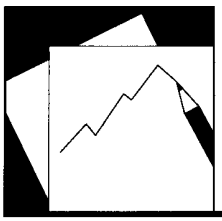

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How Well Are Recessions and Recoveries Forecast?

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How Well Are Recessions and Recoveries Forecast?

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Abstract

The paper examines the performance of private sector forecasts for economic growth, focusing on recessions and recoveries associated with banking, currency and debt crises. The sample covers 78 advanced, emerging and developing economies during January 1989–December 2008. Both recessions and recoveries are difficult to predict, particularly when associated with crises. The quality of forecasts for advanced economies is largely independent of the duration of recessions and the pace of recoveries, while for emerging and developing economies shorter recessions and faster recoveries are harder to predict. Forecasts are found to be inefficient, in the sense of a tendency for smoothing and bias, for both groups of economies, all regions and most recovery, recession and crisis episodes.

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Keywords: forecast, performance, accuracy, recovery, recession, crises

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I. INTRODUCTION

Forecasting the turning points of business cycles is a daunting task. Most recessions remain undetected until they are well underway. Less is known about the track record for forecasting recoveries, particularly those in emerging economies. Yet this question is particularly topical now, as the global financial crisis is bottoming out and emerging economies are expected to lead the recovery.

The "predictive failure" is well known in the case of U.S. recessions (Zarnowitz, 1986; Fintzen and Stekler, 1999). During the latest recession, which according to the National Bureau of Economic Research (NBER) began in December 2007, the initial forecast for 2008, made in January 2007, was that growth would be around 3 percent (Figure 1). Almost every month since then the forecast has been lowered, barring a temporary rebound during May-September 2008. As late as September 2008, the expectation was that growth would be about 1¾ percent. It was only in the last quarter of the year that there was a decisive drop in expectations and forecast errors narrowed. Forecasts for Germany also exhibit a volatile pattern, with actual growth being overestimated even at the end of the year. Although most emerging economies did not experience a recession in 2008, their economic performance that year was also considerably misestimated during the year.

The literature examining the performance of private sector forecasts in other advanced economies and in emerging and developing economies is scant. Öller and Barot (2000) examine forecast performance for major industrialized countries, reaching similar conclusions about the predictive failure as Zarnowitz (1991) did for the United States. Davies and Lahiri (1995) suggest an innovative econometric approach to examining forecast accuracy. Loungani (2001) discusses the track record for forecasting recessions in a broad range of advanced, emerging and developing economies, concluding that forecasters' ability to predict recessions is very limited. He also finds that forecasts for both advanced and emerging and developing economies are inefficient, i.e., characterized by a tendency for smoothing and systematic biases. Our paper extends the analysis in Loungani's (2001) paper across several dimensions.

We examine performance of private sector forecasts for economic growth in a broad range of advanced and emerging economies over the past twenty years. The focus is on the track record for forecasting recoveries and how it varied depending on the shape of recovery and whether the preceding recession was caused by a banking, currency, or debt crisis. The paper also revisits the record for forecasting recessions, concentrating on crisis-related episodes. Lastly, it examines the efficiency and bias of forecasts during crisis episodes.

Our analysis points to a significant variation in the forecasting track record during normal and crisis episodes, recessions and recoveries, and advanced and emerging and developing economies. Specifically:

- Forecast errors for recession episodes tend to be smaller than those for recoveries. This result holds for both advanced and emerging economies and for different types of cycles: "normal" recession-recovery episodes caused, for example, by a tightening

of monetary policy; and boom-bust episodes associated with a buildup of macro-financial imbalances followed by banking, currency, or debt crises.

- Forecasting performance for advanced economies is independent of the duration of recession or recovery. However, for emerging economies, forecast errors during shorter, faster-paced recession or recovery episodes are larger than during multi-year recessions or slow recoveries. This result holds both during "normal" and crisis-related turning points.

- Crises exacerbate the challenges of economic forecasting. Forecast errors for recessions after banking and currency crises are considerably larger than those for "normal" recessions, both for advanced and emerging economies. The same result broadly holds for recoveries.

- Forecasts for both advanced and emerging and developing economies are inefficient, in the sense of a tendency for forecast smoothing and biases. This result is generally robust across country groups, regions and recession, recovery and crisis episodes.

The rest of the paper is organized as follows. The next section discusses data on private analysts' forecasts and the approaches we used to date recovery, recession and crisis episodes. Section III presents the results of the descriptive analysis comparing forecast errors for "normal" and crisis-related recession and recovery episodes. Section IV discusses tests of forecast efficiency and bias. The last section concludes.

II. Private Forecasts and Dating of Recession, Recovery and Crisis Episodes

The core of the data set is monthly private analysts' forecasts of output growth for the current and next year. The forecast data have been collected and published on a monthly basis by Consensus Economics, Inc. since October 1989 for major advanced economies under the title of *Consensus Forecasts*. Over time the data set was expanded to include many emerging and developing economies, initially on a bi-monthly basis, in a series of related publications.[2] The frequency of forecasts for many emerging economies increased over the years from bi-monthly to monthly. *Consensus Forecasts* survey a number of prominent financial and economic analysts and report their forecasts as well as simple statistics summarizing the distribution of forecasts, particularly the mean (the "consensus").

The data set covers the period from October 1989 to December 2008. Seventy eight countries are represented in the sample, of which 22 are advanced economies and 56 are emerging and developing economies. The sample is geographically diverse, covering countries in Africa, Asia, Europe, Middle East and Western Hemisphere. The full list of countries and regional classifications are shown in Table 1 of the Appendix.

[2] *Latin American Consensus Forecasts* have been published on a bi-monthly basis since 1993, *Asia Pacific Consensus Forecasts* on a monthly basis since 1995, and *Eastern Europe Consensus Forecasts* on a bi-monthly basis since 1998.

The "event" being forecast is annual average real GDP growth. Every month (or every other month in the case of some emerging and developing economies) a new forecast is made of the event. For each year, the sequence of forecasts are the 24 forecasts made between January of the previous year and December of the year in question. For countries for which only bi-monthly forecasts are available, we use the preceding month forecasts as values for the months for which forecast data are missing. (See Appendix Table 2 for the list of countries with monthly and bi-monthly forecasts.) In addition to forecasts, the data set includes actual data on real GDP growth from the International Monetary Fund's *International Financial Statistics*, as of June 2009.

The dating of recession and recovery episodes in a diverse cross-country data set with annual actual GDP data requires a broad definition of recessions and recoveries. For all advanced economies and 32 emerging and developing economies for which quarterly GDP series of sufficient length are available, recession episodes are identified based on the classical definition of a business cycle using quarterly changes in the level of real GDP (Burns and Mitchell, 1946).[3] Economies are classified as being in a recession in a given year if they were in a recession in at least one quarter of that year. Note that, on average, actual growth is not negative during recessions in advanced economies because the dating of recession episodes is based on the quarterly data and annual growth tends to remains positive during recessions (Figure 2).[4] For the remaining 24 emerging and developing economies, recession episodes are identified using annual data, as the years where real GDP declined.[5] Recovery years are defined as the years following the last year of recession. All in all, the data set includes 61 recession episodes in advanced economies and 45 in emerging and developing economies, and 40 recovery episodes in advanced economies and 38 in emerging and developing economies.[6] See Appendix Table 1 for the list of recovery and recession episodes.

The dating of crisis episodes follows Laeven and Valencia's (2008) data set, extended by one year to 2008. A systemic banking crisis is defined as an event when a country's corporate and financial sectors experience a large number of defaults and financial institutions and corporations face great difficulties repaying contracts on time. As a result, nonperforming loans increase sharply and all or most of the aggregate banking system capital is exhausted.

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[3] The National Bureau of Economic Research (NBER) uses a similar definition for dating turning points in the U.S. business cycle, along with judgment and additional economic series (employment, real income, industrial production and sales). The NBER methodology is difficult to implement in a diverse data set. See Claessens, Kose and Terrones (2008) for a discussion of business cycle dating in advanced economies.

[4] Cases of annual output declines exceeding 20 percent during recessions pertain mostly to the countries of the former Soviet Union in the early 1990s and Albania after the financial crisis in 1997. For advanced economies, annual output declines between 5 percent and 2½ percent took place in Finland after the banking crisis in 1992–93 and in 1998 in Japan.

[5] Applying that method to advanced economies will miss many recession episodes because they often do not result in real GDP declines on the annual basis.

[6] There are fewer recoveries than recessions because some recession episodes were not completed yet in 2008.

A "currency crisis" is defined as a nominal depreciation of the currency of at least 30 percent that is also at least a 10 percent increase in the rate of depreciation compared to the year before.[7] Sovereign debt crises are episodes of sovereign debt default and restructuring. The sample includes 5 banking crises and 3 currency crises in advanced economies and 26 banking crises, 26 currency crises and 6 debt crises in emerging and developing economies. Crisis episodes are reported in Appendix Table 1.

III. Comparing Forecast Errors for Recession, Recovery and Crisis Episodes

The distributions of forecasts tend to converge to the distributions of actual values over time, but fail to match them perfectly even at short forecast horizons (Figures 3–5). The distributions of one-year-ahead forecasts are centered around the sample mean, especially for advanced economies, suggesting that forecasters tend to anchor their forecasts on the sample mean rather than venturing to predict recessions or recoveries. As the forecast horizon narrows, forecast distributions tend to widen, moving closer to the actual distributions. By October, forecasters tend to predict the number of recessions almost correctly, both in advanced and emerging economies. The differences between the forecasted and actual distributions persist mainly in the right-hand-side tail of the distribution and especially for emerging and developing economies. Periods of rapid growth, for example, so-called V-shaped recoveries, tend to be predicted less often than recessions for this group of economies.

