

ASIAN DEVELOPMENT OUTLOOK FORECAST ACCURACY 2007–2016

Benno Ferrarini

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Asian Development Outlook Forecast Accuracy 2007–2016

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ABSTRACT

This paper assesses the accuracy of Asian Development Outlook growth and inflation forecasts for 43 Asian economies from 2007 to 2016, against the benchmark of World Economic Outlook projections by the International Monetary Fund. They are found to overlap quite closely, notwithstanding much heterogeneity across countries and years. Forecast accuracy sharpens over time as additional data and evidence become available and get incorporated during quarterly revisions. However, errors widen during crisis years as forecasters struggle to reflect such events in their projections.

Keywords: Asian Development Bank, Asian Development Outlook, International Monetary Fund, macroeconomic forecasts, World Economic Outlook

JEL codes: E17, E37

I. INTRODUCTION

Macroeconomic forecasts are not in short supply. Public bodies, both national and international, as well as investment banks and other private institutions, feed a stream of projections anticipating economies' growth performance, price inflation, and other variables for the years ahead. They meet a demand not only from investors, but also from policymakers and institutional bodies eager to sort out authentic information from noise and vested interest.

Absent genuine prescience, and the past being an unreliable guide to the future, forecasts are prone to errors. Forecasting models, however sophisticated, do not work particularly well, or not at all when large shocks occur. Inaccuracy being a given, it does not receive much consideration and hardly ever gets systematically assessed. Continuously sorting through the latest data and leading indicators, and with eyes on the future, forecasters rarely look back on their performance. To fill this gap, an earlier paper focused on Asian Development Bank's (ADB) macroeconomic forecasts from 2008 to 2011 (Ferrarini 2014). It found that the global economic crisis and heightened uncertainty posed a special challenge for forecasters during these years, leading to exceptionally wide errors.

This paper updates and expands earlier analysis in several aspects. The time horizon is broadened from 4 years to 10, with data now spanning the period 2007–2016 and the full set of 40 Asian Development Outlook (ADO) and World Economic Outlook (WEO) reports produced over that time by ADB and the International Monetary Fund (IMF). The data set is expanded to cover 43 ADB developing member countries (DMCs)—up from 33 previously—and also added are the G3 economies, comprising the euro area, Japan, and the United States. The methodology is updated to compute actual growth and inflation rates, as well as optimism bias estimates. Finally, inconsistencies affecting the earlier data have been identified and removed.

II. FORECAST ERRORS AND MEASURES OF ACCURACY

The comparative accuracy assessment method in this paper builds on Ferrarini (2014). ADO and WEO forecast errors, e_n , are defined as difference vectors:

$$e_n = x_n - f_n \quad (1)$$

where x_n is a vector of observations across countries c and years t , and f_n is a vector of forecasts. Together, the total number of observations sums over n , such that $\sum_n = \sum_c \sum_t$. Forecasts smaller than actual outcomes reflect in positive errors, and projections larger than observed values result in negative values of e_n .

For an average measure across n forecasts, errors are taken at absolute value $|e_n|$ and averaged. The mean absolute error (MAE) is then computed as

$$mae_n = \frac{1}{N} \sum_n |e_n| \quad (2)$$

and the root mean squared error (RMSE) as

$$rmse_n = \sqrt{mse_n} = \sqrt{\frac{1}{N} \sum_n e_n^2} \quad (3)$$

The MAE implies equal weights of single items, and its interpretation is straightforward. The mean squared error assigns a relatively higher weight to larger errors, thus punishing forecasts where they occur more frequently. This makes it more sensitive to outliers compared to the MAE. However, in this analysis, the two measures are found to be yielding qualitatively similar results.

To evaluate comparative forecast accuracy, Brier scores are computed similar to those applied for meteorological forecast assessments (Brier 1950). Ex ante, Brier scores are typically derived from probability estimates in relation to actual outcomes. Ex post, when forecast errors from alternative methods or approaches are known, a Brier score can be obtained as an errors' ratio. In the context of this analysis, the Brier score, bs_n , derives from the ratio of ADO over WEO mean squared errors, which detracts from 1:

$$bs_n = 1 - \frac{mse_n^{ADO}}{mse_n^{WEO}}, \quad -\infty < bs_n \leq 1. \quad (4)$$

The Brier score thus defined ranges from negative infinity to 1, with the following interpretation:

$bs_n = 1 \Rightarrow$ denotes perfect ADO forecast accuracy, i.e. $mse_n^{ADO} = 0$,

$bs_n > 0 \Rightarrow$ ADO outperforms WEO, i.e. $mse_n^{ADO} < mse_n^{WEO}$,

$bs_n < 0 \Rightarrow$ WEO outperforms ADO, i.e. $mse_n^{ADO} > mse_n^{WEO}$, and

$bs_n = 0 \Rightarrow$ identical accuracy, i.e. $mse_n^{ADO} = mse_n^{WEO}$.

In addition to gauging relative sizes of errors with the Brier score, a count score is computed, cs_n , as the relative number of instances in which ADO estimates or forecasts are more accurate than those in WEO. Specifically, the count score is expressed as:

$$cs_n = \frac{1}{N} \sum_n s_n, \quad -1 \leq cs_n \leq 1 \quad (5)$$

and ranges from -1 to 1. It sums across all the individual forecast scores, s_n , which themselves take values -1, 0, or 1 according to the comparative size of the ADO and WEO absolute forecast errors:

$s_n = 1$ if $|e_n|^{ADO} < |e_n|^{WEO}$,

$s_n = -1$ if $|e_n|^{ADO} > |e_n|^{WEO}$, and

$s_n = 0$ if $|e_n|^{ADO} = |e_n|^{WEO}$.

The count score takes the extreme value -1 if $|e_n|^{ADO} > |e_n|^{WEO} \forall n \in 1 \dots N$. At the opposite extreme, the score will be 1 if ADO errors are smaller than those in WEO for each of the economies

and years in the sample. More generally, ADO is taken to outperform WEO if $c s_n > 0$, and the opposite is true when $c s_n < 0$.

To capture the presence of optimism bias in the forecasts, they are assessed for negative skewness. Also computed are mean errors, $m e_n$, across countries and years:

$$m e_n = \frac{1}{N} \sum_n e_n, \quad -\infty \leq m e_n \leq \infty \quad (6)$$

Optimism bias is present when $m e_n < 0$, while a prevalence of forecasts lower than actual outcomes—or a more pessimistic stance, so to say—will be reflected in $m e_n > 0$.

Another measure of optimism bias is the share of incidences in each report of negative forecast errors across countries and years:

$$c o_n = \frac{1}{N-q} \sum_n o_n, \quad (\text{pessimistic}) \ 0 \leq c o_n \leq 1 \ (\text{optimistic}), \quad (7)$$

where:

$$o_n = 1 \ \text{if} \ e_n < 0 \ \text{and} \ o_n = 0, \ q = 1 \ \text{if} \ e_n \geq 0.$$

III. THE DATA: ASIAN DEVELOPMENT OUTLOOK AND WORLD ECONOMIC OUTLOOK GROWTH AND INFLATION FORECASTS

The ADO and WEO main reports are released in April each year. Later, in September each year, both institutions issue update reports on their latest data and projections. For short, this paper will refer to the main reports as ADO and WEO, and to their updates as ADOU and WEOU, or simply as updates.

Reflecting its regional area of competence, ADB releases macroeconomic forecasts and analyses for its DMCs, comprising 45 economies in Asia and the Pacific. ADO reports also include an economic outlook on G3 economies—the euro area, Japan, and the United States—which impacts the Asian economies through strong trade and investment links. By contrast, the WEO reports have a nearly global coverage, including ADB’s DMCs.

The assessment of comparative forecast accuracy focuses on economies covered in both the ADO and WEO main reports and updates over the decade spanning from 2007 to 2016.¹ The data set comprises 43 Asian economies with gross domestic product (GDP) growth and Consumer Price Index (CPI) inflation projections available for each year and from each of the four reports included. For ease of exposition, this data will henceforth be referred to set as Asia-43 and to the growth and inflation projections as “estimates” or “current-year” when they refer to the same year, and to “forecasts” or “year-ahead” when they concern the year to follow. Table 1 lists these economies’ three-letter codes and names, and indicates the years for which a full set of data is available. For 33 economies, data availability spans the entire decade of observation. For the remaining economies, especially in the Pacific, some years are missing.

¹ Actually, the analysis also includes reports released in 2006 as a source of year-ahead forecasts for 2007. This allows the data set to span over an entire decade, from 2007 to 2016.

Table 1: Economies and Years with Growth and Inflation Data Available in All the Reports

Code	Name	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
AFG	Afghanistan	1	1	1	1	1	1	1	1	1	1
ARM	Armenia	1	1	1	1	1	1	1	1	1	1
AZE	Azerbaijan	1	1	1	1	1	1	1	1	1	1
BAN	Bangladesh	1	1	1	1	1	1	1	1	1	1
BRU	Brunei Darussalam				1	1	1	1	1	1	1
BHU	Bhutan	1	1	1	1	1	1	1	1	1	1
PRC	People's Republic of China ^a	1	1	1	1	1	1	1	1	1	1
FIJ	Fiji	1	1	1	1	1	1	1	1	1	1
FSM	Federated States of Micronesia								1	1	1
GEO	Georgia				1	1	1	1	1	1	1
HKG	Hong Kong, China ^a	1	1	1	1	1	1	1	1	1	1
INO	Indonesia ^a	1	1	1	1	1	1	1	1	1	1
IND	India ^a	1	1	1	1	1	1	1	1	1	1
KAZ	Kazakhstan	1	1	1	1	1	1	1	1	1	1
KGZ	Kyrgyz Republic	1	1	1	1	1	1	1	1	1	1
CAM	Cambodia	1	1	1	1	1	1	1	1	1	1
KIR	Kiribati			1	1	1	1	1	1	1	1
KOR	Republic of Korea ^a	1	1	1	1	1	1	1	1	1	1
LAO	Lao People's Democratic Republic	1	1	1	1	1	1	1	1	1	1
SRI	Sri Lanka	1	1	1	1	1	1	1	1	1	1
MLD	Maldives	1	1	1	1	1	1	1	1	1	1
RMI	Marshall Islands								1	1	1
MYA	Myanmar					1	1	1	1	1	1
MO	Mongolia	1	1	1	1	1	1	1	1	1	1
N											
MAL	Malaysia ^a	1	1	1	1	1	1	1	1	1	1
NEP	Nepal	1	1	1	1	1	1	1	1	1	1
PAK	Pakistan	1	1	1	1	1	1	1	1	1	1
PHI	Philippines ^a	1	1	1	1	1	1	1	1	1	1
PAL	Palau									1	1
PNG	Papua New Guinea	1	1	1	1	1	1	1	1	1	1
SIN	Singapore ^a	1	1	1	1	1	1	1	1	1	1
SOL	Solomon Islands	1	1	1	1	1	1	1	1	1	1
THA	Thailand ^a	1	1	1	1	1	1	1	1	1	1
TAJ	Tajikistan	1	1	1	1	1	1	1	1	1	1
TKM	Turkmenistan		1	1	1	1	1	1	1	1	1
TIM	Timor-Leste		1	1	1	1	1	1	1	1	1
TON	Tonga	1	1	1	1	1	1	1	1	1	1
TUV	Tuvalu						1	1	1	1	1
TAP	Taipei, China ^a	1	1	1	1	1	1	1	1	1	1
UZB	Uzbekistan	1	1	1	1	1	1	1	1	1	1
VIE	Viet Nam ^a	1	1	1	1	1	1	1	1	1	1
VAN	Vanuatu	1	1	1	1	1	1	1	1	1	1
SAM	Samoa		1	1	1	1	1	1	1	1	1

^aIncluded in the Asia-11 subgroup of economies.

Source: Author.

Table 2: 2010 Growth and Inflation Data Sourcing Example

	2010 Forecasts (year ahead)	2010 Estimates (current year)	2010 Observations (previous year)
ADO/WEO	2009	2010	2011
ADOU/WEOU	2009	2010	2011
Computed:	as is	as is	ADOU/WEOU average

ADO = Asian Development Outlook, ADou = Asian Development Outlook Update, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
Source: Author.

Table 2 illustrates how the data was sourced and sorted. For example, in relation to 2010 growth and inflation, the ADO and WEO reports released in April 2009 featured the earliest available set of forecasts, which later got revised in the September 2009 ADou and WEOU reports, and then again in the April 2010 main and the September 2010 update reports as current-year estimates. Altogether, there are four projections in relation to 2010 variables. These are followed by a first, preliminary, gauge of 2010 growth and inflation, available in the 2011 spring reports, and later revised measures in the fall update reports, on the basis of more consolidated evidence and data.

Occasionally, ADou and WEOU growth and inflation consolidated statistics may differ slightly. For a common reference of actual data against which to measure the distance of projections, average ADou and WEOU figures are computed from the reports released in the year immediately following the projections. This departs from Ferrarini (2014), which used the latest GDP and inflation series available at the time of writing. However, if official estimates of past GDP and inflation get revised substantially over time, using their latest updates unduly affects accuracy measures because of factors unrelated to the evidence available at the time when forecasts were made.

Besides the Asia-43 group of economies, average forecast errors and accuracy scores are computed across a smaller sample of 11 key economies in the region: Hong Kong, China; India; Indonesia; Malaysia; the People's Republic of China (PRC); the Philippines; the Republic of Korea; Singapore; Taipei, China; Thailand; and Viet Nam. The Asia-11 aggregate allows for a more focused set of measures, without the clutter and volatility associated with the highly heterogeneous group of Asia-43 economies, which also includes the Pacific island economies. Moreover, each of the 11 economies has a full set of data available for the entire period of analysis, so that the Asia-11 sample can be suitably split into two equally spaced 5-year periods. This allows for investigation of any substantial difference in forecast performance in the two periods, one spanning from 2007 to 2011 and including the crisis years, and another from 2012 to 2016, comprising much of the postcrisis recovery.

Besides the data extracted from the regular ADO and WEO main and update reports, another data set is created to include a subsample of ADO data only, to which are added growth and inflation projections from the ADO Supplements (ADOS). Starting 2012, these forecasts have been released in July and December every year, to integrate ADO and ADou projections with quarterly updates. This will allow control for the absorption of information that becomes progressively available throughout the year, and its effects in terms of sharper forecasts as time closes in. Four projections made 1 year ahead plus four updates in the current year bring to eight the total number of projections corresponding to each growth and inflation data point in this data set.

An additional data set includes the euro area, Japan, and the United States. ADO features GDP growth and inflation forecasts for the G3 economies as a group, and also growth projections for the euro area, Japan, and the United States individually. However, disaggregate inflation forecasts are not available, and the analysis is limited to growth projections.

IV. ASIAN DEVELOPMENT OUTLOOK COMPARATIVE FORECAST ACCURACY

The core findings from comparative measures of forecast accuracy computed across the Asia-43, Asia-11, and G3 data sets are organized as charts and tables by economy groupings and variables. Figure 1 shows average GDP growth forecast errors and scores across Asia-43 economies and years. Figure 2 shows the same for Asia-43 inflation. Figure 3 and Figure 4 feature similar sets of charts on Asia-11, and Figure 5 and Figure 6 on the G3 economies.

