy Implications," *IMF Working Paper* No. 17/250.

Fatas, Antonio, and Lawrence H. Summers, 2017, "The Permanent Effects of Fiscal Consolidations," *Journal of International Economics*, Vol. 112, May, pp. 238-250.

Harding, Don and Adrian Pagan, 2002, "Dissecting the cycle: a methodological investigation," *Journal of Monetary Economics*, Vol. 49, pp. 365-81.

Howard, Greg, Robert Martin, and Beth Anne Wilson, 2011, "Are Recoveries from Banking and Financial Crises Really So Different?", *Federal Reserve Board International Finance Discussion Papers* No. 1037.

International Monetary Fund (IMF), 2009, *World Economic Outlook: Sustaining the Recovery*, October.

International Monetary Fund (IMF), 2012, *World Economic Outlook: Growth Resuming, Dangers Remain*, April.

Kilian, Lutz, 2009, "Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market," *American Economic Review*, Vol. 99, No. 3, pp. 1053–69.

Krane, Spencer D., 2011, "Professional Forecasters' View of Permanent and Transitory Shocks to GDP," *American Economic Journal: Macroeconomics*, Vol. 3, pp. 184-211.

Laeven, Luc, and Fabian Valencia, 2013, "Systemic Banking Crises Database," *IMF Economic Review*, Vol. 61, Issue 2, pp. 225–27.

Martin, Robert, Tenyanna Munyan, and Beth Anne Wilson, 2015, "Potential Output and Recessions: Are We Fooling Ourselves?", *Federal Reserve Board International Finance Discussion Papers* No. 1145.

Newey, Whitney K., and Kenneth D. West, 1987, "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, Vol. 55, No. 3, pp. 703–708.

Obstfeld, Maurice, 2004, "Globalization, Macroeconomic Performance, and the Exchange Rates of Emerging Economies," *Monetary and Economic Studies*, December: 29-55.

Pagan, Adrian, 1997, "Towards an Understanding of Some Business Cycle Characteristics," *Australian Economic Review*, Vol. 30, No. 1, pp. 1-15.

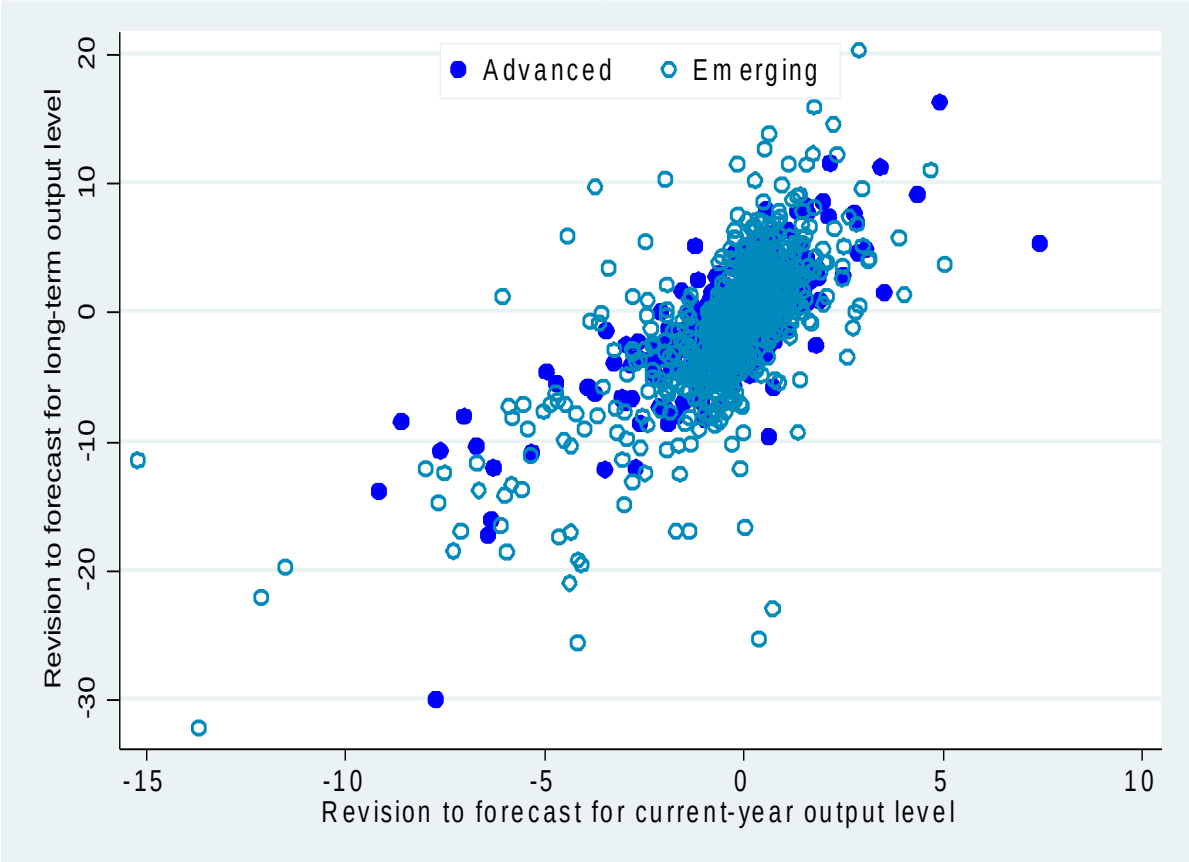
Pesaran, M. Hashem, Yongcheol Shin, and Ron P. Smith, 1999, "Pooled Mean Group Estimation of Dynamic Heterogeneous Panels," *Journal of the American Statistical Association*, Vol. 94, No. 446, pp. 621–34.