To explore differences between the forecasts of real GDP growth and the actual values more systematically, we define forecast errors for year t and made in month m of year p as:

$$e_{tmp} = A_t - F_{tmp},$$

where A_t is the "actual" annual growth outcome for year t, and F_{tmp} is the forecast of annual growth in year t made in month m of year p, where p is equal to t or t–1.

We start by comparing forecast errors during recession and recovery episodes (Table 1, Figure 6). For both advanced and emerging economies, mean forecast errors for recessions exceed those for recoveries (5½ times for advanced economies and 2½ times for emerging and developing economies). This pattern is consistent across all regions. The volatility of forecasts (as measured by their standard deviations) is similar during recession and recovery episodes, albeit only for advanced economies. For emerging and developing economies, forecasts during recessions tend to be more volatile than those during recoveries.

The monthly pattern of forecasts underscores the challenges of forecasting turning points (Figure 7). A year prior to the recession year, forecasts are close to the unconditional average, especially for advanced economies. Around July–October of that year, forecasters

[7] An alternative definition recommended by Milesi-Ferretti and Razin (2000)—a 15 percent minimum rate of depreciation, a minimum 10 percent increase in the rate of depreciation with respect to the previous year, and a rate of depreciation the previous year of below 10 percent—renders much fewer episodes of currency crises, precluding the analysis of regional patterns.

start marking down forecasts, although they continue to overestimate growth well into the recession year. This pattern holds for both advanced and emerging and developing economies. During recessions in emerging and developing economies, forecasters usually sharply mark down forecasts at the beginning of the recession year and by summer anticipate that annual growth will turn negative.

The monthly pattern of forecasts is similar during recoveries (Figure 7). For advanced economies, the first forecast in January of the year preceding a recovery is close to the unconditional forecast. For emerging and developing economies, it is about 1½ percentage points below the unconditional forecasts, possibly reflecting deeper recessions in emerging and developing economies, many of which have been associated with economic and financial crises. Throughout that year, forecasts tend to be marked down, possibly because of growing pessimism about the duration of recession. This pattern is particularly pronounced in emerging and developing economies. At the beginning of the recovery year, however, forecasters shift to marking up the forecasts, growing more and more optimistic as recovery takes hold.

The splitting of the forecast errors by quintiles of actual GDP growth shows that forecast performance is largely independent of the pace of recovery in advanced economies (Table 2, Figure 6). Absolute forecast errors for faster (V-shaped) recoveries (defined here as the fifth quintile) are very similar to those for slower (L-shaped) recoveries (defined as the first quintile): 1.19 percentage points compared to 1.33 percentage points, respectively. In contrast, for emerging and developing economies, steeper recoveries seem to be harder to predict than slower recoveries. For those economies, absolute forecast errors for faster recoveries are 3½ times larger those for those for slower recoveries. The differences hold consistently across all regions. They also apply to recoveries following both normal cycles and cycles associated with banking, debt and currency crises.

Forecast performance weakens considerably during crises (Table 3, Figure 6). For both groups of economies, forecasters tend to underestimate the depth of recessions following banking crises. For advanced economies, forecast errors for recessions that take place a year after the banking crisis are more than double than unconditional average forecasts during recessions (–3.0 percentage points compared to –1.3 percentage points). For emerging and developing economies, forecast errors during recessions that take place a year after when banking crises occurred are also much larger than unconditional average forecasts during recessions (6.2 percentage points compared to 4.6 percentage points). The differences in forecast errors are smaller for recessions associated with currency and debt crises.

Recoveries following crises are also hard to predict (Table 3, Figure 6). For emerging economies, for example, forecast errors for recoveries two years after currency and debt crises are 3½ times larger than average unconditional errors for recoveries, and, for banking crises, 1½ times larger. Similar comparisons cannot be made for advanced economies owing to an insufficient number of post-crisis recovery episodes. However, the pattern is consistent across regions.

Whether forecast errors depend on the duration of recession varies between advanced and emerging and developing economies (Table 4, Figure 8).[8] The comparison of forecast errors during one-year recessions and the second year of multi-year (typically two-year) recessions shows that the length of recession does not seem to affect forecast performance for advanced economies, while for emerging and developing economies forecast errors for single-year recessions are larger than those for multi-year recessions. These differences hold in all recession episodes, including all crisis-related episodes. They are also observed in all regions, and are particularly pronounced in Asia and Europe.

IV. TESTING THE EFFICIENCY AND BIAS OF FORECASTS

We use two simple tests of efficiency and bias of forecasts. The first test of efficiency is inspired by Nordhaus's (1997) idea that a sequence of forecasts of the same event must follow a martingale. To implement the test, we define the initial revision of the forecast as the change in the forecast between October and April of the previous year, the middle revision as the change between April of the current year and October of the previous year, and the final revision as the change between October of the current year and April of the current year. We run Ordinary Least Squares regressions with robust errors, separately for advanced and emerging and developing economies, as well as for individual regions. We also include interaction terms for banking, currency and debt crises and for recession and recovery episodes to ascertain differences in forecast efficiency during these episodes compared to averages. We use Wald tests to ascertain if coefficients on the initial and middle revisions are zero.

There is overwhelming evidence of forecast inefficiency (Table 5). Forecasts tend to be smoothed, i.e., revisions in one direction tend to be followed by revisions in the same direction, across advanced, emerging and developing economies and across all regions. It also generally holds for recovery, recession and crisis episodes. The only case where efficiency is found is during banking and currency crises in Asia and banking crises in Europe. Forecast smoothing is most pronounced between adjacent revisions. As Loungani (2001), we find that the hypothesis of forecast efficiency cannot be rejected for nonadjacent revisions (i.e., between final and initial revisions) for all country groups and regions (except Middle East) and during recovery episodes. Forecasts seem to be smoothed even between nonadjacent revisions during recession and currency crisis episodes in advanced economies.

The second test of efficiency is based on the following regression:

$$A_t = a_0 + a_1 F_t + u_t,$$

[8] Examples of multi-year recessions include the 1990–91 recessions in the United States and the United Kingdom, 1992–93, 1995–96 and 2002–04 recessions in Germany. In emerging and developing economies, multi-year recessions have been often associated with crises, for example, 1998–99 recession in Brazil, 1999–2002 recession in Argentina and 1990–91 recession in Poland. See Appendix Table 1.

Forecasts are efficient if the intercept a_0 is zero, the slope a_1 is 1 and the errors u_t are random. The test can also be interpreted as a test for bias in the forecast, although, as Holden and Peel (1990) demonstrate, it is a sufficient but not a necessary condition for unbiasedness. Since the data are pooled across countries and over time, the error term is unlikely to be random. We add fixed effects for individual years to account for time-specific factors and use robust estimation to ensure that the error term is well behaved. We test the joint hypothesis for the slope and intercept coefficients using the Wald tests. The hypothesis of forecast efficiency is overwhelmingly rejected, with the exception of the banking crisis episodes in Europe (Table 6). These findings confirm the conclusions of the first test.

V. CONCLUSIONS

This paper has documented the track record for forecasting recoveries and recessions during normal and crisis episodes, underscoring similarities and differences between advanced and emerging and developing economies. There is uniform evidence that forecast uncertainty increases sharply during crisis episodes, especially those associated with banking crises. In particular, we found that short recessions and fast recoveries are harder to predict for emerging economies than prolonged recessions and recoveries. Further improvements in leading indicators for emerging economies may help improve forecast performance.

Clearly, there is no crystal ball for forecasting either recessions or recoveries, independent of their shapes and causes. Does it mean one should stop looking at forecasts? No, but for forecasts to be meaningful, they need to be accompanied by a measure of forecast risk—a fan chart, as many central banks do, or by metrics of forecast dispersion across forecasters. To improve forecast performance in emerging economies, further efforts to create good leading indicators may be useful.

Table 1. Forecast Errors for Recovery and Recession Episodes
(In percent)

	Mean	Std. Dev.	Min	Max
		Advanced economies		
Recession	-1.3	1.3	-6.6	1.7
Recovery	0.2	1.2	-3.7	3.0
		Emerging and developing economies		
Recession	-4.6	4.3	-21.3	10.0
Recovery	1.9	2.9	-7.1	13.7
		Asia		
Recession	-4.0	4.3	-21.3	2.8
Recovery	1.4	2.5	-3.0	11.0
		Europe		
Recession	-1.9	2.5	-12.5	10.0
Recovery	0.6	1.7	-7.1	9.2
		Middle East		
Recession	-3.2	1.5	-5.7	0.0
Recovery	1.6	1.7	-1.0	5.8
		Western Hemisphere		
Recession	-3.2	3.4	-14.2	7.6
Recovery	1.5	3.1	-3.8	13.7

Source: Authors' estimates.

Table 2. Forecast Errors for Recovery Episodes by Quintile
(In percent)

Quintiles	Actual Growth	Forecast Errors	Absolute Forecast Errors
	Advanced Countries		
1	0.18	-0.99	1.19
2	1.44	-0.64	0.99
3	2.12	0.43	0.51
4	2.66	0.96	0.96
5	3.89	1.31	1.33
	Emerging and Developing Countries		
1	0.62	-0.40	1.81
2	2.45	1.49	1.68
3	3.62	1.44	1.75
4	4.85	1.61	1.78
5	9.39	6.41	6.41
	Asia		
1	0.35	0.31	1.39
2	2.32	0.53	1.27
3	3.03	1.19	1.47
4	4.09	0.92	1.65
5	6.91	4.10	4.23
	Europe		
1	0.00	-1.16	1.37
2	1.69	0.13	0.71
3	2.38	0.65	0.68
4	3.32	1.41	1.43
5	7.58	2.78	2.78
	Middle East		
1	1.11	.	.
2	2.57	.	.
3	2.69	1.28	1.45
4	5.13	2.13	2.13
5	6.70	.	.
	Western Hemisphere		
1	1.15	-0.77	1.55
2	2.30	1.04	1.29
3	3.52	1.63	1.67
4	4.49	0.94	1.25
5	8.63	5.15	5.15

Source: Author's estimates.