The more finely disaggregated tabulations and charts are relegated to a number of appendices. Figure A5.1 and Figure A5.2 show yearly averages of errors and scores across the whole of Asia-43. Figures A6.1–A6.4 show period averages for the 43 economies individually. At the finest level of detail, Appendix 7 contains yearly bar charts for selected economies.

For an overview of results, Table 3 summarizes the core statistics by country aggregates and time periods. For each of the four reports, shown are mean average errors and RMSEs, in relation to current-year estimates (MAE0 and RMSE0) and year-ahead forecasts (MAE1 and RMSE1). Also shown are actual growth and inflation averages (Avg) and the coefficient of variation (CoV), to account for the varying degrees of volatility across the aggregates.

A. Asia-43—Gross Domestic Product Growth Forecasts

Both forecasters' growth projections contain large errors on average. For current-year estimates, e.g., 2010 growth projected in 2010, the average error is nearly one-third of average growth (Table 3 and Figure 1). For year-ahead forecasts, e.g., 2010 growth projected in April 2009, it is nearly one-half. For example, an average country growing by 5% in any given year would have been expected to expand by as little as 2.6% or nearly 7.6% instead. Aggregate RMSEs of year-ahead forecasts are even larger, exceeding 3.2 percentage points on average, because of the heavier weights assigned to larger errors.

On average across Asia-43, ADO forecast errors are smaller than those of WEO. This is also the case for ADOU—compared to WEOU—but distances are less pronounced. Brier scores are positive as a result. At less than 0.1, they are negligible for all but ADO versus WEO current-year estimates, which measures 0.16 (Figure 1).² This suggests that ADO and ADOU come out just ahead of WEO and WEOU, but only marginally so.

² The Brier scale has a maximum of 1, which would be reached if ADO forecast errors were either zero or infinitely smaller than WEO errors across all the economies and years.

Table 3: Asia-43 and Asia-11 Average Forecast Errors by Report, Across Countries, and Years
(Percentage points)

Sample	Variable	Report	Current Year		Year Ahead		
			MAEO	RMSEO	MAE1	RMSE1	
Asia-43 2007–2016	GDP	ADO	1.52	2.29	2.29	3.38	
		Avg: 4.97	WEO	1.65	2.50	2.39	3.51
		CoV: 0.77	ADOU	1.08	1.62	2.14	3.21
			WEOU	1.09	1.69	2.14	3.24
	CPI	ADO	2.11	3.39	2.97	4.44	
		Avg: 5.44	WEO	1.82	2.87	2.92	4.45
		CoV: 0.90	ADOU	1.15	1.90	2.90	4.47
			WEOU	0.96	1.49	2.86	4.34
	Asia-11 2007–2016	GDP	ADO	1.25	1.79	2.03	2.88
			Avg: 4.85	WEO	1.31	1.98	2.21
CoV: 0.62			ADOU	0.72	1.12	1.87	2.72
			WEOU	0.63	0.94	1.72	2.49
CPI		ADO	1.06	1.54	1.99	2.93	
		Avg: 3.85	WEO	1.05	1.54	1.92	2.85
		CoV: 0.91	ADOU	0.43	0.78	2.00	3.07
			WEOU	0.47	0.72	1.90	2.82
Asia-11 2007–2011		GDP	ADO	1.66	2.28	2.69	3.69
			Avg: 5.26	WEO	1.82	2.57	3.03
	CoV: 0.70		ADOU	1.04	1.47	2.54	3.51
			WEOU	0.88	1.20	2.30	3.16
	CPI	ADO	1.39	1.99	2.50	3.70	
		Avg: 4.78	WEO	1.23	1.85	2.42	3.60
		CoV: 0.88	ADOU	0.55	1.03	2.70	4.05
			WEOU	0.48	0.68	2.44	3.63
	Asia-11 2012–2016	GDP	ADO	0.85	1.10	1.37	1.73
			Avg: 4.45	WEO	0.80	1.12	1.39
CoV: 0.47			ADOU	0.40	0.58	1.19	1.58
			WEOU	0.38	0.57	1.14	1.56
CPI		ADO	0.74	0.90	1.48	1.87	
		Avg: 2.92	WEO	0.87	1.13	1.43	1.82
		CoV: 0.78	ADOU	0.31	0.42	1.30	1.58
			WEOU	0.46	0.76	1.37	1.66

ADO = Asian Development Outlook, ADou = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, MAE = mean absolute error, RMSE = root mean squared error, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.

Notes: Averages (Avg) and coefficients of variation (CoV) are computed across observed growth and inflation rates. Asia-43 refers to 45 developing member countries of ADB; Cook Islands and Nauru are excluded due to data issues. Asia-11 refers to Hong Kong, China; India; Indonesia; Malaysia; the People's Republic of China; the Philippines; the Republic of Korea; Singapore; Thailand; Taipei, China; and Viet Nam.

Source: Author's calculations.

Table 4: G3 Average Forecast Errors by Report and Periods
(Percentage points)

Period	Variable	Report	Current Year		Year Ahead	
			MAEO	RMSE0	MAE1	RMSE1
2007–2016	GDP	ADO	0.76	1.03	1.51	2.26
	Avg: 0.88	WEO	0.60	0.85	1.51	2.22
	CoV: 2.31	ADOU	0.41	0.59	1.43	2.06
		WEOU	0.36	0.52	1.20	1.76
2007–2011	GDP	ADO	1.07	1.34	2.34	3.05
	Avg: 0.43	WEO	0.75	1.07	2.39	2.99
	CoV: 6.10	ADOU	0.49	0.70	2.17	2.78
		WEOU	0.43	0.62	1.84	2.37
2012–2016	GDP	ADO	0.45	0.57	0.68	0.93
	Avg: 1.33	WEO	0.44	0.57	0.64	0.94
	CoV: 0.81	ADOU	0.32	0.44	0.68	0.87
		WEOU	0.29	0.40	0.55	0.75

ADO = Asian Development Outlook, ADou = Asian Development Outlook Update, GDP = gross domestic product, MEA = mean absolute error, RMSE = root mean squared error, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.

Note: Averages (Avg) and coefficients of variation (CoV) are computed across observed growth and inflation rates.

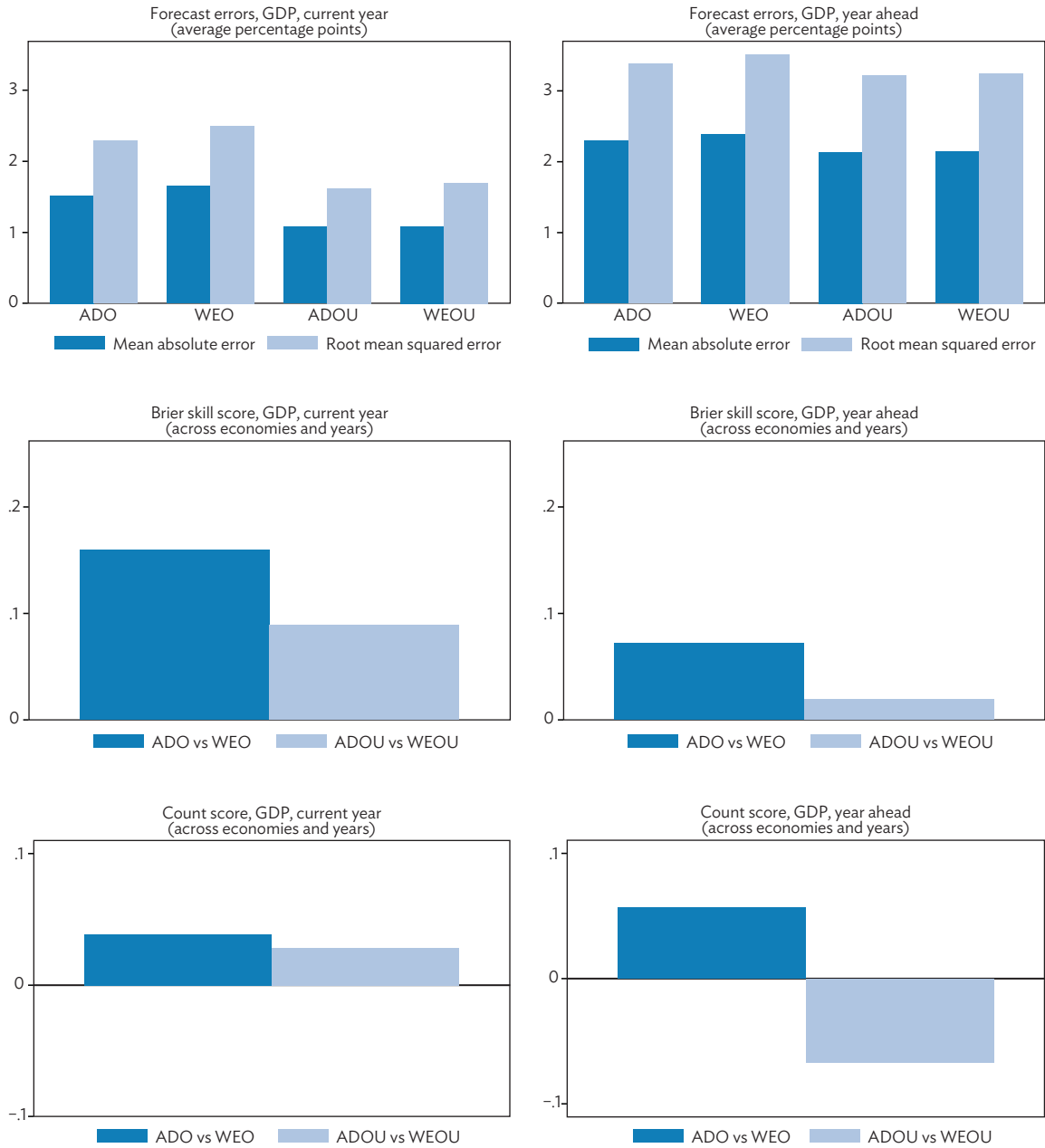
Source: Author's calculations.

ADOU and WEOU projections, released in fall each year, are far more accurate than those of the main reports released earlier, in spring, because both forecasters can access evidence that is more up-to-date and reliable compared to that available half a year earlier. Over a period of revisions spanning 2 years—such as from year-ahead forecasts in ADO 2009, to ADou 2009, on to current-year estimates in ADO 2010 and then to ADou 2010—forecast errors can indeed be seen getting smaller and smaller (Figure 1). This is confirmed by the analysis of quarterly updates of the Asia-11 aggregate, discussed below.

Count scores, shown in the third row of Figure 1, confirm Brier scores, by and large. Again, scores are small and far from reaching the upper boundary of 1, which would entail consistently more accurate ADO forecasts across each of the 43 economies and 10 years of data. Instead, ADO main reports are just slightly ahead of WEO in terms of current and year-ahead forecasts, and ADou has a small lead in relation to current-year estimates. Not so for WEOU, which beats ADou on year-ahead forecasts. Anyway, the differences observed are small, suggesting a fairly close match across the reports.

Appendix 5, Figure A5.1, breaks down GDP forecast errors and scores by years. Charts in the upper half show that errors were larger during the first few years, especially in 2009 and 2010, when the global financial crisis hit Asia. Again, ADO and WEO errors appear to be similar in size, with some exceptions, such as the 2010 year-ahead forecasts, when WEO was farther off target. Any such differences translate into positive or negative values of the Brier and count scores, shown in the bottom charts of Figure A5.1. Even if the balance is slightly in favor of ADO and ADou, particularly with regard to current-year estimates, many years have Brier and count scores in favor of the WEO and WEOU.

Figure 1: Asia-43 Gross Domestic Product Growth Forecast Accuracy, 2007–2016

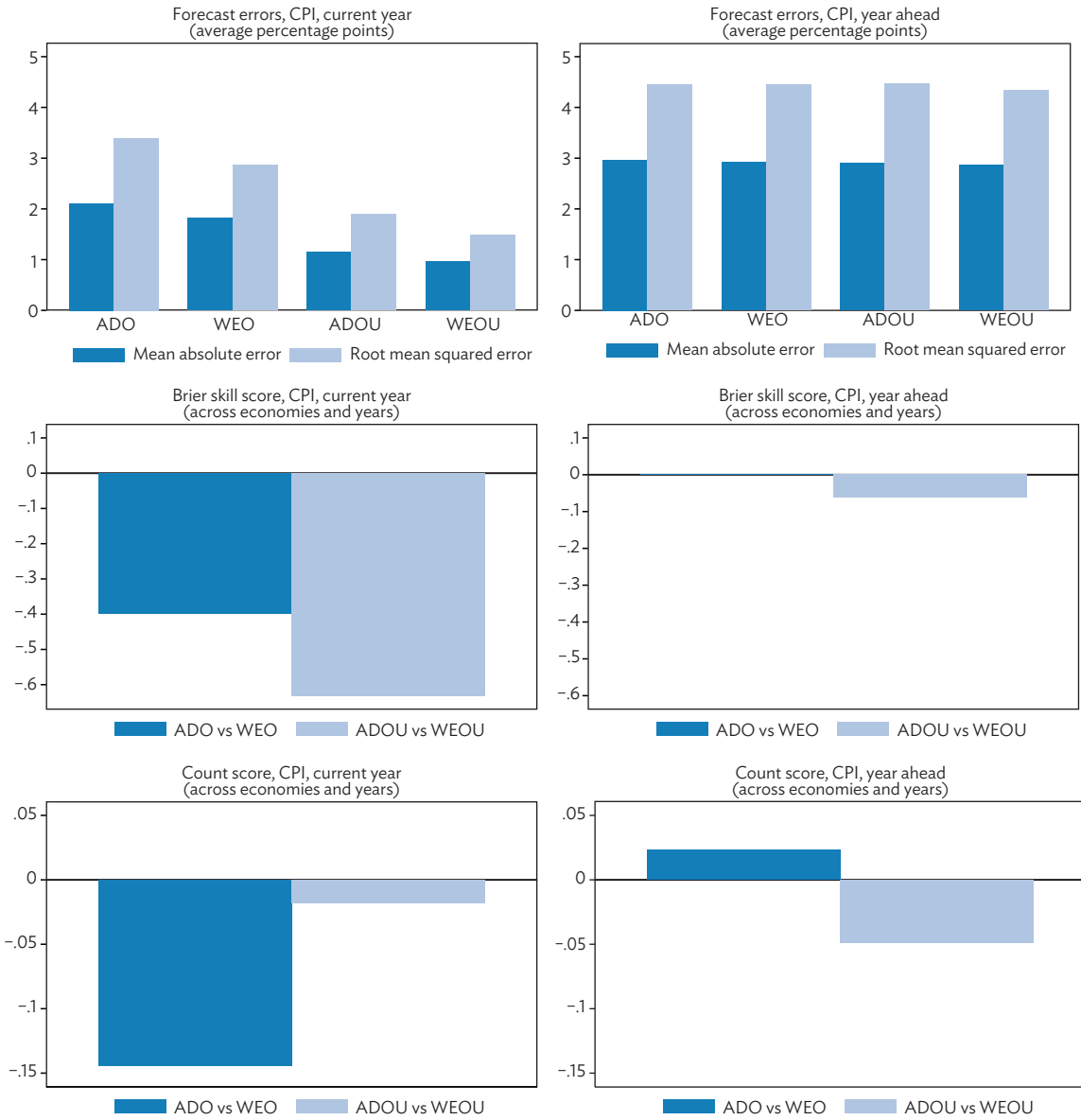


ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, GDP = gross domestic product, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.