Reinhart, Carmen, and Kenneth Rogoff, 2009, "The Aftermath of Financial Crises," *American Economic Review*, Vol. 99, No. 2, pp. 466–72.

Sichel, Daniel E., 1994, "Inventories and the Three Phases of the Business Cycle," *Journal of Business and Economic Statistics*, Vol. 12, No. 3, pp. 269–77.

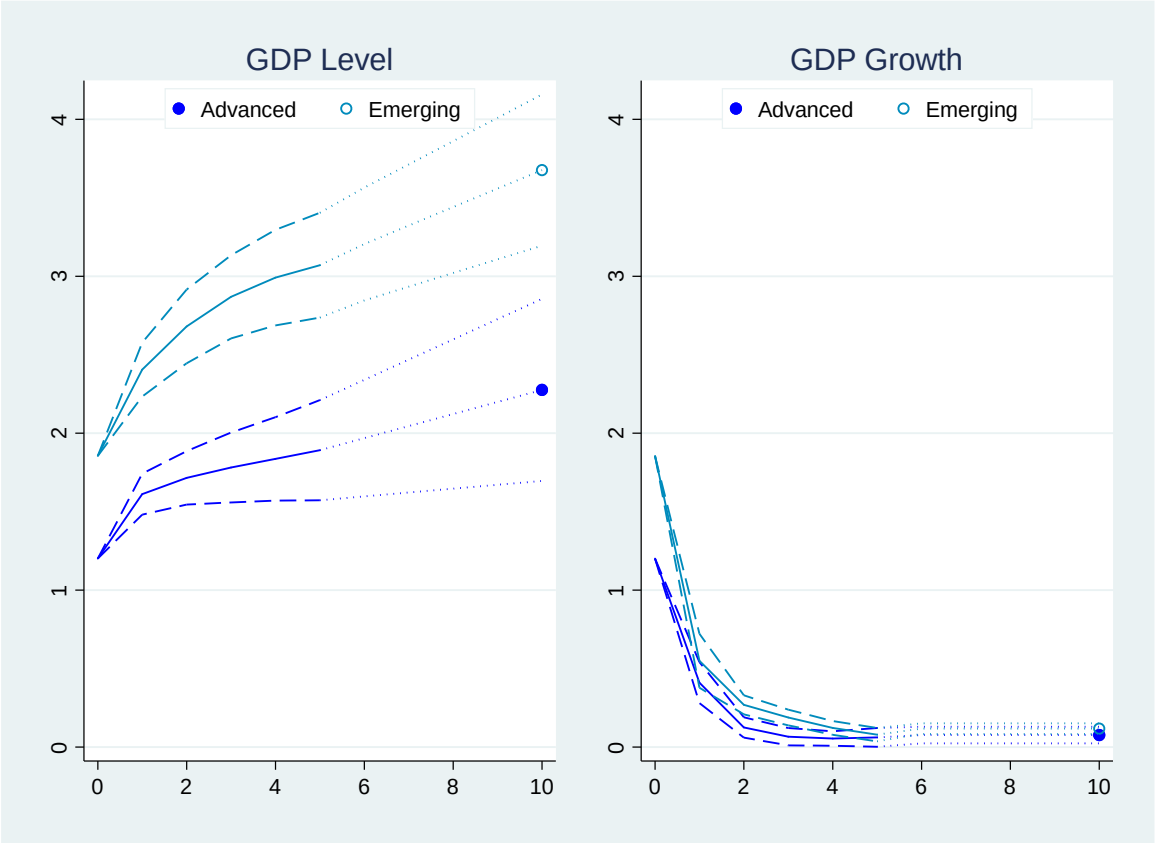
Smets, Frank, and Rafael Wouters, 2007, "Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach," *American Economic Review*, Vol. 97, No. 3, pp. 586-606.