Table 3. Forecast Errors during Crisis Episodes
(In percent)

	Banking Crises		Currency Crises		Debt Crises	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
			Advanced economies			
Recession	-1.3	1.3	-1.3	1.3	-1.3	1.3
with crisis in the current year	-1.6	1.8	-2.6	1.8	.	.
with crisis in the previous year	-3.0	1.4	.	.	.	.
Recovery	0.2	1.2	0.2	1.2	0.2	1.2
with crisis in the previous year	.	.	1.2	0.9	.	.
with crisis two years earlier	.	.	.	.	.	.
			Emerging and developing economies			
Recession	-4.6	4.3	-4.6	4.3	-4.6	4.3
with crisis in the current year	-5.3	3.4	-5.7	5.4	-4.8	3.3
with crisis in the previous year	-6.2	5.7	-0.7	6.2	-2.3	5.8
Recovery	1.9	2.9	1.9	2.9	1.9	2.9
with crisis in the previous year	1.3	2.4	2.7	2.7	1.6	2.5
with crisis two years earlier	3.1	2.7	6.5	4.3	5.6	2.1
			Asia			
Recession	-4.0	4.3	-4.0	4.3	-4.0	4.3
with crisis in the current year	-3.5	3.3	-7.8	6.6	.	.
with crisis in the previous year	-7.0	6.3	.	.	.	.
Recovery	1.4	2.5	1.4	2.5	1.4	2.5
with crisis in the previous year	.	.	3.3	3.0	.	.
with crisis two years earlier	3.3	3.0	.	.	.	.
			Europe			
Recession	-1.9	2.5	-1.9	2.5	-1.9	2.5
with crisis in the current year	-3.3	3.4	-5.1	3.8	-4.7	2.6
with crisis in the previous year	-3.8	3.2	-0.4	5.8	0.1	2.6
Recovery	0.6	1.7	0.6	1.7	0.6	1.7
with crisis in the previous year	3.7	3.6	1.9	2.0	3.7	3.6
with crisis two years earlier	2.7	1.8	3.4	1.7	5.2	1.6
			Middle East			
Recession	-3.2	1.5	-3.2	1.5	-3.2	1.5
with crisis in the current year	.	.	.	.	.	.
with crisis in the previous year	.	.	.	.	.	.
Recovery	1.6	1.7	1.6	1.7	1.6	1.7
with crisis in the previous year	.	.	.	.	.	.
with crisis two years earlier	.	.	.	.	.	.
			Western Hemisphere			
Recession	-3.2	3.4	-3.2	3.4	-3.2	3.4
with crisis in the current year	-3.7	3.3	-3.9	4.3	-4.9	3.6
with crisis in the previous year	-5.6	5.1	-1.5	7.1	-4.1	6.9
Recovery	1.5	3.1	1.5	3.1	1.5	3.1
with crisis in the previous year	0.9	1.9	2.3	2.3	1.1	1.9
with crisis two years earlier	3.1	2.7	10.7	2.8	5.8	2.3

Source: Authors' estimates.
Note: The symbol "." indicates that data is not available, for example, owing to insufficient number of crisis episodes.

Table 4. Forecast Errors for One-Year and Multi-Year Recession Episodes
(In percent)

	Mean	Std. Dev.
Advanced economies		
Recession		
Single year recessions	-1.4	1.2
Multi-year recessions	-1.5	1.6
Accompanied by a banking crisis		
Single year recessions	.	.
Multi-year recessions	-1.9	1.8
Accompanied by a currency crisis		
Single year recessions	.	.
Multi-year recessions	-2.6	1.8
Emerging and developing economies		
Recession		
Single year recessions	-5.3	4.1
Multi-year recessions	-4.0	3.9
Accompanied by a banking crisis		
Single year recessions	-4.9	2.9
Multi-year recessions	-3.9	3.0
Accompanied by a currency crisis		
Single year recessions	-5.9	5.6
Multi-year recessions	-4.1	5.0
Accompanied by a debt crisis		
Single year recessions	-5.1	3.3
Multi-year recessions	-4.4	3.2

Source: Authors' estimates.

Note: The symbol "." indicates that data is not available, for example, owing to an insufficient number of crisis episodes. For multi-year recessions, forecast errors refer to the second year of recession.

Table 5. Test of Efficiency

	Advanced		Emerging and developing		Asia		Europe		Middle East		Western Hemisphere	
	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error
Middle revision	0.37	0.07 ***	0.60	0.07 ***	0.74	0.11 ***	0.57	0.09 ***	0.50	0.14 ***	0.47	0.08 ***
Middle revision during recoveries	0.10	0.19	0.13	0.18	0.40	0.19 **	-0.12	0.26	—	—	0.08	0.26
Middle revision during recessions	0.09	0.13	-0.93	0.12 ***	1.92	0.75 ***	-0.11	0.18	-1.13	0.15 ***	-0.73	0.09 ***
Middle revision during banking crises	0.89	0.52 *	-0.27	0.16 *	-1.51	0.52 ***	-0.10	0.35	—	—	0.26	0.29
Middle revision during currency crises	2.06	0.09 ***	0.71	0.24 ***	-1.94	0.76 ***	1.42	0.51 ***	—	—	0.37	0.08 ***
Middle revision during debt crises	—	—	0.94	0.45 **	—	—	—	—	—	—	0.93	0.72
Initial revision	-0.02	0.08	-0.03	0.10	-0.15	0.14	-0.09	0.11	-0.30	0.17 *	0.21	0.09 **
Initial revision during recoveries	-0.01	0.17	-0.13	0.16	0.06	0.17	0.08	0.26	1.08	0.17 ***	-0.13	0.22
Initial revision during recessions	-0.42	0.19 **	0.06	0.19	-1.09	0.87	-0.39	0.31	—	—	-0.02	0.19
Initial revision during banking crises	-0.75	0.53	0.06	0.44	2.43	1.47 *	-0.32	0.49	—	—	-0.73	0.72
Initial revision during currency crises	-2.11	0.18 ***	-0.66	0.43	1.24	0.93	-2.24	0.67 ***	—	—	-1.45	0.25 ***
Initial revision during debt crises	—	—	-0.54	0.32 *	-0.71	0.09 ***	—	—	—	—	0.77	0.84
Number of observations		387		475		235		325		39		240
R-squared		0.38		0.52		0.69		0.45		0.53		0.52
P-values for Wald tests												
Middle revision during recoveries		0.01 ***		0.00 ***		0.00 ***		0.07 *		—		0.03 **
Middle revision during recessions		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***
Middle revision during banking crises		0.02 **		0.05 **		0.13		0.19		—		0.01 ***
Middle revision during currency crises		0.00 ***		0.00 ***		0.11		0.00 ***		—		0.00 ***
Middle revision during debt crises		0.00 ***		0.00 ***		0.00 ***		—		—		0.05 **
Initial revision during recoveries		0.87		0.19		0.39		0.94		0.00 ***		0.68
Initial revision during recessions		0.01 ***		0.86		0.15		0.10 *		—		0.27
Initial revision during banking crises		0.14		0.96		0.12		0.40		—		0.47
Initial revision during currency crises		0.00 ***		0.12		0.25		0.00 ***		—		0.00 ***
Initial revision during debt crises		0.84		0.09 *		0.00 ***		—		—		0.25

Source: Authors' estimate

Note: The dependent variable is the final revisions. Asterisks *** (**, *) indicate statistical significance at the 1, 5, 10 percent level. Regressions include dummy variables for recession, recovery and crisis episodes. The hypothesis for the Wald test is that the value of the respective total effect is not statistically different from zero.