Note: Asia-43 refers to 45 developing member countries of ADB; Cook Islands and Nauru are excluded due to data issues.

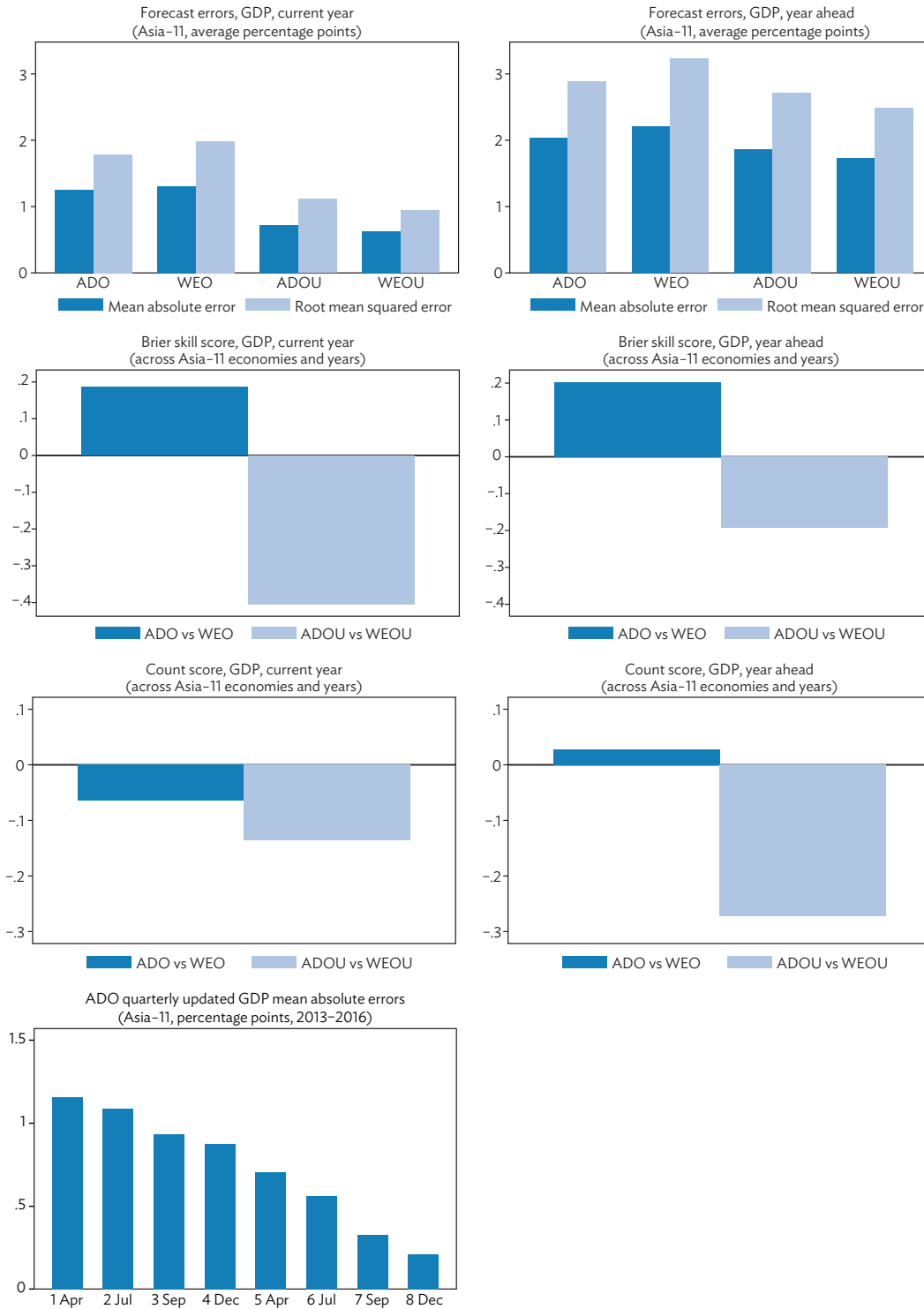
Source: Author's calculations.

Figure 2: Asia-43 Inflation Forecast Accuracy, 2007–2016



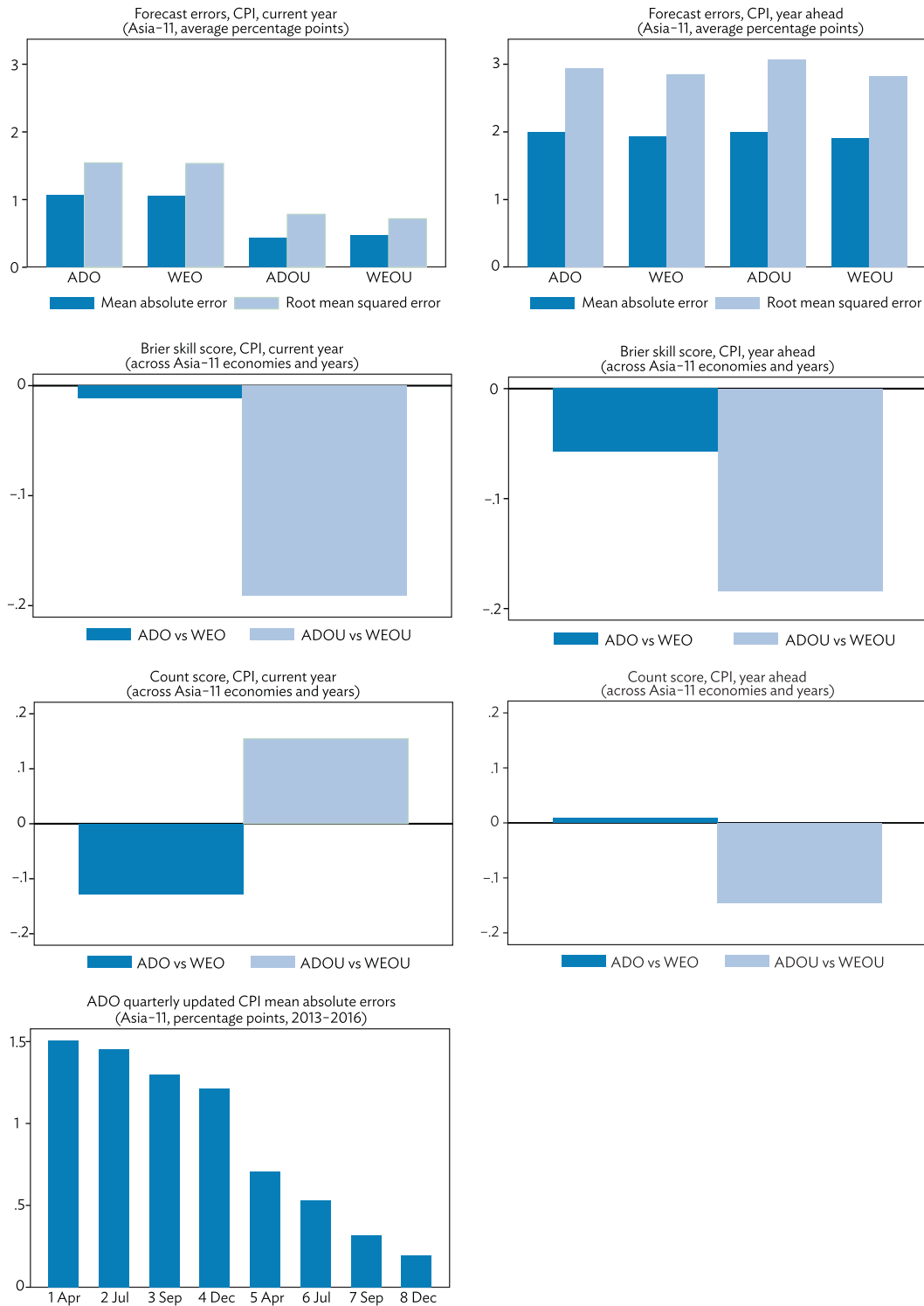
ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Note: Asia-43 refers to 45 developing member countries of ADB; Cook Islands and Nauru are excluded due to data issues.
 Source: Author's calculations.

Figure 3: Asia-11 Gross Domestic Product Growth Forecast Accuracy, 2007–2016



ADO = Asian Development Outlook, AD OU = Asian Development Outlook Update, GDP = gross domestic product, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Note: Asia-11 refers to Hong Kong, China; India; Indonesia; Malaysia; the People’s Republic of China; the Philippines; the Republic of Korea; Singapore; Thailand; Taipei,China; and Viet Nam.
 Source: Author’s calculations.

Figure 4: Asia-11 Inflation Forecast Accuracy, 2007–2016

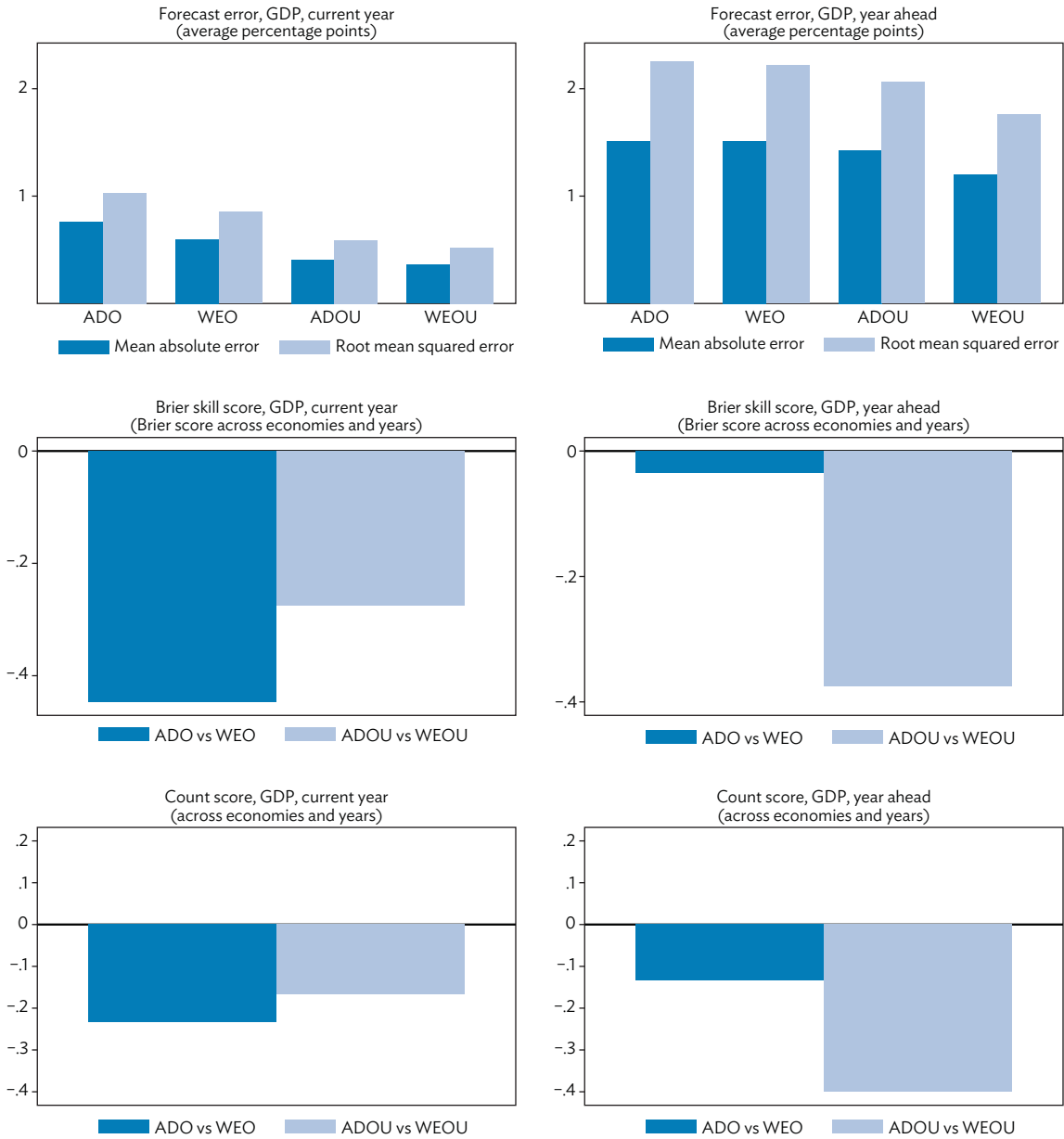


ADO = Asian Development Outlook, AD OU = Asian Development Outlook Update, CPI = Consumer Price Index, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.

Note: Asia-11 refers to Hong Kong, China; India; Indonesia; Malaysia; the People’s Republic of China; the Philippines; the Republic of Korea; Singapore; Thailand; Taipei,China; and Viet Nam.