Figure 1. Long-term Output Forecast Revisions vs. Current-period Output Forecast Revisions
(Percentage points)



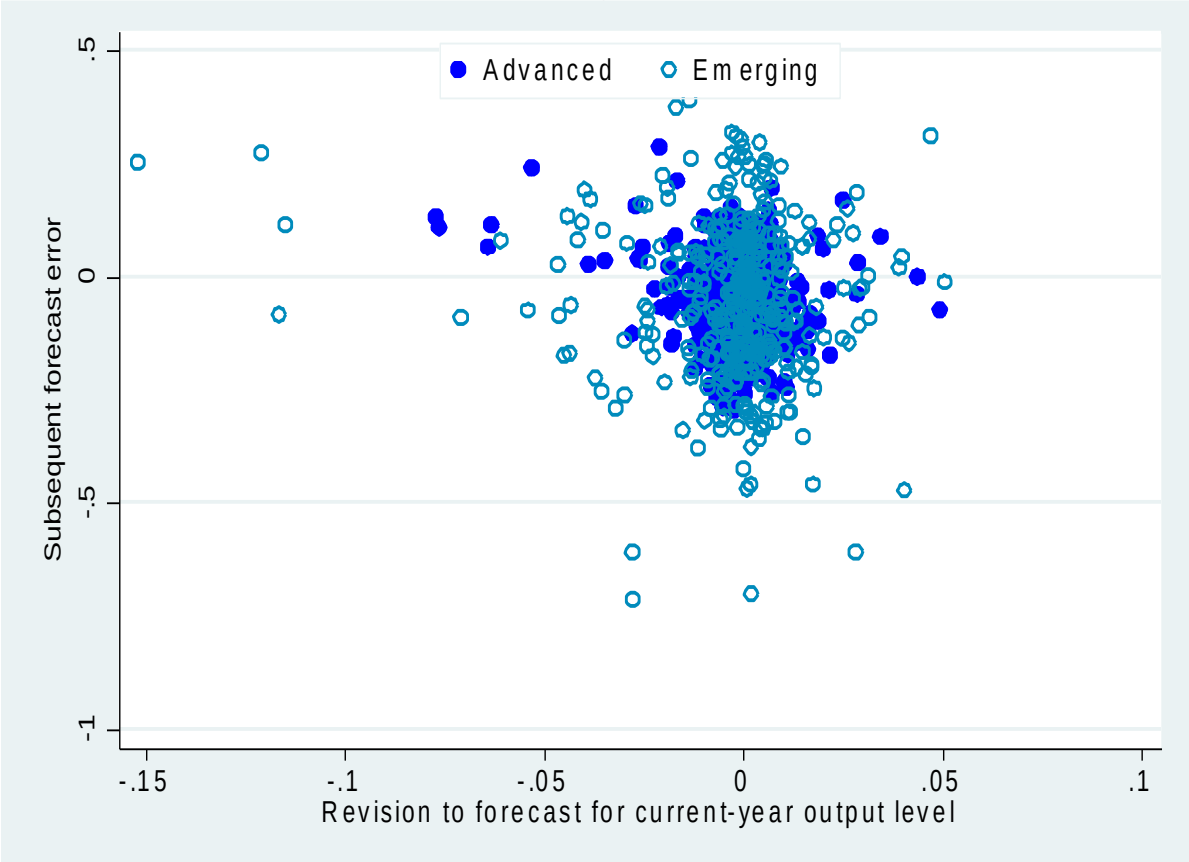
Note: Revision to long-term output level is revision to cumulative growth over years *t* to *t* + 10.