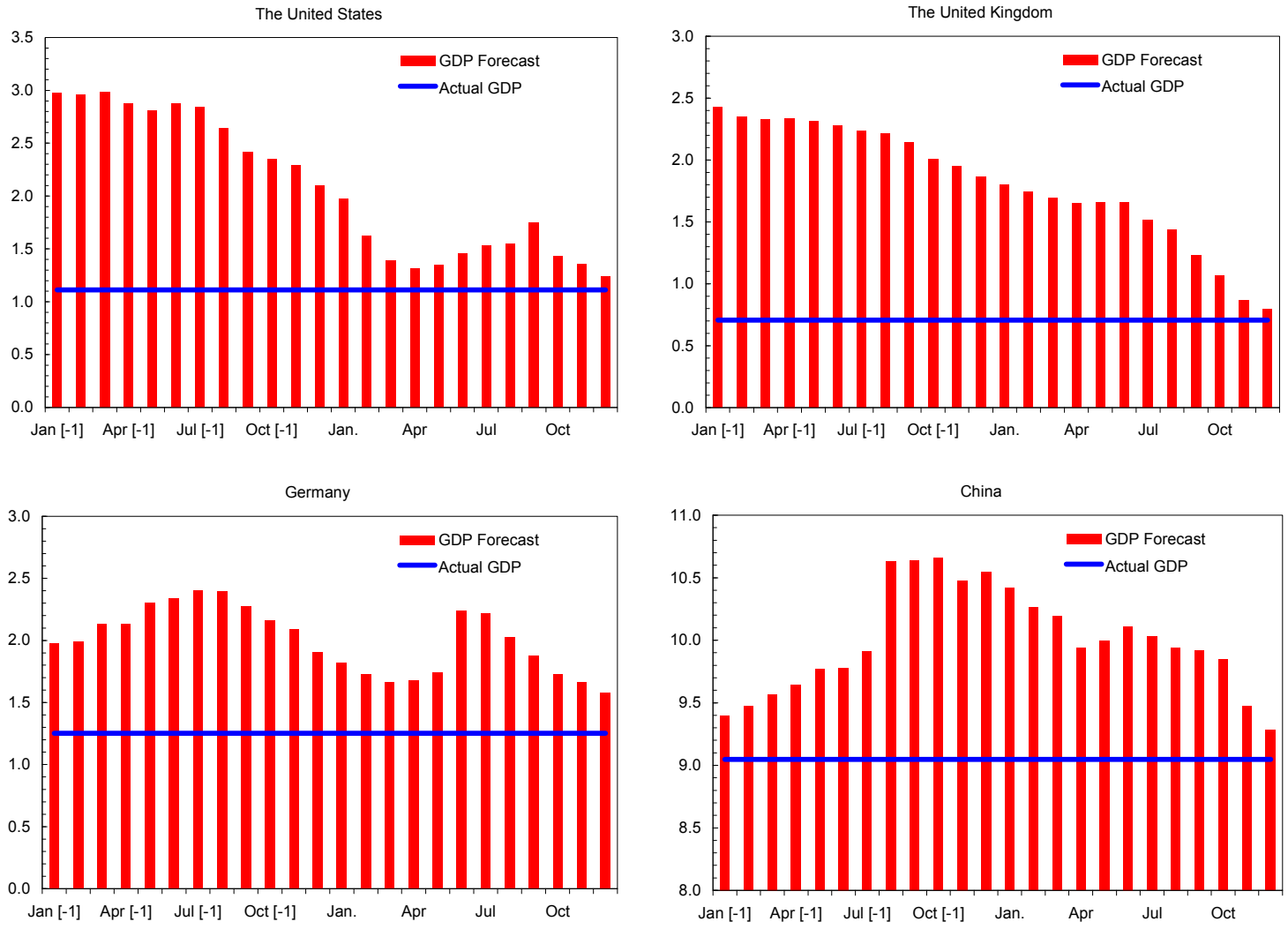
Table 6. Test of Bias

	Advanced		Emerging and developing		Asia		Europe		Middle East		Western Hemisphere	
	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error	Coeff.	St. Error
Constant	0.34	0.08 ***	1.56	0.41 ***	1.26	0.22 ***	-0.10	0.14	1.14	0.19	1.66	0.22 ***
Dummy for recovery	0.07	0.09	0.87	0.16 ***	1.48	0.20 ***	0.42	0.18 **	2.14	0.32 ***	0.29	0.21
Dummy for recession	-0.52	0.06 ***	-4.61	0.13 ***	-0.52	0.15 ***	-1.16	0.10 ***	-3.21	0.27 ***	-2.96	0.16 ***
Dummy for banking crisis	0.38	0.15 **	-0.52	0.16 ***	0.42	0.23 *	-0.32	0.19 *	4.65	0.33 ***	-0.62	0.20 ***
Dummy for currency crisis	-1.10	0.08 ***	-1.05	0.20 ***	-5.97	0.41 ***	-1.19	0.33 ***	-0.44	0.31	-1.27	0.36 ***
Dummy for debt crisis	—	—	0.58	0.27 **	-3.08	0.22 ***	-0.23	0.56	—	—	-0.70	0.40 *
Forecast	0.96	0.02 ***	0.84	0.01 ***	0.84	0.02 ***	1.06	0.02 ***	0.95	0.03 ***	0.77	0.03 ***
Forecast during recovery	-0.22	0.05 ***	-0.04	0.06	-0.45	0.08 ***	-0.37	0.09 ***	-0.78	0.10 ***	0.39	0.09 ***
Forecast during recession	-0.36	0.03 ***	-0.39	0.03 ***	-0.80	0.05 ***	-0.37	0.05 ***	-0.93	0.09 ***	-0.31	0.03 ***
Forecast during banking crisis	-0.31	0.09 ***	-0.07	0.03 ***	-0.15	0.03 ***	0.02	0.05	-0.95	0.03 ***	-0.22	0.05 ***
Forecast during currency crisis	-0.69	0.04 ***	-0.12	0.04 ***	0.15	0.07 **	0.01	0.11	0.02	0.13	0.04	0.05
Forecast during debt crisis	—	—	0.05	0.06	-0.39	0.07 ***	-0.86	0.21 ***	—	—	-0.02	0.08
Number of observations		9656		13562		5866		10522		1466		4774
R-squared		0.71		0.70		0.81		0.68		0.74		0.70
P-values for Wald tests												
Forecast		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***
Forecast during recovery		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***
Forecast during recession		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***
Forecast during banking crisis		0.00 ***		0.00 ***		0.00 ***		0.18		0.00 ***		0.00 ***
Forecast during currency crisis		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.05 **		0.00 ***
Forecast during debt crisis		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***		0.00 ***

Source: Authors' estimate

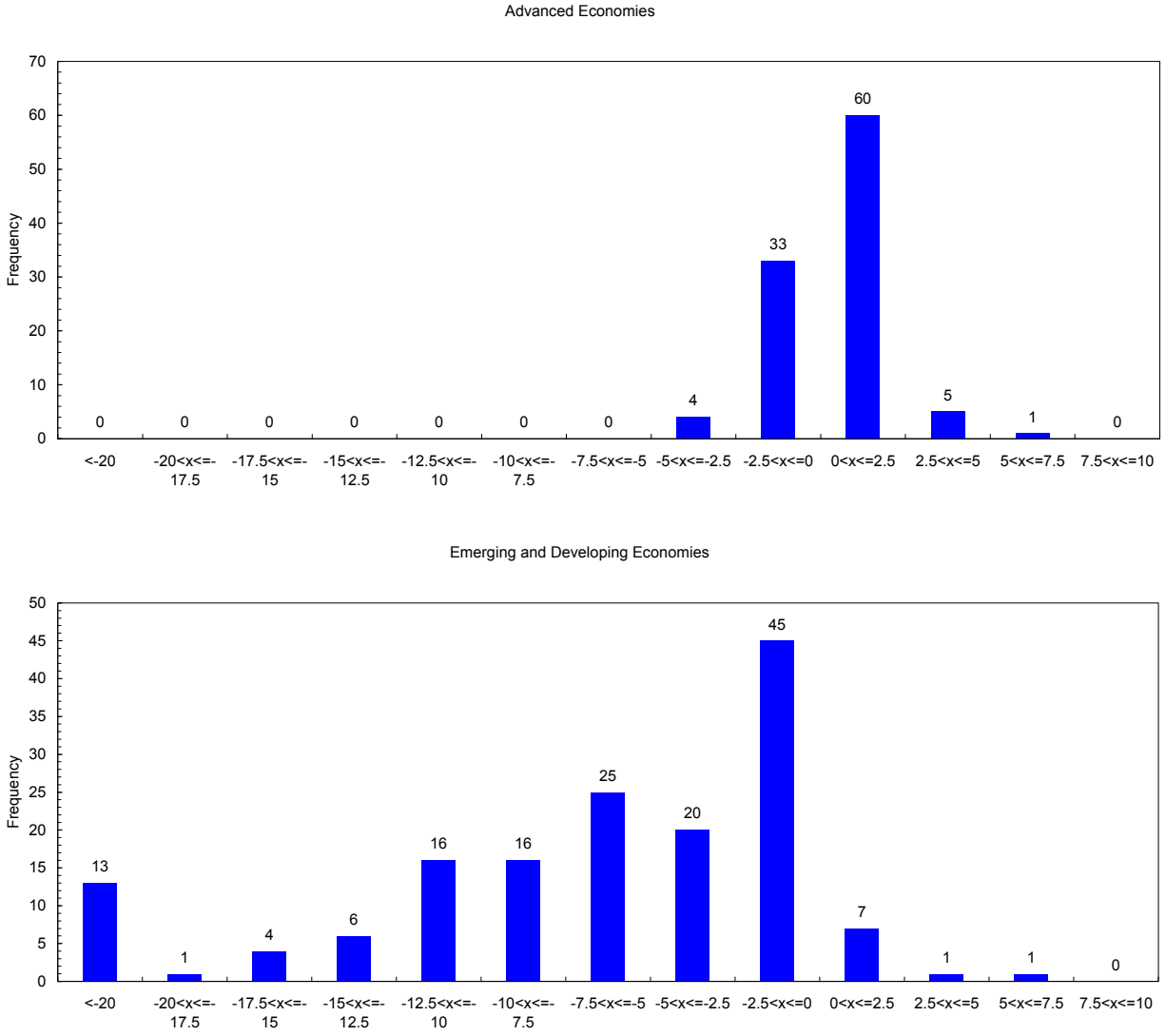
Note: The dependent variable is the actual forecasts. Asterisks *** (**, *) indicate statistical significance at the 1, 5, 10 percent level. The joint Wald test focuses on the hypothesis that the coefficient on the respective consensus forecast is equal to 1 and the respective constant is equal to 0.