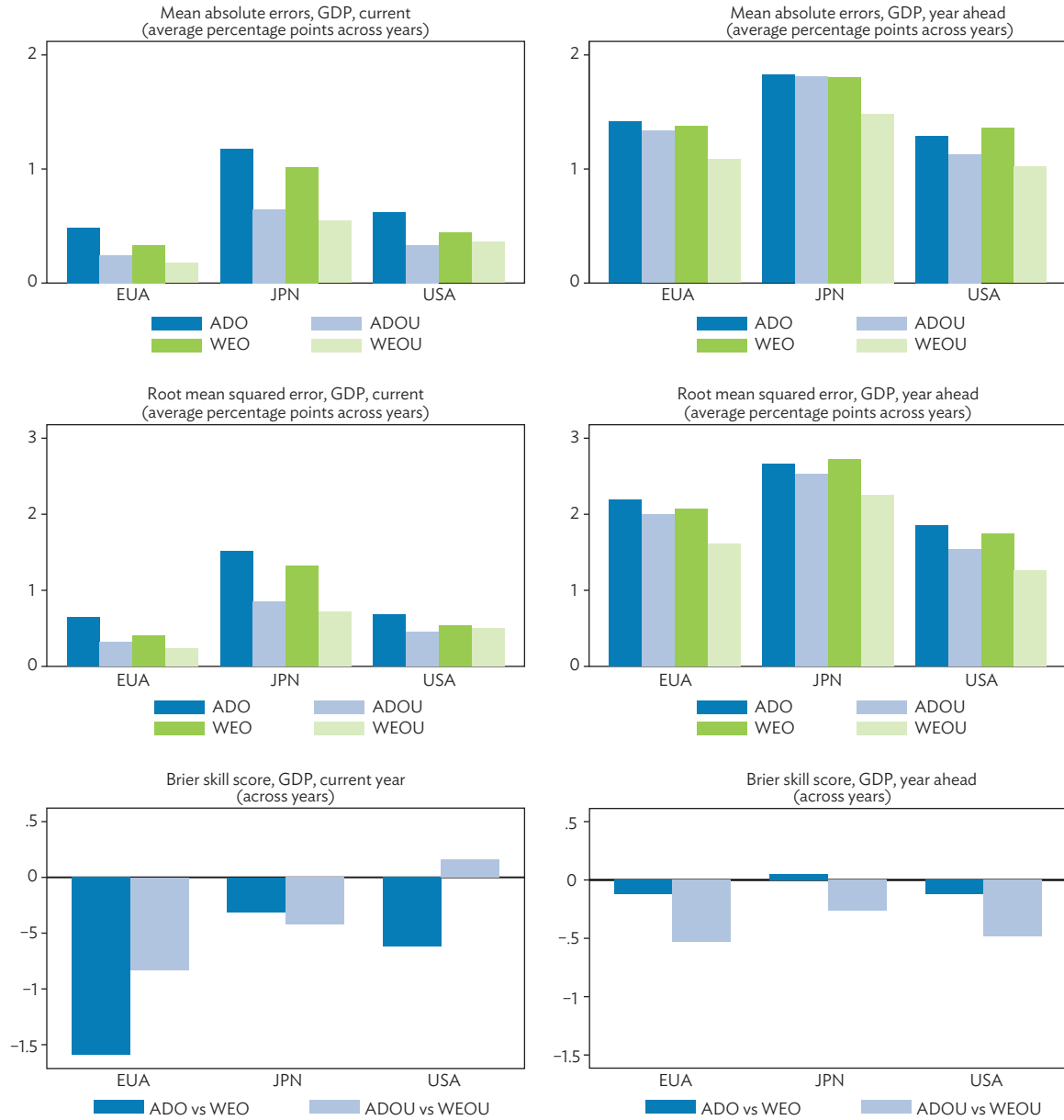
Source: Author’s calculations.

Figure 5: G3 Gross Domestic Product Growth Forecast Accuracy



ADO = Asian Development Outlook; ADOU = Asian Development Outlook Update; G3 = euro area, Japan, and the United States; GDP = gross domestic product; vs = versus; WEO = World Economic Outlook; WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Figure 6: G3 Gross Domestic Product Growth Forecast Accuracy



ADO = Asian Development Outlook; ADOU = Asian Development Outlook Update; EUA = euro area; G3 = euro area, Japan, and the United States; GDP = gross domestic product; JPN = Japan; USA = United States of America; vs = versus; WEO = World Economic Outlook; WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Much of the variation within the Asia-43 aggregate comes from the small economies and those depending on oil exports, which tend to be associated with large forecast errors. For current-year GDP growth projections, this is shown in Appendix 6, Figure A6.1, which breaks down RMSEs and Brier scores by country averages across years. For example, ADO growth projections are least accurate for Armenia, Afghanistan, and the Kyrgyz Republic. Conversely, projections are most precise for countries like Bangladesh, Indonesia, or Viet Nam.

Economies' Brier scores are largest where the size of average errors differs the most among the reports. For example, the right-hand chart in Figure A6.2 indicates that ADO and ADOU score highest for the Marshall Islands, Brunei Darussalam, and Kiribati. They are lowest for the Federated States of Micronesia, Bangladesh, and Tuvalu. For some economies, such as the PRC and Indonesia, ADO's advantage over WEO got lost entirely by the time the update reports were released, when WEOU managed to come up with more precise growth projections compared to ADOU. The reverse is true for some other economies, such as Mongolia. Some of these patterns are confirmed by count scores for individual economies, shown in Appendix 3, Table A3.1, and summarized in Tables A3.2–A3.4.

For completeness of exposition, Appendix 1, Tables A1.1 to A1.4, provide detailed tabulations of individual economies' errors for each of the four reports, ranked by descending RMSEs. Also shown is the coefficient of variation, which tends to be higher for economies associated with larger forecast errors and rank lower in the tables. There are exceptions, especially the Pacific economies with only few years of observation available, which affects the CoV measure.

In sum, the average magnitudes of errors in the ADB and IMF growth forecasts in the Asia-43 sample are similar. Although ADO and ADOU projections score slightly higher on average, results are very mixed indeed, and they vary across individual years and economies. For all the reports, accuracy tends to improve over time, as more information becomes available and projections converge toward actual growth rates, causing errors to shrink.

B. Asia-43—Consumer Price Index Inflation Forecasts

Inflation tends to be forecast less accurately than growth (Figure 2). Projections 1 year ahead entail mean average errors of nearly 3 percentage points (Table 3). Moreover, average accuracy improves only slightly from the main reports to the release of updates. WEO and WEOU current-year inflation estimates are more accurate than those in ADO and ADOU, and Brier scores are negative as a result. Not so in relation to year-ahead inflation forecasts, where scores close to zero suggest a more even match, and differences are rather negligible. Count scores corroborate these findings.

Unsurprisingly, inflation errors are largest in 2008–2010, during the global economic crisis (Figure A5.2). Brier and count scores both suggest that WEO and WEOU projections were significantly more accurate for 2008, 2009, 2012, and 2014 estimates, as well as for 2007 forecasts. The evidence is mixed for the other years, especially in relation to year-ahead inflation forecasts, where ADO and ADOU did better in some years, such as in 2010.

Breaking down results by economies, Figure A6.3 and Figure A6.4 identify smaller and more vulnerable economies as the main sources of error, driving up averages. ADO's largest RMSE is recorded for Afghanistan, in excess of 8 percentage points in relation to current-year inflation, and 10 percentage points with regard to inflation forecasts. Yearly data reveal that this reflects extremely large errors in both 2008 and 2009.

Brier scores tend to favor WEO and WEOU, especially in relation to current-year estimates. Scores are largest where the difference in mean square errors among the reports is most pronounced, such as for Turkmenistan (Figure A6.3) and Tuvalu (Figure A6.4).³

In sum, WEO and WEOU inflation projections tend to be more accurate than those in ADO and ADOU, especially in relation to current-year estimates. Differences in year-ahead projections are too small to be conclusive, but they too point to somewhat higher accuracy of the WEOU reports. Similarly to growth, accuracy measures of inflation projections reveal a great deal of heterogeneity across the Asia-43 aggregate and years considered.⁴

C. Asia-43—Are Growth Forecasts Overly Optimistic?

For each of the Asia-43 economies, size and count measures of optimism are computed according to the method described in section II.⁵ Data from 2007 to 2010 is excluded because the economic crisis took forecasters by surprise, so much as to cause a break in the data that would overshadow and invalidate the optimism measure. What remains are 6 years of GDP projections, from 2011 to 2016.

Table 5 shows skewness, as well as averages of the size and count measures in relation to each of the four reports. On account of current-year estimates, ADO has the strongest optimistic bias among these reports, with a size measure equal to -0.24 . WEO is less optimistic, at -0.11 , and both the update reports are fairly balanced, at 0.04 , without any significant bias. Far more significant are the readings with regard to year-ahead forecasts, where uncertainty is higher and optimism comes to play. Indeed, large negative average errors in all the reports point to a somewhat overoptimistic bias throughout, especially in ADO (-0.63). Count measures in excess of 0.5 and negative skewness across year-ahead forecasts confirm the presence of an optimism bias.

Table 5: Asia-43 Gross Domestic Product Forecast Optimism, 2011–2016

Report	Current Year			Year Ahead		
	Skew	Size	Count	Skew	Size	Count
ADO	0.11	-0.24	0.52	-0.17	-0.63	0.59
ADOU	0.36	0.04	0.44	-0.06	-0.49	0.59
WEO	-0.31	-0.11	0.51	-0.29	-0.43	0.59
WEOU	0.49	0.04	0.50	-0.30	-0.46	0.59

ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.

Note: Asia-43 refers to 45 developing member countries of ADB; Cook Islands and Nauru are excluded due to data issues.

Source: Author's calculations.

³ However, even for these economies, an apparently large difference is likely caused by an outlier year, rather than a significant qualitative difference of forecast quality over the entire period of observation. For example, ADOU 2009 failed to reverse the ADO current-year inflation estimates for Turkmenistan, which turned out experiencing deflation that year. By contrast, WEOU was able to anticipate that turnaround and adjust its inflation estimates accordingly, thereby ending up committing a significantly smaller error compared to ADOU. Besides this specific lapse, and another in relation to 2010 year-ahead forecasts, the inflation projections for Turkmenistan in the two reports are quite similar.

⁴ Tables A1.5 to A1.8 in Appendix 1 provide detailed tabulations of CPI forecast errors for each of the four reports, ranked by descending RMSEs.

⁵ It will be recalled from the definition in section II, that a negative size measure is taken to indicate an overoptimistic bias of projections because it derives from errors computed as actual minus projected growth.

Appendix 4, Tables A4.1 to A4.4 break down results for the individual economies. For each of the reports, economies are ranked by decreasing size of average bias in the year-ahead forecasts. Clearly, there is a wide spectrum of bias. For example, in relation to ADO, Azerbaijan tops the list of overly optimistic forecasts (Table A4.1); an average error of -3.82 and a count measure of 0.83 indicates that year-ahead forecasts were far too sanguine, both in terms of average distance to actual growth and the number of years in which they remained unfulfilled. At the opposite extreme is Palau, with an error of 1.65 , because forecasts (fewer in number than for other economies) on average fell short of actual growth, and Tajikistan, with a count measure equal to zero because forecast errors are positive throughout. In between these extremes, there is much variation across economies. For example, ADO projections of PRC growth, in row 21 of Table A4.1, were overly optimistic, especially by count of the years when growth expectations were not met in reality.

D. Asia-11—Growth and Inflation Forecasts

The Asia-43 economies are highly heterogeneous and associated with a broad range of forecast errors. By contrast, the Asia-11 sample allows for a comparison of average errors and scores among a more compact group of economies. To recall, this includes the PRC and India—the largest emerging economies in the region—the Republic of Korea; Hong Kong, China; Singapore; and Taipei, China—the co-called Asian Tigers—as well as Indonesia, Malaysia, Thailand, the Philippines, and Viet Nam—the major Southeast Asian emerging economies.

Compared to Asia-43, Asia-11 errors across the reports are significantly smaller (Table 3). For example, year-ahead GDP forecasts across the sample were off by more than one-half of average growth during the 2007–2011 crisis years, and nearly by a third in the quinquennium from 2012. Current-year and year-ahead growth Brier scores are in favor of ADO versus WEO, but year-ahead growth scores see WEOU prevail over ADOU (Figure 3). On inflation, the IMF reports are ahead on most counts but, again, average differences do not seem to be particularly significant (Figure 4). Count scores only partly confirm, and the score board (Table 6) suggests that, by and large, they tilt the balance in favor of the IMF reports, mainly because of superior accuracy in the year-ahead forecasts.

Table 6 summarizes also the scores for the 11 economies individually, which are shown also in the charts in Appendix 6. Results are mixed, but for 7 out of the 11 economies—including the PRC and India—WEOU reports are more accurate, if only so slightly. The pattern is less clear in relation to the main reports, where ADO's accuracy is higher across the board for a number of economies, including the Republic of Korea; Malaysia; and Taipei, China.

A more granular analysis, based on charts by economies and years in Appendix 6, provides additional insights. For example, charts in Figure A7.1 on the PRC show that ADO and WEO yearly forecasts resemble each other quite closely. Scores are determined not by a qualitative difference between the reports, but by somewhat larger discrepancies during specific years, such as 2007 and 2008, when ADOU projections were farther removed from actual growth rates.

To assess whether there are significant differences in the aggregate size of forecast errors over time, the Asia-11 sample is split into two 5-year periods. The first half spans from 2007 to 2011, and the second from 2012 to 2016. Table 3 shows that average errors during the latter 5 years are roughly half the size of those during the earlier period, when the Asian region had to deal with the global economic crisis. A comparison of Brier and count scores for the entire decade and the two subperiods suggests that higher accuracy of WEO and especially WEOU reports over the entire decade is mainly reflective of the earlier period. Indeed, the period from 2012 onward scores mostly in favor of the ADO and ADOU reports, except for current-year growth estimates, where WEOU prevails (Tables 6 and 7).

Table 6: Score Board

Group/Economy	Period	Growth		Inflation	
		Estimates	Forecasts	Estimates	Forecasts
Asia-43	2007–2016	ADO	ADO	WEO	ADO
		ADOU	-	WEOU	WEOU
Asia-11	2007–2016	-	ADO	WEO	-
		WEOU	WEOU	-	WEOU
Asia-11	2007–2011	ADO	ADO	WEO	WEO
		WEOU	WEOU	-	WEOU
Asia-11	2012–2016	-	ADO	-	-
		WEOU	ADOU	ADOU	ADOU
PRC	2007–2016	ADO	ADO	WEO	WEO
		WEOU	WEOU	WEOU	WEOU
HKG	2007–2016	ADO	ADO	WEO	ADO
		WEOU	WEOU	ADOU	WEOU
INO	2007–2016	ADO	ADO	WEO	WEO
		ADOU	WEOU	WEOU	ADOU
IND	2007–2016	WEO	WEO	WEO	ADO
		WEOU	WEOU	WEOU	WEOU
KOR	2007–2016	ADO	ADO	ADO	ADO
		WEOU	WEOU	WEOU	WEOU
MAL	2007–2016	ADO	ADO	ADO	ADO
		ADOU	ADOU	ADOU	ADOU
PHI	2007–2016	ADO	ADO	WEO	WEO
		ADOU	WEOU	WEOU	WEOU
SIN	2007–2016	ADO	ADO	WEO	WEO
		WEOU	WEOU	WEOU	WEOU
THA	2007–2016	WEO	ADO	ADO	WEO
		WEOU	WEOU	WEOU	WEOU
TAP	2007–2016	ADO	ADO	ADO	ADO
		WEOU	WEOU	ADOU	ADOU
VIE	2007–2016	ADO	ADO	ADO	WEO
		ADOU	ADOU	ADOU	WEOU
G3	2007–2016	WEO	WEO	n.a.	n.a.
		WEOU	WEOU	n.a.	n.a.
G3	2007–2011	WEO	WEO	n.a.	n.a.
		WEOU	WEOU	n.a.	n.a.
G3	2012–2016	WEO	ADO	n.a.	n.a.
		WEOU	WEOU	n.a.	n.a.

- = not available; ADO = Asian Development Outlook; ADOU = Asian Development Outlook Update; G3 = euro area, Japan, and the United States; HKG = Hong Kong, China; IND = India; INO = Indonesia; KOR = Republic of Korea; MAL = Malaysia; n.a. = not applicable; PHI = Philippines; PRC = People's Republic of China; SIN = Singapore; TAP = Taipei, China; THA = Thailand; VIE = Viet Nam; WEO = World Economic Outlook; WEOU = World Economic Outlook Update.