Figure 2. Perceived Impulse Responses: Advanced vs. Emerging Markets
(Scaled by standard deviation of perceived shocks; years on horizontal axis)



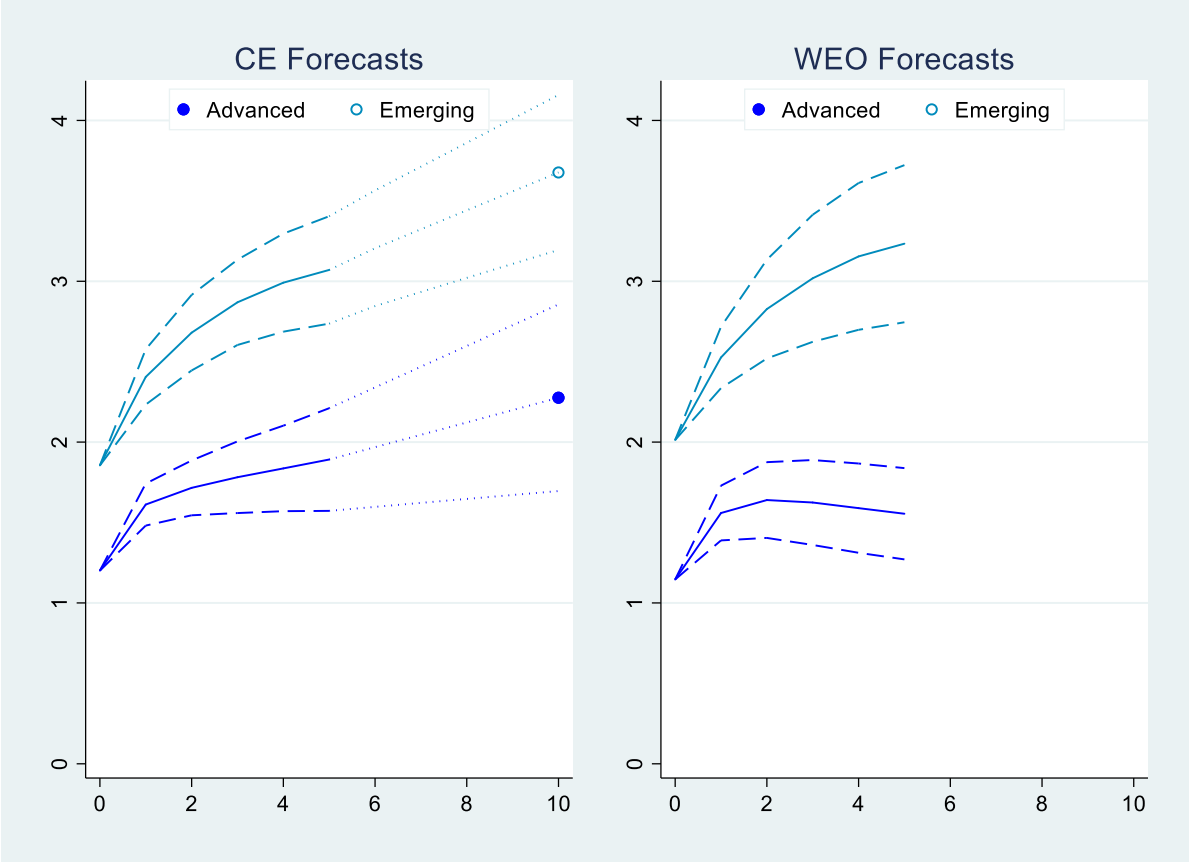
Note: Figure reports point estimates and 90 percent confidence intervals (dashes). Impulse responses estimated for years *t* to *t* + 5 and year *t* + 10. Fine dashes indicate interpolation for years *t* + 6 to *t* + 9.