Figure 1. Predicting Economic Growth in 2008, January 2007–December 2008



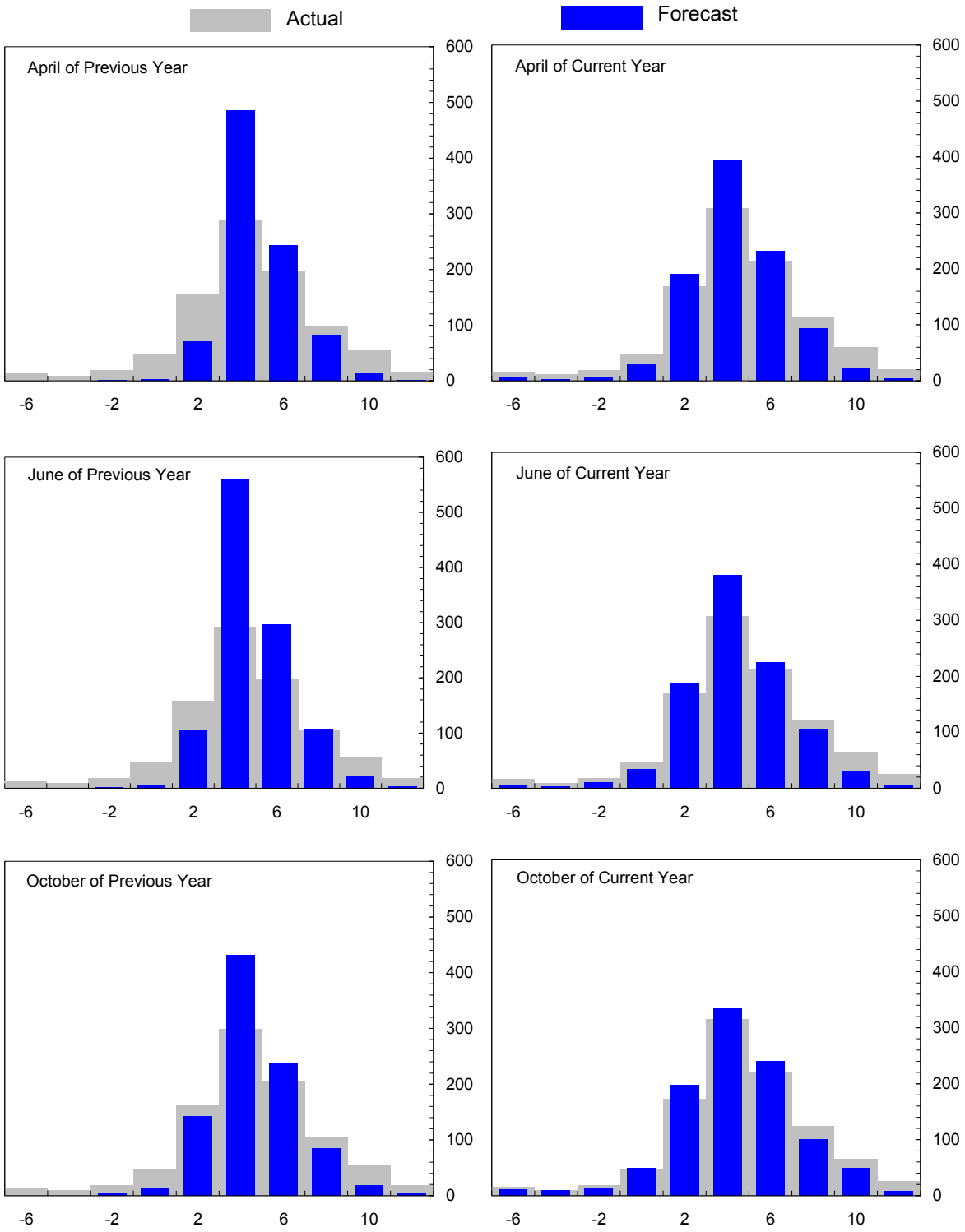
Source: Authors' estimates.
Note: The figure plots mean forecasts of the 2008 real GDP growth during January 2007–December 2008, as well as the actual value of real GDP growth.

Figure 2. Distribution of Actual Real GDP Growth in Recession Years



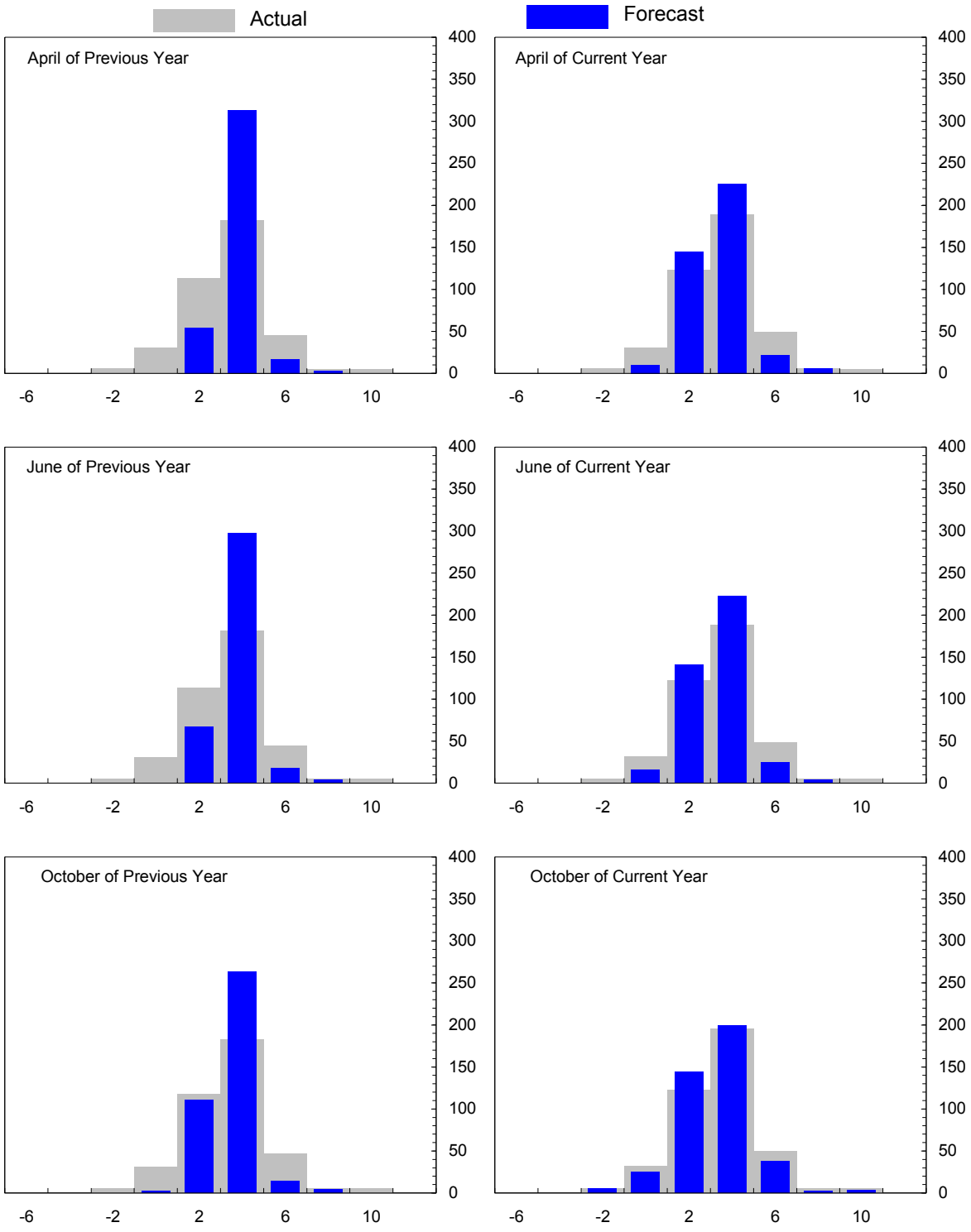
Source: Authors' estimates.