Notes: Asia-43 and Asia-11, "-" indicates opposite Brier and Count scores. G3 and single economies, Brier only. Asia-43 refers to 45 developing member countries of ADB; Cook Islands and Nauru are excluded due to data issues. Asia-11 refers to Hong Kong, China; India; Indonesia; Malaysia; the People's Republic of China; the Philippines; the Republic of Korea; Singapore; Thailand; Taipei, China; and Viet Nam.

Source: Author's calculations.

Table 7: Asia-11, Brier, and Count Scores

	Estimates		Forecasts	
	ADO/WEO	ADOU/WEOU	ADO/WEO	ADOU/WEOU
GDP Growth, Brier Scores				
2007–2016	0.19	-0.40	0.20	-0.19
2007–2011	0.21	-0.49	0.23	-0.23
2012–2016	0.04	-0.02	0.02	-0.03
GDP Growth, Count Scores				
2007–2016	-0.06	-0.14	0.03	-0.27
2007–2011	0.07	-0.27	0.02	-0.44
2012–2016	-0.20	0.00	0.04	-0.11
CPI Inflation, Brier Scores				
2007–2016	-0.01	-0.19	-0.06	-0.18
2007–2011	-0.15	-1.28	-0.06	-0.24
2012–2016	0.37	0.69	-0.05	0.10
CPI Inflation, Count Scores				
2007–2016	-0.13	0.15	0.01	-0.15
2007–2011	-0.22	0.24	-0.07	-0.33
2012–2016	-0.04	0.07	0.09	0.04

ADO = Asian Development Outlook, ADou = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.

Note: Asia-11 refers to Hong Kong, China; India; Indonesia; Malaysia; the People's Republic of China; the Philippines; the Republic of Korea; Singapore; Thailand; Taipei, China; and Viet Nam.

Source: Author's calculations.

Similarly to Asia-43, Asia-11 forecast errors tend to shrink as more information becomes available over time, leading to a gradual correction of the projections (Figure 3 and Figure 4). For a closer assessment of this pattern in relation to ADO forecasts, July and December GDP and CPI forecasts from the ADO Supplement reports are added to the data set, with coverage from 2012 onward. In addition to the April and September releases of data, this brings to four the total number of projections available each year, and to eight over the period of 2 years, considering both year-ahead and current-year estimates.⁶ The full series of data, averaged across Asia-11, is shown in the bottom charts of Figure 3, on growth, and of Figure 4, on inflation. In either case, forecasts tend to sharpen considerably as new information becomes available and gets reflected in the quarterly updated reports. The same is true for individual economies, as suggested by the charts in Appendix 9. In part, this would explain smaller average errors observed in the IMF forecasts, which are usually released weeks later than ADB's thus incorporating the latest information, such as national accounts estimates and leading indicators.

⁶ For example, the ADO April 2012 report issued the earliest projections of 2013 growth forecasts, which then got updated eight times up until the release of the ADO Supplement in December 2013, with the latest projections prior to the availability of actual data in the quarter to follow.

In sum, Asia-11 aggregate scores are prevalently in favor of the IMF reports, which tend to be more accurate. However, this applies mainly to projections in relation to the earlier period of heightened volatility, not otherwise. Average scores for the 5 years from 2012 suggest not only that errors were lower for all the reports, compared to 5 years earlier, but also that net differences were larger for ADO and ADOU reports, which improved accuracy more significantly. This is further corroborated by the marked fall of growth and inflation projection errors observed in relation to ADO quarterly projection updates, which display a correcting trend over time.

E. G3—Euro Area, Japan, and the United States Growth Forecasts

G3 forecast errors are smaller than those of both the Asia-43 and Asia-11 samples (Figure 5). Both Brier and count scores are clearly in favor of the WEO and WEOU projections, both in relation to current-year estimates and year-ahead forecasts.

Among G3, ADO euro area projections score the lowest. This is because the euro area has a higher relative discrepancy, compared to WEO and WEOU forecast errors, notwithstanding smaller absolute errors than Japan and the United States (Figure 6). Yearly averages further indicate that euro area growth projections are associated with large errors not only during 2009–2011, when also Japan and United States errors were high, but also afterwards, in 2012 and 2013, when the euro crisis seems to have caught forecasters by surprise (Appendix 8, Figures A8.1 to A8.3).

Japan has the largest average errors among G3, which seems partly justified by a higher coefficient of variation, of 5.6 during 2007–2016, compared to 3.2 for the euro area and 1.0 for the United States (Appendix 2). Against this backdrop, Japan’s marginally positive ADO versus WEO score in year-ahead growth forecasts and a smaller negative ADOU versus WEOU score compare somewhat favorably against the other two economies (Figure 6).

Finally, the comparison of G3 forecast errors across the two subperiods, 2007–2011 and 2012–2016, shows that errors are significantly smaller in the latter period (Table 4). The same is true for the coefficient of variation, partly because of higher average growth. In both periods, ADO and ADOU errors are larger than those in WEO and WEOU, respectively. This translates into Brier scores that are mostly negative across both periods (Table 8) and the IMF reports’ higher accuracy across G3 growth projections, with the only exception of year-ahead growth forecasts (Table 6).

Table 8: G3 Gross Domestic Product Growth Projections—Brier Scores, 2007–2016

Period	Estimates		Forecasts	
	ADO/WEO	ADOU/WEOU	ADO/WEO	ADOU/WEOU
2007–2016	–0.45	–0.27	–0.03	–0.38
2007–2011	–0.57	–0.30	–0.04	–0.38
2012–2016	–0.02	–0.21	0.02	–0.35

ADO = Asian Development Outlook; ADOU = Asian Development Outlook Update; G3 = euro area, Japan, and the United States; WEO = World Economic Outlook; WEOU = World Economic Outlook Update.

Source: Author’s calculations.

In sum, WEO and WEOU growth projections for G3 economies tend to be more reliable than ADB's. Unlike the Asia-11 aggregate, where IMF projections were found to be more accurate mainly in the period spanning from 2007 to 2011 but not afterwards, for the G3 group of economies they are somewhat sharper than ADB's throughout much of the decade considered.

V. CONCLUSIONS

This paper assessed the comparative accuracy of ADO against the WEO yearly growth and inflation forecasts for 43 Asian economies from 2007 to 2016. Results are mixed, with one forecaster prevailing over the other in relation to different reference periods and economies. However, the two sets of forecasts are a fairly close match overall. Average errors are quite substantial, but projections do sharpen significantly as additional information gets incorporated closer to the reference dates. Indeed, there is strong evidence of progressively shrinking errors over forecasts' life span of 2 years, from the earliest year-ahead projections to the latest current-year estimates.

Both ADB and IMF projections are found to be somewhat optimistic and they often err in the same direction. Evidently, a shared set of models and assumptions about the main macroeconomic forces at play are reflected in similar projections. However, similar forecast numbers do not necessarily imply overlapping narratives. Besides the numbers as such, macroeconomic forecasting is about the way in which various available indicators and policy analyses are brought together within a coherent narrative that captures a forecaster's view about a country's short-run macro environment and prospects. It is within these narratives that certain differences and qualities are often observed in relation to the ADO and WEO reports, conferring a unique and special value to each. However, capturing these qualities is entirely beyond the reach of this paper.

APPENDIXES

Appendix 1: Asia-43 Growth and Inflation Forecast Errors

Table A1.1: ADO GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAE0	RMSE0	MAE1	RMSE1	
1	BAN	Bangladesh	0.34	0.42	0.55	0.63	0.07
2	RMI	Marshall Islands	1.83	2.08	0.67	0.71	0.65
3	TUV	Tuvalu	0.37	0.57	0.67	0.87	0.55
4	LAO	Lao People's Democratic Republic	0.48	0.68	0.67	0.88	0.06
5	INO	Indonesia	0.44	0.52	0.90	1.03	0.13
6	KIR	Kiribati	0.95	1.08	0.86	1.04	0.62
7	MYA	Myanmar	0.95	1.25	1.13	1.33	0.15
8	VIE	Viet Nam	0.45	0.50	1.04	1.35	0.16
9	PRC	People's Republic of China	0.80	1.03	1.10	1.42	0.19
10	UZB	Uzbekistan	0.73	0.96	1.02	1.47	0.06
11	PAK	Pakistan	0.70	1.13	1.12	1.79	0.29
12	SRI	Sri Lanka	0.99	1.21	1.67	1.88	0.25
13	NEP	Nepal	0.81	1.05	1.35	1.92	0.41
14	TON	Tonga	0.91	1.21	1.59	1.96	1.54
15	TAJ	Tajikistan	1.26	1.61	1.70	2.10	0.20
16	GEO	Georgia	1.43	2.00	1.74	2.13	0.39
17	KOR	Republic of Korea	1.16	1.53	1.70	2.19	0.53
18	VAN	Vanuatu	1.22	1.45	1.80	2.25	0.67
19	IND	India	1.27	1.46	2.03	2.30	0.23
20	PHI	Philippines	1.52	1.80	1.90	2.42	0.37
21	BHU	Bhutan	1.57	2.22	1.88	2.52	0.48
22	TKM	Turkmenistan	2.12	2.77	2.34	2.61	0.30
23	MAL	Malaysia	0.87	1.06	1.40	2.61	0.52
24	FSM	Federated States of Micronesia	1.72	1.80	2.38	2.88	34.83
25	BRU	Brunei Darussalam	2.11	2.45	2.29	2.90	-8.04
26	SAM	Samoa	1.49	2.09	2.29	3.14	2.17
27	HKG	Hong Kong, China	0.94	1.14	2.46	3.17	0.95
28	CAM	Cambodia	0.95	1.59	2.04	3.28	0.49
29	FIJ	Fiji	1.65	1.84	2.62	3.28	2.49
30	KAZ	Kazakhstan	1.28	1.77	3.02	3.58	0.62
31	THA	Thailand	1.78	2.26	3.09	3.67	1.01
32	SOL	Solomon Islands	2.22	2.85	3.10	3.87	0.80
33	KGZ	Kyrgyz Republic	3.19	3.85	3.39	4.06	0.89
34	TAP	Taipei, China	2.22	2.78	3.31	4.26	1.27
35	MLD	Maldives	2.65	3.18	3.37	4.39	0.80
36	TIM	Timor-Leste	2.07	2.75	3.52	4.57	0.37
37	SIN	Singapore	2.31	3.27	3.41	4.69	1.14
38	PNG	Papua New Guinea	1.80	2.56	3.34	4.73	0.33
39	AFG	Afghanistan	3.26	5.04	3.74	5.25	0.94
40	AZE	Azerbaijan	2.78	3.17	4.66	5.37	1.34
41	PAL	Palau	1.25	1.26	5.75	5.98	0.94
42	MON	Mongolia	2.70	3.46	5.80	6.53	0.76
43	ARM	Armenia	3.17	5.11	4.34	7.61	2.33

ADO = Asian Development Outlook, CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error.

Source: Author's calculations.

Table A1.2: WEO GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAE0	RMSE0	MAE1	RMSE1	
1	BAN	Bangladesh	0.41	0.47	0.44	0.51	0.07
2	TUV	Tuvalu	0.45	0.52	0.63	0.79	0.55
3	INO	Indonesia	0.42	0.69	0.92	1.19	0.13
4	RMI	Marshall Islands	1.20	1.62	1.03	1.30	0.65
5	LAO	Lao People's Democratic Republic	0.65	0.96	1.07	1.32	0.06
6	VIE	Viet Nam	0.66	0.84	1.28	1.45	0.16
7	PRC	People's Republic of China	0.68	1.05	1.18	1.51	0.19
8	FSM	Federated States of Micronesia	1.05	1.47	1.02	1.52	34.83
9	MYA	Myanmar	0.98	1.32	1.35	1.53	0.15
10	KIR	Kiribati	0.68	0.92	1.24	1.55	0.62
11	NEP	Nepal	0.92	1.09	1.09	1.75	0.41
12	PAK	Pakistan	0.67	1.07	1.13	1.83	0.29
13	SRI	Sri Lanka	1.13	1.29	1.51	1.92	0.25
14	UZB	Uzbekistan	1.36	1.49	1.65	1.92	0.06
15	TON	Tonga	1.15	1.45	1.55	1.95	1.54
16	IND	India	1.18	1.43	1.87	2.16	0.23
17	GEO	Georgia	1.43	2.08	1.96	2.20	0.39
18	TAJ	Tajikistan	1.89	2.28	1.90	2.25	0.20
19	KOR	Republic of Korea	1.23	1.69	1.87	2.34	0.53
20	VAN	Vanuatu	1.52	1.71	2.05	2.50	0.67
21	PHI	Philippines	1.55	1.85	2.11	2.88	0.37
22	MAL	Malaysia	0.87	1.13	1.65	2.95	0.52
23	BHU	Bhutan	1.49	1.61	2.46	3.05	0.48
24	FIJ	Fiji	2.05	2.77	2.55	3.21	2.49
25	CAM	Cambodia	0.92	1.29	1.97	3.33	0.49
26	SOL	Solomon Islands	2.85	3.52	2.80	3.38	0.80
27	SAM	Samoa	2.62	3.47	2.73	3.52	2.17
28	TKM	Turkmenistan	2.36	2.87	3.16	3.53	0.30
29	HKG	Hong Kong, China	1.00	1.20	2.75	3.56	0.95
30	KAZ	Kazakhstan	1.62	2.08	2.89	3.62	0.62
31	MLD	Maldives	2.04	2.54	3.05	3.64	0.80
32	KGZ	Kyrgyz Republic	2.23	3.00	3.02	3.67	0.89
33	THA	Thailand	1.69	2.07	3.47	4.24	1.01
34	BRU	Brunei Darussalam	2.33	3.34	3.60	4.29	-8.04
35	TAP	Taipei,China	2.33	2.87	3.56	4.63	1.27
36	PNG	Papua New Guinea	2.17	3.71	3.61	5.00	0.33
37	PAL	Palau	3.65	5.09	4.00	5.12	0.94
38	SIN	Singapore	2.81	4.17	3.65	5.44	1.14
39	MON	Mongolia	2.99	3.75	4.54	5.51	0.76
40	TIM	Timor-Leste	3.14	4.31	4.25	5.54	0.37
41	AZE	Azerbaijan	2.98	3.82	4.42	5.56	1.34
42	AFG	Afghanistan	3.20	5.00	4.16	5.63	0.94
43	ARM	Armenia	2.83	3.87	4.03	7.57	2.33

CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error, WEO = World Economic Outlook.

Source: Author's calculations.