Figure 3. Current-period Output Forecast Revisions vs. Subsequent Forecast Errors
(Percentage points)



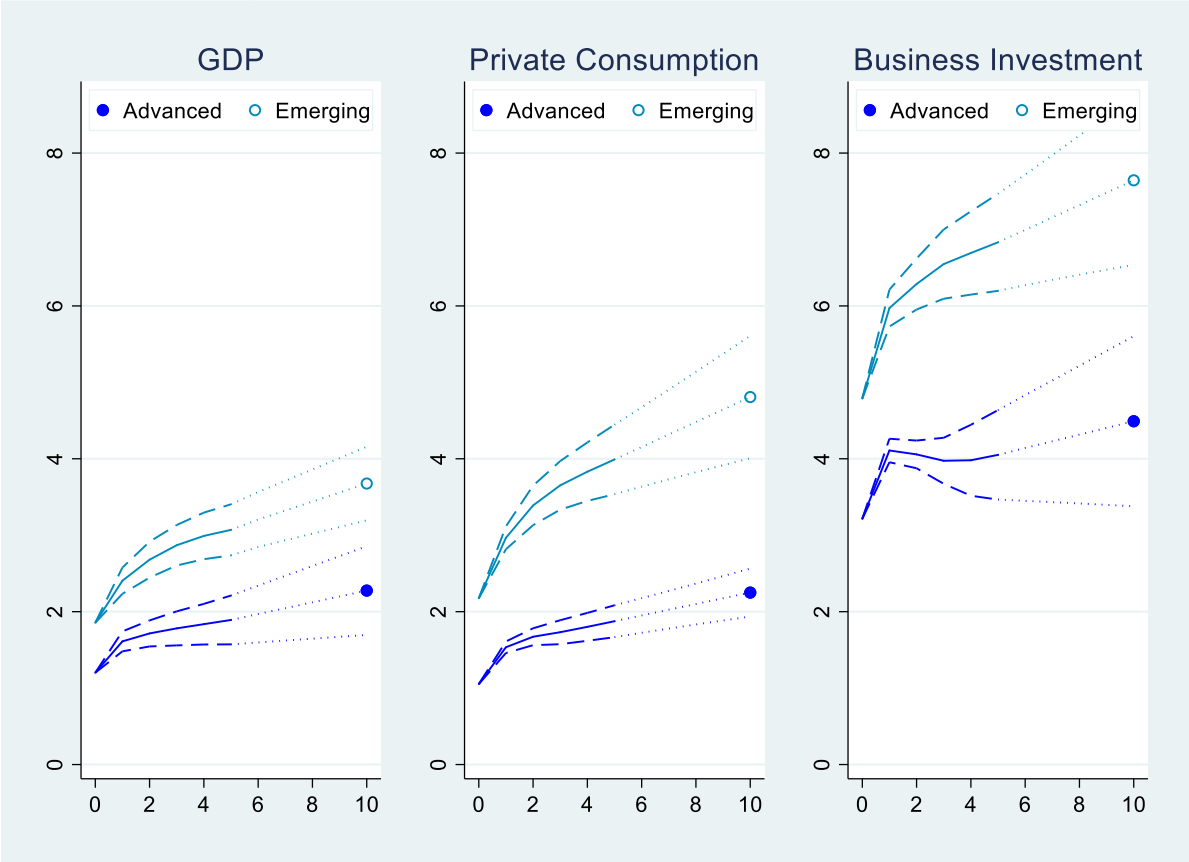
Note: Forecast errors are for cumulative growth over years *t* to *t* + 10.

Figure 4. Perceived Impulse Responses for Output Level:
Consensus Economics (CE) vs. IMF *World Economic Outlook* (WEO) Forecasters
(Scaled by standard deviation of perceived shocks; years on horizontal axis)



Note: Figure reports point estimates and 90 percent confidence intervals (dashes). For CE forecasts, impulse responses estimated for years *t* to *t* + 5 and year *t* + 10; fine dashes indicate interpolation for years *t* + 6 to *t* + 9. For WEO forecasts, results available for years *t* to *t* + 5 only.

Figure 5. GDP, Consumption and Investment Level: Perceived Impulse Responses
(Scaled by standard deviation of perceived shocks; years on horizontal axis)



Note: Figure reports point estimates and 90 percent confidence intervals (dashes). Impulse responses estimated for years *t* to *t* + 5 and year *t* + 10. Fine dashes indicate interpolation for years *t* + 6 to *t* + 9.