Figure 3. Distributions of Real GDP Growth, All Countries, 1989–2008



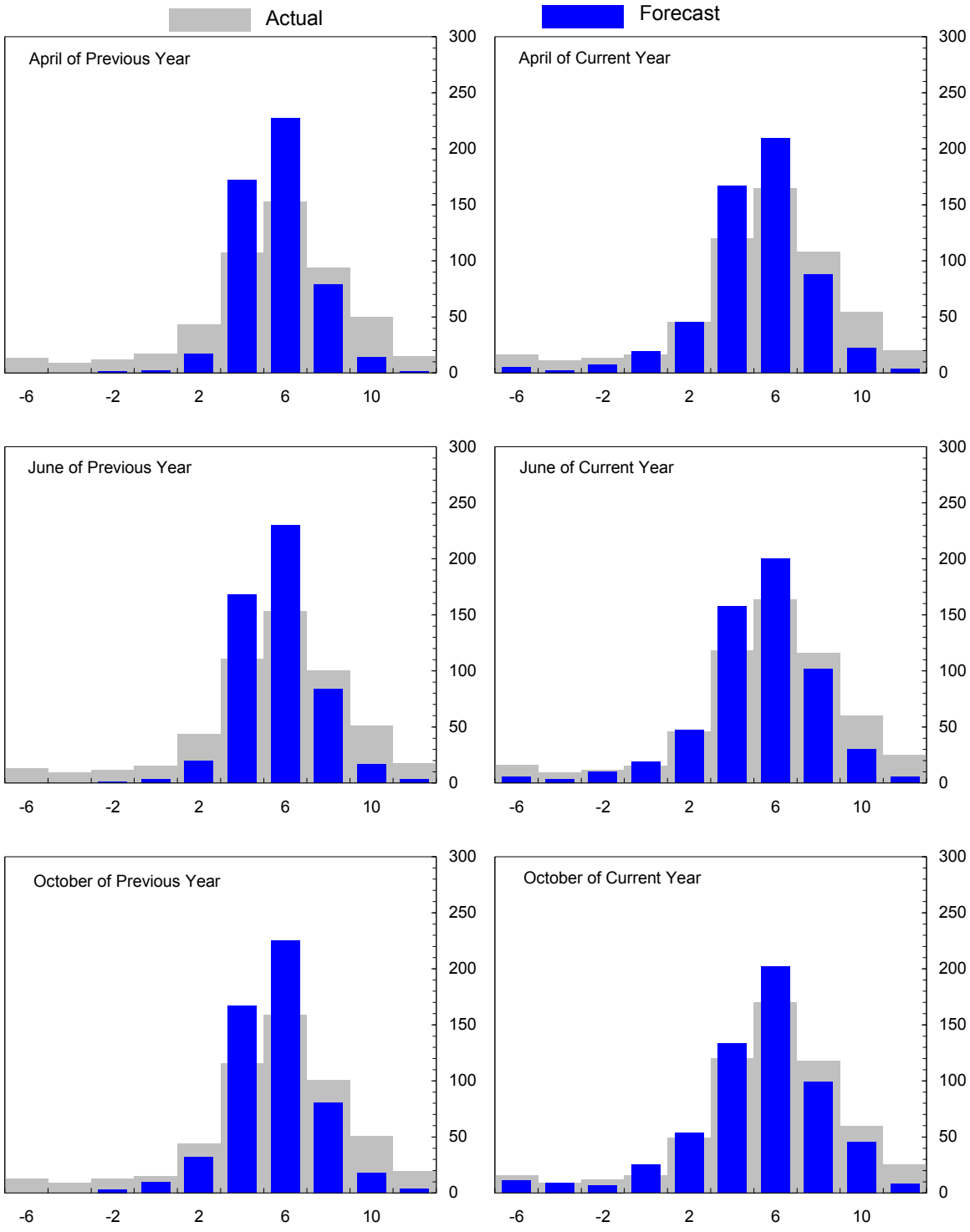
Source: Authors' estimates.

Figure 4. Distributions of Real GDP Growth, Advanced Economies, 1989–2008



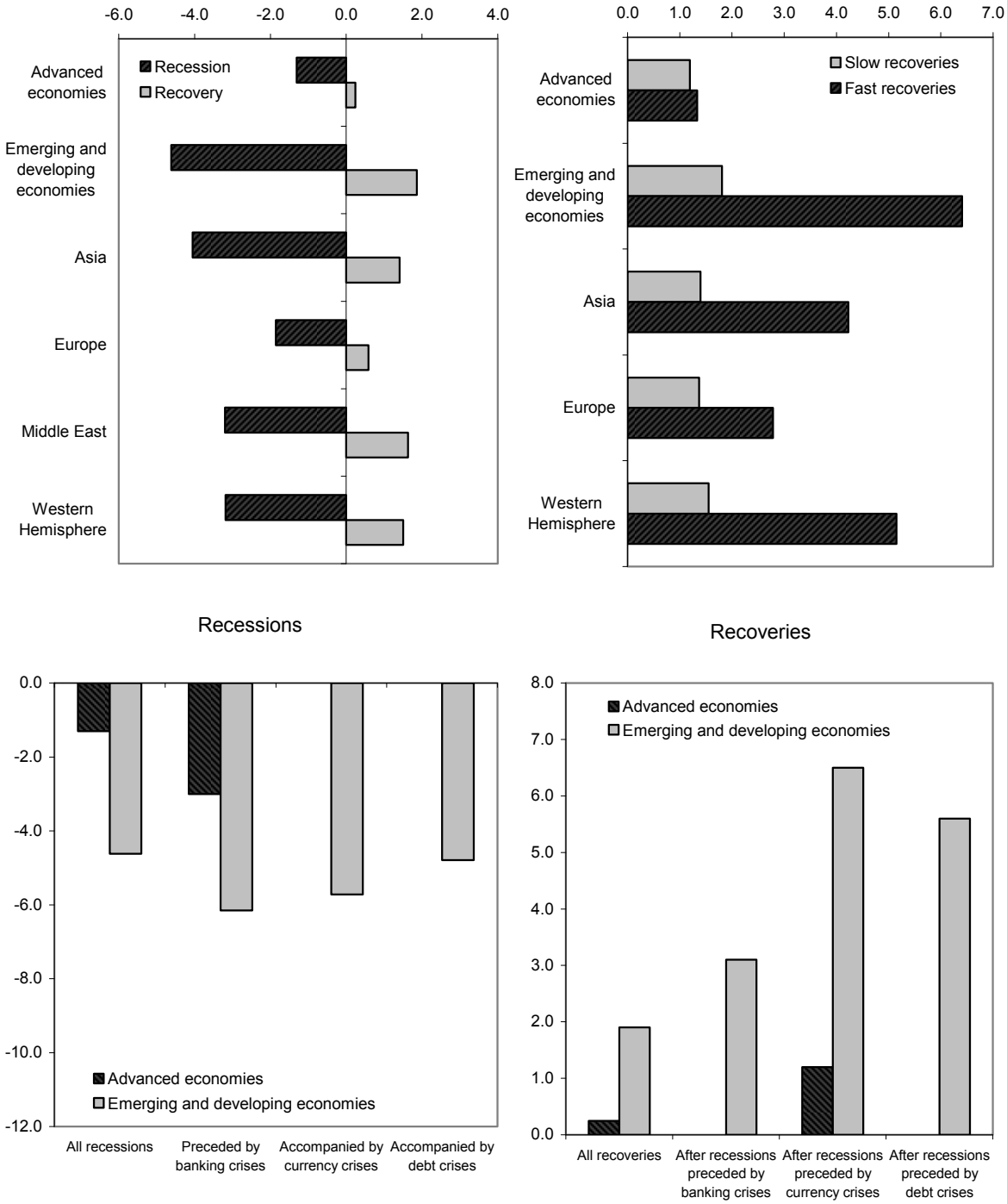
Source: Authors' estimates.

Figure 5. Distributions of Real GDP Growth, Emerging and Developing Economies, 1989–2008



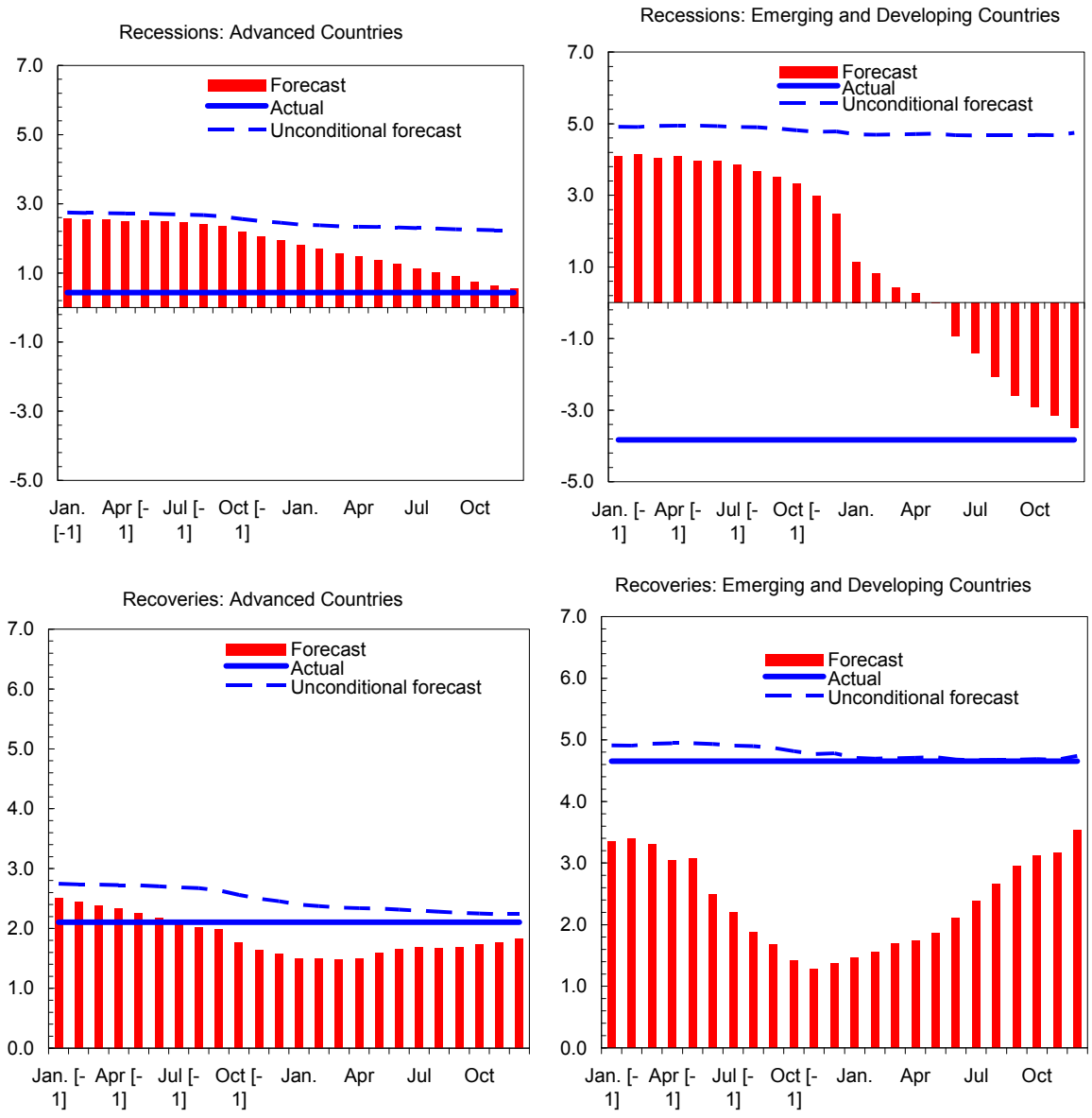
Source: Authors' estimates.