Table A1.3: ADOU GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAE0	RMSE0	MAE1	RMSE1	
1	BAN	Bangladesh	0.14	0.16	0.50	0.58	0.07
2	RMI	Marshall Islands	1.83	2.08	0.67	0.71	0.65
3	INO	Indonesia	0.11	0.14	0.70	0.82	0.13
4	TUV	Tuvalu	0.43	0.57	0.65	0.86	0.55
5	LAO	Lao People's Democratic Republic	0.44	0.65	0.64	0.86	0.06
6	KIR	Kiribati	0.84	0.94	0.86	1.01	0.62
7	VIE	Viet Nam	0.25	0.30	0.84	1.03	0.16
8	PRC	People's Republic of China	0.38	0.54	0.86	1.16	0.19
9	MYA	Myanmar	0.93	1.24	1.13	1.29	0.15
10	PAK	Pakistan	0.56	0.94	0.93	1.39	0.29
11	UZB	Uzbekistan	0.69	0.83	0.97	1.42	0.06
12	TON	Tonga	0.74	1.10	1.40	1.61	1.54
13	SRI	Sri Lanka	0.74	0.94	1.54	1.78	0.25
14	NEP	Nepal	0.42	0.48	1.25	1.82	0.41
15	IND	India	0.76	0.93	1.73	1.99	0.23
16	KOR	Republic of Korea	0.75	1.10	1.57	2.03	0.53
17	PHI	Philippines	0.62	0.75	1.77	2.21	0.37
18	VAN	Vanuatu	0.77	0.95	1.81	2.21	0.67
19	TAJ	Tajikistan	1.64	1.97	1.74	2.24	0.20
20	GEO	Georgia	0.79	1.01	2.03	2.39	0.39
21	FSM	Federated States of Micronesia	1.18	1.46	2.02	2.45	34.83
22	BHU	Bhutan	1.45	2.10	1.86	2.50	0.48
23	MAL	Malaysia	0.59	0.71	1.51	2.50	0.52
24	BRU	Brunei Darussalam	1.91	2.32	2.11	2.63	-8.04
25	TKM	Turkmenistan	2.01	2.57	2.45	2.88	0.30
26	CAM	Cambodia	0.42	0.59	1.91	2.99	0.49
27	HKG	Hong Kong, China	0.63	0.90	2.32	3.07	0.95
28	SAM	Samoa	1.23	1.49	2.31	3.11	2.17
29	FIJ	Fiji	1.27	1.40	2.53	3.21	2.49
30	KGZ	Kyrgyz Republic	1.53	1.80	2.73	3.31	0.89
31	KAZ	Kazakhstan	1.11	1.33	2.76	3.33	0.62
32	THA	Thailand	1.21	1.65	3.02	3.60	1.01
33	SOL	Solomon Islands	1.69	2.13	3.15	3.93	0.80
34	TAP	Taipei, China	1.48	1.99	3.08	4.03	1.27
35	MLD	Maldives	1.44	2.18	3.20	4.14	0.80
36	TIM	Timor-Leste	2.33	2.98	3.49	4.49	0.37
37	PNG	Papua New Guinea	0.88	1.19	2.94	4.50	0.33
38	SIN	Singapore	1.12	1.64	3.16	4.54	1.14
39	AZE	Azerbaijan	2.52	3.00	3.96	4.59	1.34
40	AFG	Afghanistan	2.29	3.16	3.76	5.37	0.94
41	MON	Mongolia	1.67	2.41	4.26	5.45	0.76
42	PAL	Palau	0.35	0.43	7.25	7.25	0.94
43	ARM	Armenia	2.31	2.67	4.23	7.59	2.33

ADOU = Asian Development Outlook Update, CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error.

Source: Author's calculations.

Table A1.4: WEOU GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAEO	RMSE0	MAE1	RMSE1	
1	BAN	Bangladesh	0.32	0.40	0.24	0.33	0.07
2	TUV	Tuvalu	0.35	0.39	0.51	0.58	0.55
3	INO	Indonesia	0.19	0.25	0.48	0.62	0.13
4	PRC	People's Republic of China	0.26	0.34	0.71	0.93	0.19
5	LAO	Lao People's Democratic Republic	0.56	0.88	0.70	0.96	0.06
6	VIE	Viet Nam	0.24	0.31	0.91	1.06	0.16
7	RMI	Marshall Islands	1.23	1.62	1.03	1.30	0.65
8	PAK	Pakistan	0.59	0.97	0.89	1.31	0.29
9	KIR	Kiribati	0.54	0.86	1.06	1.39	0.62
10	FSM	Federated States of Micronesia	1.22	1.53	0.88	1.39	34.83
11	MYA	Myanmar	0.87	1.14	1.33	1.46	0.15
12	UZB	Uzbekistan	1.04	1.09	1.40	1.48	0.06
13	SRI	Sri Lanka	0.81	0.94	1.27	1.51	0.25
14	TON	Tonga	1.01	1.33	1.30	1.59	1.54
15	NEP	Nepal	0.46	0.58	1.22	1.71	0.41
16	KOR	Republic of Korea	0.52	0.77	1.51	1.82	0.53
17	IND	India	0.82	0.93	1.66	1.91	0.23
18	PHI	Philippines	0.61	0.81	1.69	2.10	0.37
19	TAJ	Tajikistan	1.19	1.41	1.87	2.27	0.20
20	GEO	Georgia	0.74	0.83	1.90	2.37	0.39
21	VAN	Vanuatu	0.75	0.87	2.13	2.44	0.67
22	MAL	Malaysia	0.59	0.84	1.50	2.59	0.52
23	HKG	Hong Kong, China	0.69	0.83	2.02	2.67	0.95
24	CAM	Cambodia	0.47	0.62	1.69	2.89	0.49
25	KAZ	Kazakhstan	1.12	1.44	2.38	2.93	0.62
26	FIJ	Fiji	1.12	1.33	2.40	3.09	2.49
27	KGZ	Kyrgyz Republic	1.36	1.60	2.69	3.32	0.89
28	SAM	Samoa	1.63	2.16	2.40	3.35	2.17
29	THA	Thailand	0.96	1.42	2.79	3.40	1.01
30	TAP	Taipei, China	1.28	1.67	2.70	3.40	1.27
31	BHU	Bhutan	1.96	2.31	2.47	3.45	0.48
32	TKM	Turkmenistan	1.75	2.27	3.08	3.62	0.30
33	SOL	Solomon Islands	2.01	2.68	2.96	3.62	0.80
34	MLD	Maldives	1.35	1.94	3.20	4.04	0.80
35	SIN	Singapore	0.74	1.08	2.99	4.19	1.14
36	PNG	Papua New Guinea	1.19	1.69	3.17	4.34	0.33
37	BRU	Brunei Darussalam	2.64	3.46	3.61	4.39	-8.04
38	PAL	Palau	3.65	4.05	4.00	5.12	0.94
39	TIM	Timor-Leste	2.36	3.98	3.53	5.14	0.37
40	AFG	Afghanistan	2.49	3.48	3.56	5.30	0.94
41	AZE	Azerbaijan	2.20	2.67	4.52	5.43	1.34
42	MON	Mongolia	1.57	2.25	4.62	5.56	0.76
43	ARM	Armenia	1.74	2.11	4.14	7.61	2.33

CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error, WEOU = World Economic Outlook Update.

Source: Author's calculations.

Table A1.5: ADO CPI Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAE0	RMSE0	MAE1	RMSE1	
1	BRU	Brunei Darussalam	0.71	0.77	0.98	1.07	2.52
2	TAP	Taipei, China	0.76	0.89	0.98	1.24	1.02
3	KOR	Republic of Korea	0.65	0.76	1.14	1.29	0.56
4	MAL	Malaysia	0.78	1.06	1.11	1.34	0.53
5	HKG	Hong Kong, China	0.48	0.58	1.11	1.37	0.45
6	TUV	Tuvalu	0.87	1.23	1.35	1.49	0.35
7	BAN	Bangladesh	0.71	0.89	1.32	1.58	0.18
8	INO	Indonesia	1.10	1.32	1.59	1.78	0.29
9	VAN	Vanuatu	1.78	1.97	1.87	2.05	0.69
10	PHI	Philippines	1.30	1.94	1.64	2.13	0.59
11	THA	Thailand	0.71	0.84	1.82	2.24	1.01
12	PRC	People's Republic of China	0.93	1.22	2.20	2.62	0.68
13	BHU	Bhutan	1.44	2.02	2.49	2.63	0.29
14	FSM	Federated States of Micronesia	1.57	2.11	2.70	2.70	-5.57
15	SIN	Singapore	1.04	1.26	2.28	2.74	0.99
16	NEP	Nepal	0.87	1.19	2.05	2.75	0.21
17	ARM	Armenia	2.28	2.77	2.12	2.78	0.67
18	TON	Tonga	2.51	3.21	2.15	2.80	0.91
19	LAO	Lao People's Democratic Republic	1.38	2.01	2.16	2.82	0.53
20	IND	India	1.88	2.64	2.30	2.92	0.28
21	RMI	Marshall Islands	2.47	2.90	2.93	2.99	-2.15
22	FIJ	Fiji	2.18	2.62	2.42	3.01	0.61
23	PAL	Palau	1.93	2.06	2.38	3.22	4.51
24	PNG	Papua New Guinea	1.93	2.59	2.51	3.36	0.49
25	MYA	Myanmar	2.35	2.66	2.65	3.42	0.47
26	UZB	Uzbekistan	2.19	2.40	3.17	3.52	0.20
27	SAM	Samoa	2.32	2.68	3.18	3.66	1.28
28	SOL	Solomon Islands	3.05	4.29	2.61	3.79	0.83
29	GEO	Georgia	2.30	2.86	3.04	3.95	1.06
30	KIR	Kiribati	3.19	4.65	3.11	4.05	2.95
31	KAZ	Kazakhstan	1.59	2.13	3.18	4.39	0.45
32	TKM	Turkmenistan	2.91	4.93	2.98	4.56	0.71
33	MLD	Maldives	3.12	3.79	4.36	5.04	0.74
34	PAK	Pakistan	1.28	1.68	4.45	5.85	0.51
35	TAJ	Tajikistan	3.66	4.35	4.26	6.04	0.58
36	TIM	Timor-Leste	3.58	4.48	5.48	6.13	1.02
37	SRI	Sri Lanka	2.23	3.18	4.14	6.19	0.82
38	AZE	Azerbaijan	3.80	5.15	5.92	6.91	0.95
39	CAM	Cambodia	3.34	6.70	3.81	7.19	1.33
40	VIE	Viet Nam	2.08	2.67	5.70	7.21	0.78
41	MON	Mongolia	4.38	6.25	4.72	7.31	0.66
42	KGZ	Kyrgyz Republic	4.72	6.14	5.86	7.90	0.77
43	AFG	Afghanistan	5.74	8.49	7.38	10.29	1.48

ADO = Asian Development Outlook, CoV = coefficient of variation, CPI = Consumer Price Index, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error.
Source: Author's calculations.

Table A1.6: WEO CPI Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAE0	RMSE0	MAE1	RMSE1	
1	TUV	Tuvalu	0.67	0.74	0.51	0.54	0.35
2	BRU	Brunei Darussalam	0.84	0.87	0.86	1.06	2.52
3	TAP	Taipei,China	0.82	0.96	0.91	1.30	1.02
4	MAL	Malaysia	0.75	1.10	1.20	1.40	0.53
5	KOR	Republic of Korea	0.69	0.83	1.20	1.43	0.56
6	VAN	Vanuatu	1.25	1.46	1.49	1.67	0.69
7	INO	Indonesia	1.01	1.31	1.31	1.78	0.29
8	HKG	Hong Kong, China	0.38	0.45	1.52	1.97	0.45
9	BAN	Bangladesh	0.75	1.00	1.72	1.97	0.18
10	THA	Thailand	0.72	0.95	1.66	2.03	1.01
11	PHI	Philippines	0.93	1.66	1.55	2.06	0.59
12	PRC	People's Republic of China	0.65	0.96	1.98	2.41	0.68
13	PAL	Palau	2.03	2.60	2.22	2.41	4.51
14	SIN	Singapore	1.08	1.20	2.15	2.56	0.99
15	ARM	Armenia	1.71	2.01	2.13	2.67	0.67
16	UZB	Uzbekistan	1.21	1.36	2.14	2.72	0.20
17	BHU	Bhutan	1.71	1.97	2.39	2.73	0.29
18	RMI	Marshall Islands	0.70	0.95	2.43	2.76	-2.15
19	FIJ	Fiji	1.88	2.67	2.35	2.93	0.61
20	FSM	Federated States of Micronesia	1.57	1.90	2.87	2.94	-5.57
21	LAO	Lao People's Democratic Republic	1.12	1.39	2.34	2.99	0.53
22	TON	Tonga	3.02	3.93	2.65	3.09	0.91
23	PNG	Papua New Guinea	2.21	2.86	2.41	3.15	0.49
24	IND	India	1.65	1.90	2.93	3.49	0.28
25	SAM	Samoa	1.72	2.33	3.04	3.49	1.28
26	SOL	Solomon Islands	2.74	3.82	2.42	3.50	0.83
27	MYA	Myanmar	2.32	2.60	2.82	3.53	0.47
28	NEP	Nepal	0.88	1.17	2.60	3.62	0.21
29	MLD	Maldives	1.78	2.63	3.25	3.85	0.74
30	KIR	Kiribati	2.55	3.24	3.27	3.92	2.95
31	GEO	Georgia	2.07	2.31	3.41	4.43	1.06
32	KAZ	Kazakhstan	1.24	1.48	3.08	4.62	0.45
33	TKM	Turkmenistan	2.22	3.97	3.07	5.07	0.71
34	TAJ	Tajikistan	2.70	3.39	4.14	5.27	0.58
35	TIM	Timor-Leste	3.51	4.37	4.99	5.61	1.02
36	PAK	Pakistan	1.02	1.40	4.72	5.86	0.51
37	VIE	Viet Nam	2.88	3.40	4.76	6.61	0.78
38	SRI	Sri Lanka	2.40	3.89	4.96	6.70	0.82
39	CAM	Cambodia	2.96	5.50	4.05	7.24	1.33
40	AZE	Azerbaijan	2.35	2.75	5.51	7.37	0.95
41	MON	Mongolia	4.20	6.13	5.11	7.73	0.66
42	KGZ	Kyrgyz Republic	3.31	3.83	5.59	8.11	0.77
43	AFG	Afghanistan	4.99	6.96	7.59	10.43	1.48

CoV = coefficient of variation, CPI = Consumer Price Index, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error, WEO = World Economic Outlook.

Source: Author's calculations.