Table 1. Individual Country Estimates.
Perceived Long-term Effect of a 1 Percentage Point Shock to GDP Level
Equation: Forecast Revision of $\Delta Y_{i,t:t+h|t} = \alpha + \beta_h$ Forecast Revision of $\Delta Y_{i,t|t} + \varepsilon_{i,t:t+h}$

Advanced markets	β	(s.e.)	*N*	R^2	Emerging markets	β	(s.e.)	*N*	R^2
AUS	1.23	(0.34)	53	0.30	ARG	1.66	(0.13)	48	0.61
CAN	0.92	(0.25)	55	0.31	BRA	2.06	(0.42)	48	0.50
CHE	2.35	(0.17)	38	0.78	CHL	1.99	(0.65)	48	0.33
CZE	1.98	(0.19)	39	0.64	CHN	3.46	(0.86)	45	0.50
DEU	1.53	(0.39)	55	0.49	COL	2.47	(0.52)	37	0.56
ESP	2.21	(0.24)	45	0.44	HUN	2.43	(0.20)	39	0.60
FRA	2.31	(0.25)	55	0.61	IDN	1.91	(0.19)	39	0.64
GBR	1.28	(0.17)	55	0.37	IND	4.41	(1.41)	45	0.36
HKG	1.81	(0.19)	40	0.51	MEX	1.85	(0.28)	48	0.62
ITA	1.75	(0.20)	55	0.43	MYS	2.68	(0.37)	45	0.72
JPN	1.86	(0.51)	53	0.52	PER	2.84	(0.28)	40	0.57
KOR	2.59	(0.48)	45	0.81	POL	2.02	(0.29)	39	0.51
NLD	2.10	(0.36)	45	0.53	ROM	2.28	(0.32)	39	0.51
NOR	1.51	(0.36)	34	0.28	RUS	2.28	(0.38)	39	0.57
NZL	1.10	(0.25)	45	0.43	SVK	1.91	(0.20)	39	0.68
SGP	1.64	(0.37)	45	0.55	THA	2.56	(0.45)	42	0.62
SWE	1.65	(0.38)	45	0.44	TUR	1.37	(0.49)	37	0.28
TWN	2.01	(0.37)	45	0.62	UKR	2.10	(0.20)	39	0.51
USA	2.02	(0.33)	55	0.63	VEN	1.34	(0.40)	42	0.17
Mean	1.78	(0.10)	902	0.51	Mean	2.30	(0.17)	798	0.52

Note: The table reports estimates for each economy, indicated by International Organization for Standardization (ISO) three-letter codes. Mean indicates arithmetic mean of β estimates for each group's economy, obtained using the Pesaran, Shin, and Smith (1999) mean group estimator. Standard errors clustered by year.

Table 2. Robustness
Equation: Forecast Revision of $\Delta Y_{i,t:t+h|t} = \alpha + \beta_h$ Forecast Revision of $\Delta Y_{i,t|t} + \varepsilon_{i,t:t+h}$

	Advanced Markets				Emerging Markets			
	β	(s.e.)	*N*	R^2	β	(s.e.)	*N*	R^2
Baseline	1.89	(0.29)	902	0.57	1.98	(0.16)	798	0.45
Trimmed sample	1.57	(0.08)	769	0.29	1.93	(0.18)	679	0.29
1989-2003 sample	2.61	(0.21)	372	0.66	2.05	(0.34)	268	0.44
2004-2017 sample	1.45	(0.10)	530	0.55	1.93	(0.09)	530	0.45
Positive revisions sample	1.97	(0.48)	417	0.32	1.88	(0.30)	398	0.12
Negative revisions sample	1.79	(0.41)	485	0.54	1.65	(0.18)	400	0.40
Controling for lagged revisions	1.86	(0.27)	873	0.58	1.98	(0.14)	761	0.45
Adding economy-fixed effects	1.89	(0.30)	902	0.58	1.99	(0.16)	798	0.45
Adding time-fixed effects	1.95	(0.30)	902	0.61	1.88	(0.17)	798	0.49

Note: This table lists estimates of β for the group of advanced (19) and emerging (19) market economies. Standard errors clustered by year. For estimation controlling for lagged revisions, two lags of current-year revisions are included in the equation estimated. Trimmed sample obtained by discarding the largest and smallest 5 percent of both the current-period and the long-term output forecast revisions.