Figure 6. Forecast Errors for Recession and Recovery Episodes, 1989–2008
(In percent)



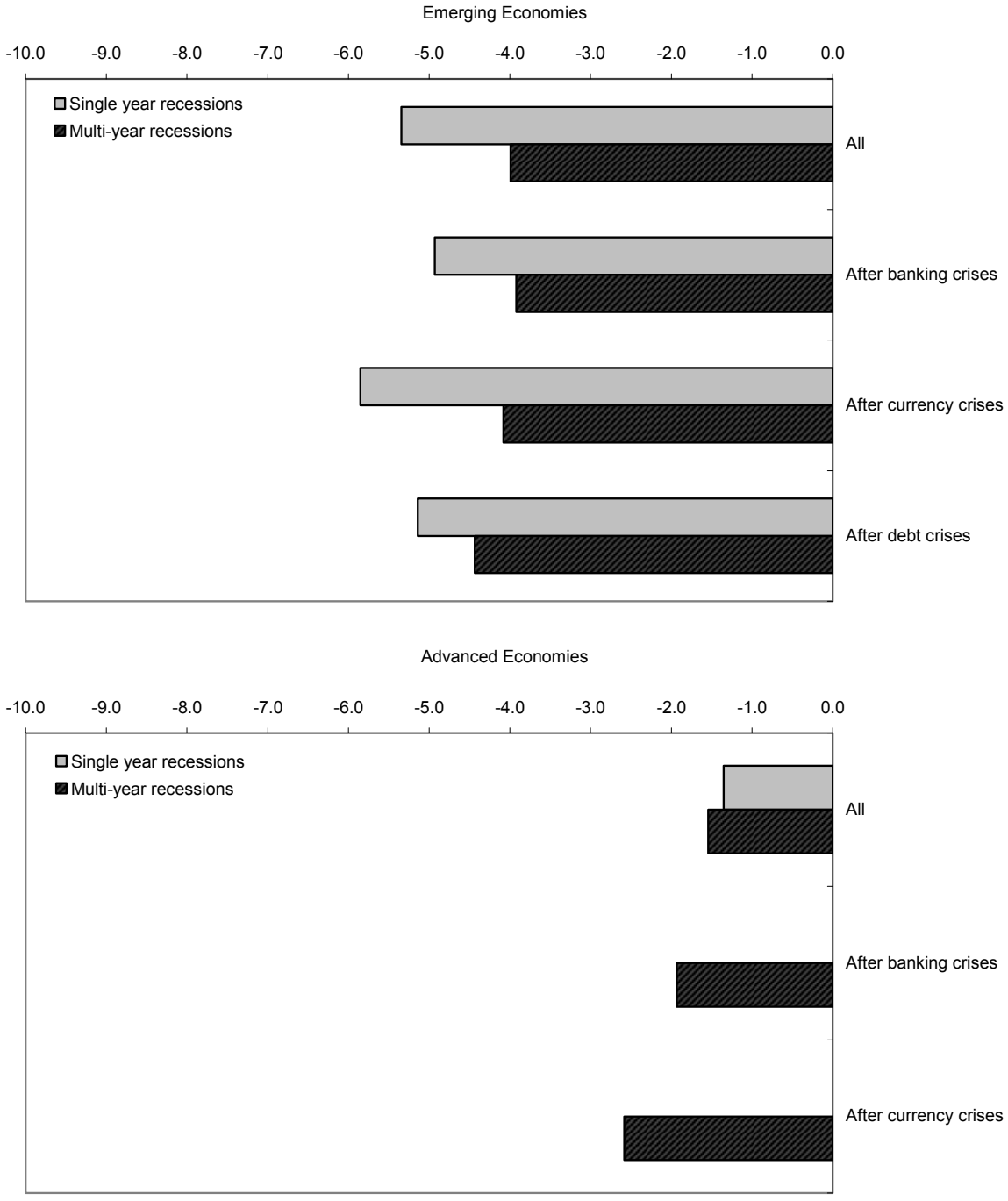
Source: Authors' estimates.
Note: "Accompanied" means that a crisis occurred the same year. "Preceded" means that it took place the previous year.

Figure 7. Actual and Forecasted Real GDP Growth during Recessions and Recoveries



Source: Authors' estimates.

Figure 8. Forecast Errors for Post-Crisis Recessions, 1989–2008
(In percent)



Source: Authors' estimates.

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APPENDIX I. DESCRIPTION OF SAMPLE

Appendix Table 1. List of Countries and Recession, Recovery and Crisis Episodes

Country name	Region	Starting date	Banking crisis	Currency crisis	Debt crisis	Recession	Recovery
				Advanced economies			
AUSTRALIA*	Asia	Jan-90				1990-91, 2008	1992
AUSTRIA*	Europe	Nov-89				1992-93, 2001, 2008	1994, 2002
BELGIUM*	Europe	Nov-89	2008			1992-93, 2001-2003, 2008	1994, 2004
CANADA*	Western Hemisphere	Oct-89				1990-91, 2008	1992
DENMARK*	Europe	Nov-89				1992-93, 1997, 2006-08	1994, 1998
FINLAND*	Europe	Nov-89	1991	1993		1990-93, 2001, 2008	1994, 2002
FRANCE*	Europe	Oct-89				1992-93, 2002-03, 2008	1994, 2004
GERMANY*	Europe	Oct-89				1992-93, 1995-96, 2002-04, 2008	1994, 1997, 2005
GREECE*	Europe	Jun-93		1993		1993-95, 2008	1996
IRELAND*	Europe	Nov-89	2008			2001, 2008	2002
ISRAEL*	Europe	Jan-95				2001-02	2003
ITALY*	Europe	Oct-89				1992-93, 1996, 2001, 2003-05, 2008	1994, 1997, 2002, 2006
JAPAN*	Asia	Oct-89	1997			1993, 1997-99, 2001, 2008	1994, 2000, 2002
NETHERLANDS*	Europe	Nov-89	2008			2008	
NEW ZEALAND*	Asia	Nov-89				1991, 1997-98, 2008	1992, 1999
NORWAY*	Europe	Nov-89				2002-03, 2008	2004
PORTUGAL*	Europe	Nov-89				1992-93, 2002, 2008	1994, 2003
SPAIN*	Europe	Nov-89				1992-93, 2008	1994
SWEDEN*	Europe	Nov-89	1991	1993		1990-93, 2008	1994
SWITZERLAND*	Europe	Nov-89				1990-93, 1996, 1998-99, 2001-03, 2008	1994, 1997, 2000, 2004
UNITED STATES*	Western Hemisphere	Oct-89	2007, 2008			1990-91, 2001, 2008	1992, 2002
UNITED KINGDOM*	Europe	Oct-89	2007, 2008			1990-91, 2008	1992
Number of countries or episodes		22	5	3	0	61	40

Sources: International Financial Statistics, Claessens, Kose and Terrones (2008), Laeven and Valencia (2008), and authors' estimates.

Notes: The classification of countries into advanced, emerging and developing is aligned with Consensus Forecasts publications. Countries for which the dating of recession and recovery episodes is based on quarterly data are marked with an asterisk. Only crises during the time period for which consensus forecasts are available are reported.

Appendix Table 1. List of Countries and Recession, Recovery and Crisis Episodes, continued

Country name		Starting date	Banking crisis	Currency crisis	Debt crisis	Recession	Recovery
			Emerging and developing economies				
ALBANIA	Europe	May-07					
ARGENTINA*	Western Hemisphere	Mar-93	1995, 2001	2002	2001	1995, 1999-2002	1996, 2003
ARMENIA	Middle East	May-07					
AZERBAIJAN	Middle East	May-98					
BANGLADESH	Asia	Dec-94					
BELARUS*	Europe	May-98		1999			
BOLIVIA	Western Hemisphere	Mar-93	1994				
BRAZIL*	Western Hemisphere	Nov-89	1990, 1994	1992, 1999		1990, 1992, 1998-1999	1991, 1993, 2000
BULGARIA	Europe	Jan-95	1996	1996		1996-97	1998
CHILE*	Western Hemisphere	Mar-93				1999	2000
CHINA*	Asia	Dec-94	1998				
COLOMBIA*	Western Hemisphere	Mar-93	1998			1999	2000
COSTA RICA	Western Hemisphere	Mar-93	1994			1996	1997
CROATIA*	Europe	May-98	1998			1998-99	2000
CZECH REPUBLIC*	Europe	Jan-95	1996			1998-99	2000
DOMINICAN REPUBLIC*	Western Hemisphere	Mar-93	2003	2003	2003	2001, 2003	2002, 2004
ECUADOR	Western Hemisphere	Mar-93	1998	1999	1999	1999	2000
EGYPT	Middle East	Jan-95					
ESTONIA*	Europe	May-98				1999, 2008	2000
GEORGIA	Middle East	May-07					
HONG KONG*	Asia	Nov-90				1998	1999
HUNGARY*	Europe	Nov-90	1991			1990-93	1994
INDIA*	Asia	Dec-94	1993				
INDONESIA*	Asia	Nov-90	1997	1998	1999	1998	1999
KAZAKHSTAN	Middle East	May-98	2008	1999			
LATVIA*	Europe	May-98				2008	
LITHUANIA*	Europe	May-98				1999	2000
MACEDONIA	Europe	May-07					

Sources: International Financial Statistics, Claessens, Kose and Terrones (2008), Laeven and Valencia (2008), and authors' estimates.