Table A1.7: ADOU CPI Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAE0	RMSE0	MAE1	RMSE1	
1	BRU	Brunei Darussalam	0.45	0.51	0.85	1.01	2.52
2	TUV	Tuvalu	0.97	1.11	1.01	1.12	0.35
3	KOR	Republic of Korea	0.29	0.39	1.14	1.25	0.56
4	TAP	Taipei,China	0.20	0.24	1.12	1.47	1.02
5	BAN	Bangladesh	0.50	0.61	1.26	1.52	0.18
6	HKG	Hong Kong, China	0.29	0.37	1.31	1.71	0.45
7	MAL	Malaysia	0.23	0.28	1.36	1.71	0.53
8	INO	Indonesia	0.27	0.37	1.49	1.80	0.29
9	BHU	Bhutan	0.55	0.91	1.79	1.87	0.29
10	NEP	Nepal	0.10	0.19	1.50	1.97	0.21
11	VAN	Vanuatu	1.44	1.64	1.74	1.97	0.69
12	FSM	Federated States of Micronesia	1.10	1.37	2.17	2.26	-5.57
13	PRC	People's Republic of China	0.33	0.46	1.87	2.51	0.68
14	PAK	Pakistan	0.02	0.06	2.11	2.56	0.51
15	FIJ	Fiji	1.12	1.54	2.02	2.57	0.61
16	THA	Thailand	0.32	0.53	1.97	2.63	1.01
17	SIN	Singapore	0.55	0.64	2.25	2.65	0.99
18	PHI	Philippines	0.35	0.50	2.15	2.81	0.59
19	IND	India	1.51	2.14	2.05	2.85	0.28
20	TON	Tonga	1.52	1.90	2.19	2.89	0.91
21	PAL	Palau	1.73	1.96	2.18	2.94	4.51
22	RMI	Marshall Islands	1.37	2.09	2.93	2.99	-2.15
23	UZB	Uzbekistan	1.96	2.08	2.69	3.10	0.20
24	ARM	Armenia	1.27	1.56	2.64	3.12	0.67
25	PNG	Papua New Guinea	1.44	2.02	2.30	3.31	0.49
26	MYA	Myanmar	2.33	2.76	2.55	3.35	0.47
27	SAM	Samoa	0.97	1.76	3.09	3.45	1.28
28	SOL	Solomon Islands	1.44	1.88	2.63	3.91	0.83
29	GEO	Georgia	1.31	1.55	3.04	3.95	1.06
30	KAZ	Kazakhstan	1.00	1.31	3.08	4.10	0.45
31	LAO	Lao People's Democratic Republic	0.78	1.09	2.80	4.24	0.53
32	TKM	Turkmenistan	2.78	4.91	2.96	4.42	0.71
33	MLD	Maldives	1.34	1.69	4.06	4.79	0.74
34	TAJ	Tajikistan	2.18	2.78	3.89	5.04	0.58
35	KIR	Kiribati	2.88	4.36	3.81	5.11	2.95
36	TIM	Timor-Leste	1.76	1.99	5.34	5.81	1.02
37	SRI	Sri Lanka	0.98	1.12	4.49	6.77	0.82
38	MON	Mongolia	1.85	2.30	5.27	7.18	0.66
39	AZE	Azerbaijan	2.38	2.92	5.87	7.25	0.95
40	VIE	Viet Nam	0.42	0.70	5.25	7.40	0.78
41	KGZ	Kyrgyz Republic	2.60	3.31	6.05	8.08	0.77
42	CAM	Cambodia	0.46	0.75	4.88	8.56	1.33
43	AFG	Afghanistan	3.35	4.00	7.37	10.72	1.48

ADOU = Asian Development Outlook Update, CoV = coefficient of variation, CPI = Consumer Price Index, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error.
Source: Author's calculations.

Table A1.8: WEOU CPI Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAE0	RMSE0	MAE1	RMSE1	
1	TUV	Tuvalu	0.65	0.87	0.55	0.69	0.35
2	BRU	Brunei Darussalam	0.68	0.76	0.84	1.00	2.52
3	KOR	Republic of Korea	0.15	0.21	1.06	1.19	0.56
4	TAP	Taipei, China	0.43	0.46	1.11	1.53	1.02
5	VAN	Vanuatu	0.91	0.98	1.46	1.60	0.69
6	HKG	Hong Kong, China	0.43	0.61	1.34	1.67	0.45
7	MAL	Malaysia	0.28	0.37	1.47	1.89	0.53
8	INO	Indonesia	0.25	0.36	1.60	2.04	0.29
9	UZB	Uzbekistan	0.86	1.04	1.78	2.05	0.20
10	THA	Thailand	0.17	0.20	1.66	2.09	1.01
11	BAN	Bangladesh	0.67	0.79	1.80	2.12	0.18
12	IND	India	1.48	1.68	1.82	2.19	0.28
13	NEP	Nepal	0.16	0.31	1.87	2.24	0.21
14	PRC	People's Republic of China	0.27	0.32	1.84	2.31	0.68
15	FIJ	Fiji	1.12	1.41	2.04	2.37	0.61
16	PAL	Palau	1.78	2.25	2.22	2.41	4.51
17	PHI	Philippines	0.38	0.43	1.93	2.46	0.59
18	SIN	Singapore	0.40	0.61	2.25	2.52	0.99
19	PAK	Pakistan	0.02	0.06	2.16	2.59	0.51
20	ARM	Armenia	0.69	0.79	2.15	2.70	0.67
21	RMI	Marshall Islands	1.43	1.60	2.43	2.76	-2.15
22	BHU	Bhutan	1.15	1.38	2.41	2.85	0.29
23	LAO	Lao People's Democratic Republic	1.27	1.86	2.36	2.87	0.53
24	FSM	Federated States of Micronesia	1.57	1.90	2.80	2.88	-5.57
25	PNG	Papua New Guinea	1.57	2.48	2.35	3.10	0.49
26	MLD	Maldives	0.92	1.24	2.65	3.30	0.74
27	SAM	Samoa	0.74	1.35	2.89	3.51	1.28
28	MYA	Myanmar	1.73	2.08	2.82	3.55	0.47
29	GEO	Georgia	0.77	0.89	3.11	3.76	1.06
30	KAZ	Kazakhstan	0.62	0.90	2.77	3.90	0.45
31	SOL	Solomon Islands	1.69	2.01	2.97	4.11	0.83
32	TON	Tonga	1.97	2.96	3.67	4.30	0.91
33	KIR	Kiribati	2.41	3.19	3.71	4.54	2.95
34	TKM	Turkmenistan	1.00	1.09	2.91	4.93	0.71
35	TIM	Timor-Leste	1.76	2.14	4.41	5.22	1.02
36	TAJ	Tajikistan	1.65	2.26	4.72	5.37	0.58
37	VIE	Viet Nam	0.97	1.13	4.85	6.82	0.78
38	CAM	Cambodia	0.80	1.61	3.96	7.03	1.33
39	SRI	Sri Lanka	0.79	0.91	5.42	7.43	0.82
40	AZE	Azerbaijan	1.18	1.35	5.77	7.67	0.95
41	KGZ	Kyrgyz Republic	1.50	1.88	6.13	7.87	0.77
42	MON	Mongolia	1.22	1.41	5.97	8.24	0.66
43	AFG	Afghanistan	2.44	3.24	6.64	9.92	1.48

CoV = coefficient of variation, CPI = Consumer Price Index, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error WEOU = World Economic Outlook Update.

Source: Author's calculations.

Appendix 2: G3 Growth Forecast Errors, 2007–2016

Table A2.1: ADO GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAEO	RMSE0	MAE1	RMSE1	
1	USA	United States	0.62	0.69	1.29	1.85	1.03
2	EUA	Euro area	0.49	0.65	1.41	2.19	3.22
3	JPN	Japan	1.17	1.51	1.83	2.66	5.64

ADO = Asian Development Outlook, CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error.

Source: Author's calculations.

Table A2.2: WEO GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAEO	RMSE0	MAE1	RMSE1	
1	USA	United States	0.44	0.54	1.36	1.75	1.03
2	EUA	Euro area	0.33	0.40	1.38	2.07	3.22
3	JPN	Japan	1.01	1.32	1.80	2.73	5.64

CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error, WEO = World Economic Outlook.

Source: Author's calculations.

Table A2.3: ADOU GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAEO	RMSE0	MAE1	RMSE1	
1	USA	United States	0.33	0.46	1.13	1.53	1.03
2	EUA	Euro area	0.24	0.32	1.34	2.00	3.22
3	JPN	Japan	0.65	0.85	1.82	2.53	5.64

ADOU = Asian Development Outlook Update, CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error.

Source: Author's calculations.

Table A2.4: WEOU GDP Average Forecast Errors by Descending Degree of Accuracy on RMSE1

Rank	ISO	Economy	Current Year		Year Ahead		CoV
			MAEO	RMSE0	MAE1	RMSE1	
1	USA	United States	0.36	0.50	1.02	1.26	1.03
2	EUA	Euro area	0.17	0.24	1.09	1.62	3.22
3	JPN	Japan	0.55	0.71	1.49	2.25	5.64

CoV = coefficient of variation, GDP = gross domestic product, ISO = International Organization for Standardization, MAE = mean absolute error, RMSE = root mean squared error, WEOU = World Economic Outlook Update.

Source: Author's calculations.

Appendix 3: Growth and Inflation Count Scores

Table A3.1: Gross Domestic Product Growth

	Estimates		Forecasts	
	ADO	ADOU	ADO	ADOU
Afghanistan	-0.3	0.2	0.5	-0.1
Armenia	-0.4	-0.3	-0.3	0.0
Azerbaijan	-0.3	0.2	-0.2	0.2
Bangladesh	0.3	0.3	-0.3	-0.8
Bhutan	0.0	0.6	0.4	0.2
Brunei Darussalam	0.1	0.1	0.7	0.7
Cambodia	0.0	0.4	0.0	-0.4
Fiji	0.0	-0.2	0.0	0.0
Georgia	0.0	0.1	0.1	-0.1
Hong Kong, China	0.1	0.2	0.1	-0.5
India	-0.3	0.0	-0.4	-0.4
Indonesia	-0.5	0.4	-0.4	-0.5
Kazakhstan	0.3	-0.2	-0.2	-0.3
Kiribati	0.0	-0.4	0.3	0.1
Republic of Korea	0.0	-0.6	0.0	0.0
Kyrgyz Republic	-0.5	-0.1	-0.2	0.4
Lao People's Democratic Republic	0.3	0.1	0.9	-0.1
Malaysia	-0.2	0.1	0.0	-0.3
Maldives	-0.5	0.0	-0.3	-0.2
Marshall Islands	-0.3	-0.3	0.3	0.3
Federated States of Micronesia	-0.3	0.3	-1.0	-1.0
Mongolia	0.0	-0.1	-0.5	0.4
Myanmar	0.2	0.0	0.7	0.3
Nepal	0.3	0.0	-0.4	0.2
People's Republic of China	-0.4	-0.3	0.2	-0.4
Pakistan	0.0	-0.1	0.2	0.0
Palau	0.0	1.0	-1.0	-1.0
Papua New Guinea	0.3	0.1	0.2	0.2
Philippines	0.1	0.0	0.1	-0.1
Samoa	0.7	0.3	0.1	-0.1
Singapore	0.1	-0.4	0.0	-0.2
Solomon Islands	0.5	0.4	0.1	0.0
Sri Lanka	0.2	0.2	-0.4	-0.3
Taipei, China	0.0	-0.4	0.3	-0.2
Tajikistan	0.2	-0.2	0.1	0.2
Thailand	0.0	-0.4	0.0	-0.4
Timor-Leste	0.3	-0.1	0.2	-0.3
Tonga	0.3	0.3	0.1	-0.1
Turkmenistan	0.0	0.1	0.3	0.1
Tuvalu	0.4	0.2	0.0	0.0
Uzbekistan	0.5	0.6	0.4	0.5
Vanuatu	-0.1	-0.1	0.4	0.4
Viet Nam	0.4	-0.1	0.4	0.0

ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update.
Source: Author's calculations.

Table A3.2: Inflation (Consumer Price Index)

	Estimates		Forecasts	
	ADO	ADOU	ADO	ADOU
Afghanistan	-0.3	-0.6	0.3	-0.5
Armenia	-0.3	-0.3	-0.1	-0.4
Azerbaijan	0.0	-0.6	-0.3	-0.1
Bangladesh	0.1	0.2	0.8	0.8
Bhutan	0.1	0.7	0.0	0.5
Brunei Darussalam	0.4	0.6	-0.6	0.0
Cambodia	0.2	0.1	0.1	-0.4
Fiji	-0.5	0.1	-0.2	-0.1
Georgia	-0.1	-0.4	0.3	-0.4
Hong Kong, China	-0.4	0.1	0.4	-0.2
India	0.0	0.4	0.4	0.1
Indonesia	-0.6	0.1	-0.4	0.0
Kazakhstan	-0.3	-0.4	0.2	-0.4
Kiribati	0.0	0.1	0.4	-0.1
Republic of Korea	-0.1	-0.2	0.4	-0.4
Kyrgyz Republic	-0.3	-0.2	0.0	0.0
Lao People's Democratic Republic	0.3	0.3	0.3	0.1
Malaysia	0.1	0.0	0.3	0.2
Maldives	-0.6	-0.2	-0.5	-0.5
Marshall Islands	-0.3	0.3	-0.3	-0.3
Federated States of Micronesia	0.3	0.3	0.0	0.3
Mongolia	0.0	-0.1	0.5	0.1
Myanmar	0.2	-0.2	0.5	0.3
Nepal	-0.4	0.4	0.2	0.3
People's Republic of China	-0.8	0.0	-0.1	-0.3
Pakistan	-0.4	0.0	0.2	-0.1
Palau	0.0	0.0	0.0	0.0
Papua New Guinea	0.2	0.0	0.0	0.1
Philippines	-0.5	0.2	0.0	-0.3
Samoa	-0.4	-0.3	0.1	0.0
Singapore	0.2	-0.3	0.0	-0.2
Solomon Islands	0.0	0.0	0.0	0.6
Sri Lanka	0.0	-0.3	0.6	0.3
Taipei,China	0.4	0.8	-0.3	-0.2
Tajikistan	-0.2	0.0	0.0	0.5
Thailand	-0.2	-0.2	0.0	-0.1
Timor-Leste	-0.2	-0.1	-0.3	-0.6
Tonga	0.2	0.0	0.2	0.4
Turkmenistan	-0.6	-0.2	-0.1	0.2
Tuvalu	0.0	-0.2	-1.0	-0.4
Uzbekistan	-0.5	-0.7	-0.6	-0.6
Vanuatu	-0.7	-0.4	-0.4	-0.2
Viet Nam	0.5	0.8	-0.6	-0.2

ADO = Asian Development Outlook, ADou = Asian Development Outlook Update.
Source: Author's calculations.

Table A3.3: Asia-43 Average Count Scores by Years—Growth and Inflation

Year	GDP Growth				CPI Inflation			
	Estimates		Forecasts		Estimates		Forecasts	
	ADO	ADOU	ADO	ADOU	ADO	ADOU	ADO	ADOU
2007	0.0	-0.2	0.1	-0.2	-0.1	0.0	-0.2	-0.4
2008	-0.0	-0.1	-0.2	-0.4	-0.3	-0.2	0.0	-0.3
2009	0.3	0.1	-0.2	-0.2	-0.5	-0.0	-0.1	0.2
2010	-0.0	-0.1	0.5	0.3	-0.0	-0.1	0.3	0.1
2011	0.2	0.1	-0.1	-0.1	0.0	0.2	0.1	-0.2
2012	0.1	0.1	0.3	-0.1	-0.4	-0.2	0.2	-0.1
2013	-0.2	0.1	-0.1	0.2	0.0	0.2	-0.1	-0.1
2014	0.0	-0.1	0.4	-0.0	-0.1	-0.2	0.1	0.2
2015	0.1	0.2	-0.0	-0.1	-0.0	-0.0	-0.1	0.0
2016	-0.1	0.2	-0.1	-0.1	-0.0	0.2	-0.1	0.0

ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product.

Source: Author's calculations.