Table 3. Forecast Evaluation. Equations:
Forecast Error of $\Delta Y_{i,t:t+10|t} = \kappa + \theta$ Forecast Revision of $\Delta Y_{i,t|t} + \varepsilon_{i,t:t+h}$
Forecast Revision of $\Delta Y_{i,t:t+10|t} = \alpha + \beta$ Forecast Revision of $\Delta Y_{i,t|t} + \varepsilon_{i,t:t+h}$

Advanced markets	θ	β	θ + β	*N*
Baseline	-1.25	2.55	1.29	486
	(0.39)	(0.19)	(0.34)	
Trimmed sample	0.19	1.90	2.10	437
	(0.86)	(0.20)	(0.89)	
Trimmed sample,	0.15	1.83	1.98	437
country and time fixed effects	(0.72)	(0.22)	(0.79)	
Emerging markets	**θ**	**β**	**θ + β**	***N***
Baseline	-1.06	2.04	0.98	380
	(0.41)	(0.30)	(0.61)	
Trimmed sample	-0.16	3.09	2.93	342
	(1.29)	(0.33)	(1.26)	
Trimmed sample,	0.76	2.72	3.48	342
country and time fixed effects	(1.31)	(0.35)	(1.28)	

Note: Sample size, *N*, equal for both equations. Trimmed sample includes the middle 90 percent of the sample based on the size of current-period output forecast revision. Standard errors for estimate of θ corrected for heteroskedasticity and autocorrelation based on Newey-West (1987) procedure with 10 lags. Standard errors for estimate of β clustered at economy level. Constant term included in all specifications but estimate not reported.

Table 4. Perceived Persistence of Output: Proxies for Demand and Supply Shocks

	Advanced Markets			Emerging Markets			
Sample	β	(s.e.)	*N*	β	(s.e.)	*N*	R^2
Large AD	1.70	(0.40)	111	1.90	(0.11)	46	0.621
Large AS	2.71	(0.36)	151	2.87	(0.85)	20	
Recession, no crisis	1.51	(0.22)	69	1.49	(0.21)	69	0.501
Recession, crisis	2.26	(0.61)	19	2.05	(0.10)	24	

Note: Estimation samples vary by inclusion criteria. The two regression models are estimated jointly for advanced economy and emerging market samples using saturated interactions. Aggregate supply (AS) shocks are global oil supply shocks, calculated by extending the VAR identification approach of Kilian (2009) as in Bluedorn and others (2012). Aggregate demand (AD) shocks are measured by differences between ex-post government consumption and ex-ante forecasts of government consumption following Auerbach and Gorodnichenko (2012, 2013). Large shocks defined as those that either above the 75th percentile or below the 25th percentile of the sample, with large shock periods either predominantly large AS/AD and not both. Recessions are years with negative growth. Periods of crisis are defined as occurring within 3 years of the start of a banking crisis as identified in Laeven and Valencia (2013).

Table 5. Perceived Transitory and Permanent Shocks to GDP: Variance Decomposition

Sample	Var(y)	Var(w)	Var(e)	Var(u)	Var($e+w$)/Var(y)
Advanced markets	1.40	0.06	0.87	0.41	0.61
			(0.10)	(0.00)	(0.07)
Emerging markets	3.24	0.20	1.96	1.07	0.59
			(0.26)	(0.01)	(0.08)

Note: Table reports estimated variance of current-period output revisions, *y*, and the moments of the perceived transitory shocks to output, *u*, the permanent shocks to the output level, *e*, and the shocks to long-term growth, *w*, as well as bootstrapped standard errors in parentheses (based on 1,000 replications). Sample variances of *y* and *w* are fixed and thus have no standard errors. Decomposition is based on Krane (2011).

Table 6. Perceived Long-term Effect of a 1 Percentage Point Shock to Other Variables
Equation estimated: Forecast Revision of $x_{i,t+10}$ = α + β Forecast Revision of $x_{i,t}$ + $\varepsilon_{i,t}$

	Advanced Markets				Emerging Markets			
	β	(s.e.)	*N*	R^2	β	(s.e.)	*N*	R^2
Y	1.90	(0.30)	751	0.58	1.99	(0.18)	646	0.44
C	2.07	(0.22)	745	0.35	2.28	(0.25)	571	0.32
I	1.39	(0.22)	555	0.30	1.70	(0.18)	543	0.24
π	0.13	(0.02)	649	0.05	0.23	(0.10)	579	0.03
i	0.31	(0.04)	569	0.23	…	…	…	…

Note: *Y* = log level of real GDP; *C* = log level of real private consumption; *I* = log level of real business investment. *π* = CPI inflation; *i* = long-term government bond nominal yield. For emerging markets, sample for CPI inflation trimmed to discard the 5 lowest and highest observations for year *t* forecast revisions.