Notes: The classification of countries into advanced, emerging and developing is aligned with Consensus Forecasts publications. Countries for which the dating of recession and recovery episodes is based on quarterly data are marked with an asterisk. Only crises during the time period for which consensus forecasts are available are reported.

Appendix Table 1. List of Countries and Recession, Recovery and Crisis Episodes, continued

Country name		Starting date	Banking crisis	Currency crisis	Debt crisis	Recession	Recovery
			Emerging and developing economies				
ALBANIA	Europe	May-07					
ARGENTINA*	Western Hemisphere	Mar-93	1995, 2001	2002	2001	1995, 1999-2002	1996, 2003
ARMENIA	Middle East	May-07					
AZERBAIJAN	Middle East	May-98					
BANGLADESH	Asia	Dec-94					
BELARUS*	Europe	May-98		1999			
BOLIVIA	Western Hemisphere	Mar-93	1994				
BRAZIL*	Western Hemisphere	Nov-89	1990, 1994	1992, 1999		1990, 1992, 1998-1999	1991, 1993, 2000
BULGARIA	Europe	Jan-95	1996	1996		1996-97	1998
CHILE*	Western Hemisphere	Mar-93				1999	2000
CHINA*	Asia	Dec-94	1998				
COLOMBIA*	Western Hemisphere	Mar-93	1998			1999	2000
COSTA RICA	Western Hemisphere	Mar-93	1994			1996	1997
CROATIA*	Europe	May-98	1998			1998-99	2000
CZECH REPUBLIC*	Europe	Jan-95	1996			1998-99	2000
DOMINICAN REPUBLIC*	Western Hemisphere	Mar-93	2003	2003	2003	2001, 2003	2002, 2004
ECUADOR	Western Hemisphere	Mar-93	1998	1999	1999	1999	2000
EGYPT	Middle East	Jan-95					
ESTONIA*	Europe	May-98				1999, 2008	2000
GEORGIA	Middle East	May-07					
HONG KONG*	Asia	Nov-90				1998	1999
HUNGARY*	Europe	Nov-90	1991			1990-93	1994
INDIA*	Asia	Dec-94	1993				
INDONESIA*	Asia	Nov-90	1997	1998	1999	1998	1999
KAZAKHSTAN	Middle East	May-98	2008	1999			
LATVIA*	Europe	May-98				2008	
LITHUANIA*	Europe	May-98				1999	2000
MACEDONIA	Europe	May-07					

Sources: International Financial Statistics, Claessens, Kose and Terrones (2008), Laeven and Valencia (2008), and authors' estimates.

Notes: The classification of countries into advanced, emerging and developing is aligned with Consensus Forecasts publications. Countries for which the dating of recession and recovery episodes is based on quarterly data are marked with an asterisk. Only crises during the time period for which consensus forecasts are available are reported.

Appendix Table 1. List of Countries and Recession, Recovery and Crisis Episodes, continued

Country name		Starting date	Banking crisis	Currency crisis	Debt crisis	Recession	Recovery
MALAYSIA*	Asia	Nov-90	1997	1998		1998	1999
MEXICO*	Western Hemisphere	Nov-89	1994	1995		1995, 2001	1996, 2002
MOLDOVA	Europe	May-07					
NIGERIA	Africa	Jan-99					
PAKISTAN	Middle East	Dec-94					
PANAMA	Western Hemisphere	Mar-93					
PARAGUAY	Western Hemisphere	Mar-93	1995	2002		2000, 2002	2001, 2003
PERU*	Western Hemisphere	Mar-93				2001	2002
PHILIPPINES*	Asia	Dec-94	1997	1998		1998	1999
POLAND*	Europe	Nov-90	1992			1990-91	1992
ROMANIA	Europe	Jan-95		1996		1997-1998	1999
REPUBLIC OF KOREA*	Asia	Nov-89	1997	1998		1998	1999
RUSSIA*	Europe	Jan-95	1998	1998	1998	1995-96, 1998	1997, 1999
SAUDI ARABIA	Middle East	Jan-95				1995, 1999	1996, 2000
SINGAPORE*	Asia	Nov-90				2001, 2008	2002
SLOVAK REPUBLIC*	Europe	Jan-95	1998				
SLOVENIA*	Europe	Jan-95					
SOUTH AFRICA*	Africa	Jun-93					
SRI LANKA	Asia	Dec-94				2001, 2008	2002
TAIWAN*	Asia	Nov-89				2001, 2008	2002
THAILAND*	Asia	Nov-90	1997	1998		1997-98	1999
TURKEY*	Europe	Jan-95	2000	1996, 2001		1999, 2001	2000, 2002
TURKMENISTAN	Middle East	May-07					
UKRAINE	Europe	Jan-95	1998	1998	1998	1995-99	2000
URUGUAY	Western Hemisphere	Mar-93	2002	2002	2002	1995, 1999-2002	1996, 2003
UZBEKISTAN	Middle East	May-98		2000			
VENEZUELA*	Western Hemisphere	Mar-93	1994	1994, 2002		1993-94, 1996, 1998-99, 2002-03	1995, 1997, 2000, 2004
VIETNAM*	Asia	Dec-94	1997				
Number of countries or episodes		56	26	26	6	45	38

Sources: International Financial Statistics, Claessens, Kose and Terrones (2008), Laeven and Valencia (2008), and authors' estimates.

Notes: The classification of countries into advanced, emerging and developing is aligned with Consensus Forecasts publications. Countries for which the dating of recession and recovery episodes is based on quarterly data are marked with an asterisk. Only crises during the time period for which consensus forecasts are available are reported.

Appendix Table 2. Frequency of Data

Country	Start Date of Bi-monthly Data	Start Date of Monthly Data	Second Start of Monthly Data If Data Frequency Was Changed From Monthly to Bi-monthly to Monthly
ALBANIA	.	2007m5	.
ARGENTINA	1993m3	2001m8	.
ARMENIA	.	2007m5	.
AUSTRALIA	.	1990m1	.
AUSTRIA	.	1989m11	.
AZERBAIJAN	1998m5	2007m5	.
BANGLADESH	.	1994m12	.
BELARUS	1998m5	2007m5	.
BELGIUM	.	1989m11	.
BOLIVIA	1993m3	2001m8	.
BRAZIL	1993m6	1989m11	2001m8
BULGARIA	1998m6	1995m1	2007m5
CANADA	.	1989m10	.
CHILE	1993m3	2001m8	.
CHINA	.	1994m12	.
COLOMBIA	1993m3	2001m8	.
COSTA RICA	1993m3	2001m8	.
CROATIA	1998m5	2007m5	.
CZECH REPUBLIC	1998m6	1995m1	2007m5
DENMARK	.	1989m11	.
DOMINICAN REPUBLIC	1993m3	2001m8	.
ECUADOR	1993m3	2001m8	.
EGYPT	.	1995m1	.
ESTONIA	1998m5	2007m5	.
FINLAND	.	1989m11	.
FRANCE	.	1989m10	.
GEORGIA	.	2007m5	.
GERMANY	.	1989m10	.
GREECE	.	1993m6	.
HONG KONG	.	1990m11	.
HUNGARY	1998m6	1990m11	2007m5
INDIA	.	1994m12	.
INDONESIA	.	1990m11	.
IRELAND	.	1989m11	.
ISRAEL	.	1995m1	.
ITALY	.	1989m10	.
JAPAN	.	1989m10	.

Appendix Table 2. Classification of Countries, continued

Country	Start Date of Bi-monthly Data	Start Date of Monthly Data	Second Start of Monthly Data If Data Frequency Was Changed From Monthly to Bi-monthly to Monthly
KAZAKHSTAN	1998m5	2007m5	.
LATVIA	1998m5	2007m5	.
LITHUANIA	1998m5	2007m5	.
MACEDONIA	2007m7	2007m5	2007m10
MALAYSIA	.	1990m11	.
MEXICO	1993m6	1989m11	2001m8
MOLDOVA	.	2007m5	.
NETHERLANDS	.	1989m11	.
NEW ZEALAND	.	1989m11	.
NIGERIA	.	1999m1	.
NORWAY	.	1989m11	.
PAKISTAN	.	1994m12	.
PANAMA	1993m3	2001m8	.
PARAGUAY	1993m3	2001m8	.
PERU	1993m3	2001m8	.
PHILIPPINES	.	1994m12	.
POLAND	1998m6	1990m11	2007m5
PORTUGAL	.	1989m11	.
REPUBLIC OF KOREA	1998m6	1995m1	2007m5
ROMANIA	1998m6	1995m1	2007m5
RUSSIA	.	1995m1	.
SAUDI ARABIA	.	1990m11	.
SINGAPORE	1998m6	1995m1	2007m5
SLOVAKIA	1998m6	1995m1	2007m5
SLOVENIA	.	1993m6	.
SOUTH AFRICA	.	1989m11	.
SPAIN	.	1989m11	.
SRI LANKA	.	1994m12	.
SWEDEN	.	1989m11	.
SWITZERLAND	.	1989m11	.
TAIWAN	.	1989m11	.
THAILAND	.	1990m11	.
TURKEY	1998m6	1995m1	2007m5
TURKMENISTAN	.	2007m5	.
U.S.A.	.	1989m10	.
UKRAINE	1998m6	1995m1	2007m5
UNITED KINGDOM	.	1989m10	.
URUGUAY	1993m3	2001m8	.
UZBEKISTAN	1998m5	2007m5	.
VENEZUELA	1993m3	2001m8	.
VIETNAM	.	1994m12	.

Source: Authors' estimates.