Table A3.4: Asia-11 Average Count Scores by Years—Growth and Inflation

Year	GDP Growth				CPI Inflation			
	Estimates		Forecasts		Estimates		Forecasts	
	ADO	ADOU	ADO	ADOU	ADO	ADOU	ADO	ADOU
2007	-0.1	-0.1	0.1	-0.2	-0.2	0.1	-0.5	-0.8
2008	-0.6	-0.6	-0.4	-1.0	0.0	-0.2	0.3	-0.4
2009	0.8	-0.1	-0.5	-1.0	-0.5	0.5	-0.4	-0.2
2010	0.1	-0.4	1.0	0.1	-0.1	0.3	-0.1	0.0
2011	0.2	-0.2	-0.1	-0.1	-0.3	0.5	0.3	-0.3
2012	-0.4	0.1	0.1	-0.6	0.2	0.2	-0.3	-0.3
2013	-0.4	-0.3	0.0	0.3	0.0	0.3	-0.1	0.1
2014	-0.2	-0.5	0.5	0.3	0.1	-0.4	0.5	0.4
2015	-0.1	0.5	-0.3	-0.1	-0.2	0.1	0.0	0.0
2016	0.0	0.2	-0.2	-0.4	-0.3	0.2	0.4	0.0

ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product.

Source: Author's calculations.

Appendix 4: Asia-43—Gross Domestic Product Forecast Optimism, 2011–2016

Table A4.1: Asian Development Outlook Optimism

Rank	ISO	Economy	Current Year		Year Ahead	
			Size	Count	Size	Count
1	AZE	Azerbaijan	-1.92	0.83	-3.82	0.83
2	BRU	Brunei Darussalam	-1.80	0.67	-2.43	0.83
3	FSM	Federated States of Micronesia	-1.72	1.00	-2.32	0.67
4	THA	Thailand	-1.33	0.67	-2.00	0.83
5	TAP	Taipei, China	-1.07	0.83	-1.83	1.00
6	VAN	Vanuatu	-0.67	0.83	-1.83	1.00
7	PNG	Papua New Guinea	-0.79	0.50	-1.44	0.33
8	SIN	Singapore	-0.47	0.80	-1.42	1.00
9	BHU	Bhutan	-1.08	0.83	-1.42	0.67
10	MON	Mongolia	-0.26	0.67	-1.41	0.67
11	TIM	Timor-Leste	-1.26	0.67	-1.41	0.83
12	AFG	Afghanistan	-0.08	0.50	-1.38	0.83
13	IND	India	-0.72	0.83	-1.35	0.67
14	SRI	Sri Lanka	-0.77	0.67	-1.33	0.83
15	HKG	Hong Kong, China	-0.61	1.00	-1.26	0.83
16	KAZ	Kazakhstan	-0.19	0.50	-1.24	0.83
17	KOR	Republic of Korea	-0.55	0.67	-1.18	1.00
18	NEP	Nepal	-0.37	0.33	-1.05	0.67
19	INO	Indonesia	-0.38	0.83	-0.78	0.83
20	MLD	Maldives	-0.45	0.50	-0.77	0.67
21	PRC	People's Republic of China	-0.33	0.83	-0.64	0.83
22	GEO	Georgia	-0.07	0.33	-0.53	0.50
23	KGZ	Kyrgyz Republic	0.25	0.33	-0.38	0.67
24	RMI	Marshall Islands	-1.53	0.67	-0.37	0.67
25	VIE	Viet Nam	0.00	0.50	-0.32	0.60
26	ARM	Armenia	0.25	0.50	-0.27	0.67
27	SAM	Samoa	0.28	0.83	-0.08	0.67
28	MAL	Malaysia	0.33	0.40	-0.03	0.40
29	LAO	Lao People's Democratic Republic	0.15	0.00	-0.02	0.50
30	PAK	Pakistan	0.31	0.20	0.01	0.40
31	UZB	Uzbekistan	0.42	0.17	0.02	0.33
32	CAM	Cambodia	0.21	0.20	0.11	0.50
33	MYA	Myanmar	-0.25	0.40	0.17	0.40
34	BAN	Bangladesh	0.37	0.17	0.21	0.17
35	TKM	Turkmenistan	0.63	0.50	0.30	0.33
36	SOL	Solomon Islands	-0.17	0.50	0.49	0.50
37	PHI	Philippines	0.37	0.50	0.50	0.33
38	TUV	Tuvalu	0.09	0.33	0.67	0.00
39	KIR	Kiribati	0.44	0.33	0.79	0.17
40	TON	Tonga	0.83	0.00	0.83	0.17
41	FIJ	Fiji	0.95	0.17	1.15	0.17
42	TAJ	Tajikistan	1.55	0.00	1.22	0.00
43	PAL	Palau	0.15	0.50	1.65	0.50
	Average	Asia-43	-0.24	0.52	-0.63	0.59

ISO = International Organization for Standardization.
Source: Author's calculations.

Table A4.2: Asian Development Outlook Update Optimism

Rank	ISO	Economy	Current Year		Year Ahead	
			Size	Count	Size	Count
1	AZE	Azerbaijan	-1.17	0.83	-2.57	0.83
2	BRU	Brunei Darussalam	-1.57	0.67	-2.23	0.83
3	FSM	Federated States of Micronesia	-0.78	0.67	-1.95	0.67
4	VAN	Vanuatu	-0.30	0.67	-1.83	1.00
5	THA	Thailand	-0.68	0.60	-1.80	0.83
6	BHU	Bhutan	-1.10	0.83	-1.48	0.83
7	TAP	Taipei,China	-0.23	0.67	-1.45	0.80
8	TIM	Timor-Leste	-1.17	0.67	-1.44	0.83
9	KAZ	Kazakhstan	0.33	0.50	-1.21	0.83
10	AFG	Afghanistan	0.20	0.67	-1.20	0.83
11	SRI	Sri Lanka	-0.52	0.67	-1.12	0.67
12	PNG	Papua New Guinea	0.56	0.40	-1.11	0.33
13	SIN	Singapore	-0.12	0.67	-1.08	0.83
14	HKG	Hong Kong, China	-0.08	0.75	-1.06	0.83
15	KOR	Republic of Korea	-0.25	0.67	-1.00	1.00
16	IND	India	-0.15	0.50	-0.98	0.67
17	NEP	Nepal	-0.08	0.33	-0.92	0.67
18	MLD	Maldives	-0.63	0.67	-0.82	0.67
19	INO	Indonesia	-0.08	0.80	-0.60	0.83
20	KGZ	Kyrgyz Republic	1.08	0.33	-0.47	0.67
21	GEO	Georgia	0.27	0.33	-0.45	0.50
22	PRC	People's Republic of China	0.01	0.40	-0.38	0.80
23	ARM	Armenia	0.37	0.50	-0.37	0.67
24	RMI	Marshall Islands	-1.53	0.67	-0.37	0.67
25	VIE	Viet Nam	0.22	0.00	-0.27	0.67
26	SAM	Samoa	-0.01	0.67	-0.04	0.67
27	LAO	Lao People's Democratic Republic	0.15	0.20	0.07	0.50
28	MAL	Malaysia	0.40	0.00	0.08	0.50
29	MON	Mongolia	1.49	0.17	0.09	0.67
30	BAN	Bangladesh	0.02	0.33	0.11	0.17
31	UZB	Uzbekistan	0.48	0.17	0.13	0.33
32	PAL	Palau	-0.35	1.00	0.15	0.50
33	MYA	Myanmar	-0.27	0.33	0.17	0.33
34	TKM	Turkmenistan	1.03	0.33	0.22	0.33
35	CAM	Cambodia	0.23	0.00	0.24	0.50
36	PAK	Pakistan	0.16	0.50	0.34	0.25
37	SOL	Solomon Islands	0.79	0.17	0.49	0.50
38	PHI	Philippines	0.17	0.50	0.55	0.40
39	TUV	Tuvalu	0.23	0.25	0.65	0.00
40	TON	Tonga	0.63	0.20	0.68	0.33
41	KIR	Kiribati	0.44	0.17	0.83	0.17
42	FIJ	Fiji	0.62	0.17	0.90	0.17
43	TAJ	Tajikistan	1.38	0.00	1.23	0.00
	Average	Asia-43	0.04	0.44	-0.49	0.59

ISO = International Organization for Standardization.
Source: Author's calculations.

Table A4.3: World Economic Outlook Optimism

Rank	ISO	Economy	Current Year		Year Ahead	
			Size	Count	Size	Count
1	BRU	Brunei Darussalam	-2.42	1.00	-3.52	0.83
2	TAP	Taipei,China	-1.18	0.80	-2.22	1.00
3	THA	Thailand	-1.37	0.67	-2.18	0.83
4	VAN	Vanuatu	-0.45	0.83	-2.13	1.00
5	BHU	Bhutan	-0.90	0.67	-1.68	0.67
6	TIM	Timor-Leste	-1.07	0.67	-1.68	0.67
7	AZE	Azerbaijan	-0.68	0.67	-1.57	0.83
8	AFG	Afghanistan	-0.18	0.50	-1.43	0.83
9	SIN	Singapore	-0.22	0.67	-1.38	1.00
10	HKG	Hong Kong, China	-0.57	1.00	-1.31	0.83
11	KOR	Republic of Korea	-0.53	0.67	-1.18	1.00
12	KGZ	Kyrgyz Republic	-0.13	0.33	-1.07	0.50
13	RMI	Marshall Islands	-1.10	0.67	-1.03	1.00
14	IND	India	-0.60	0.67	-1.00	0.67
15	KAZ	Kazakhstan	0.01	0.50	-0.94	0.80
16	NEP	Nepal	-0.25	0.50	-0.82	0.67
17	PRC	People's Republic of China	-0.18	0.67	-0.74	0.83
18	FSM	Federated States of Micronesia	-0.62	0.33	-0.72	0.67
19	INO	Indonesia	-0.13	0.50	-0.62	0.83
20	PNG	Papua New Guinea	-1.07	0.33	-0.49	0.33
21	SRI	Sri Lanka	-0.38	0.67	-0.47	0.67
22	GEO	Georgia	-0.07	0.33	-0.28	0.67
23	VIE	Viet Nam	0.07	0.50	-0.15	0.50
24	MLD	Maldives	-0.42	0.50	-0.03	0.50
25	SOL	Solomon Islands	-0.11	0.67	-0.01	0.67
26	LAO	Lao People's Democratic Republic	-0.13	0.83	0.03	0.50
27	BAN	Bangladesh	0.29	0.00	0.04	0.50
28	SAM	Samoa	0.49	0.67	0.04	0.67
29	PAK	Pakistan	0.34	0.20	0.08	0.33
30	MAL	Malaysia	0.20	0.50	0.08	0.33
31	CAM	Cambodia	0.33	0.40	0.23	0.50
32	MYA	Myanmar	-0.28	0.40	0.28	0.33
33	ARM	Armenia	0.68	0.50	0.35	0.50
34	TON	Tonga	0.28	0.33	0.37	0.33
35	MON	Mongolia	-1.03	0.67	0.51	0.67
36	TUV	Tuvalu	-0.03	0.50	0.63	0.00
37	TKM	Turkmenistan	1.88	0.33	0.68	0.33
38	KIR	Kiribati	0.28	0.17	0.79	0.33
39	PHI	Philippines	0.40	0.50	0.80	0.33
40	FIJ	Fiji	0.93	0.17	1.02	0.33
41	UZB	Uzbekistan	1.53	0.00	1.40	0.00
42	TAJ	Tajikistan	1.82	0.00	1.67	0.00
43	PAL	Palau	3.55	0.50	3.20	0.50
Average	Asia-43		-0.11	0.50	-0.46	0.59

ISO = International Organization for Standardization.
Source: Author's calculations.

Table A4.4: World Economic Outlook Update Optimism

Rank	ISO	Economy	Current Year		Year Ahead	
			Size	Count	Size	Count
1	BRU	Brunei Darussalam	-2.58	0.83	-3.53	0.83
2	BHU	Bhutan	-1.18	0.83	-2.63	0.83
3	AZE	Azerbaijan	-0.87	0.83	-2.58	0.83
4	VAN	Vanuatu	-0.30	0.80	-2.00	1.00
5	THA	Thailand	-0.42	0.60	-1.90	0.80
6	KGZ	Kyrgyz Republic	0.42	0.50	-1.73	0.67
7	TAP	Taipei,China	-0.35	0.60	-1.70	1.00
8	HKG	Hong Kong, China	-0.24	0.83	-1.11	0.83
9	RMI	Marshall Islands	-1.07	0.67	-1.03	1.00
10	KOR	Republic of Korea	-0.20	0.67	-1.02	1.00
11	MON	Mongolia	0.66	0.67	-0.94	0.67
12	AFG	Afghanistan	0.55	0.50	-0.93	0.83
13	FSM	Federated States of Micronesia	-0.45	0.33	-0.88	1.00
14	NEP	Nepal	-0.17	0.50	-0.85	0.50
15	TIM	Timor-Leste	0.06	0.67	-0.82	0.50
16	SIN	Singapore	-0.13	0.67	-0.67	0.67
17	KAZ	Kazakhstan	0.48	0.50	-0.59	0.67
18	IND	India	0.10	0.50	-0.55	0.67
19	SRI	Sri Lanka	-0.27	0.67	-0.50	0.67
20	PRC	People's Republic of China	-0.03	0.50	-0.33	0.80
21	PNG	Papua New Guinea	-0.11	0.67	-0.31	0.33
22	LAO	Lao People's Democratic Republic	-0.33	1.00	-0.28	0.83
23	INO	Indonesia	0.13	0.17	-0.27	0.83
24	ARM	Armenia	-0.00	0.33	-0.23	0.67
25	GEO	Georgia	0.28	0.50	-0.18	0.67
26	VIE	Viet Nam	0.18	0.00	-0.17	0.67
27	SOL	Solomon Islands	0.33	0.50	-0.02	0.67
28	TUV	Tuvalu	-0.27	0.80	0.03	0.50
29	MYA	Myanmar	-0.43	0.60	0.07	0.33
30	MAL	Malaysia	0.23	0.40	0.15	0.60
31	SAM	Samoa	0.41	0.50	0.16	0.67
32	CAM	Cambodia	0.23	0.25	0.18	0.50
33	TON	Tonga	0.25	0.50	0.18	0.33
34	BAN	Bangladesh	0.17	0.00	0.19	0.17
35	TKM	Turkmenistan	0.82	0.33	0.30	0.50
36	PAK	Pakistan	0.13	0.50	0.41	0.20
37	MLD	Maldives	0.42	0.17	0.42	0.33
38	KIR	Kiribati	0.06	0.40	0.59	0.17
39	PHI	Philippines	0.32	0.50	0.67	0.33
40	FIJ	Fiji	0.27	0.33	0.75	0.17
41	UZB	Uzbekistan	1.18	0.00	1.32	0.00
42	TAJ	Tajikistan	1.22	0.00	1.62	0.00
43	PAL	Palau	3.65	0.00	3.20	0.50
	Average	Asia-43	0.04	0.50	-0.46	0.59

ISO = International Organization for Standardization.

Source: Author's calculations.

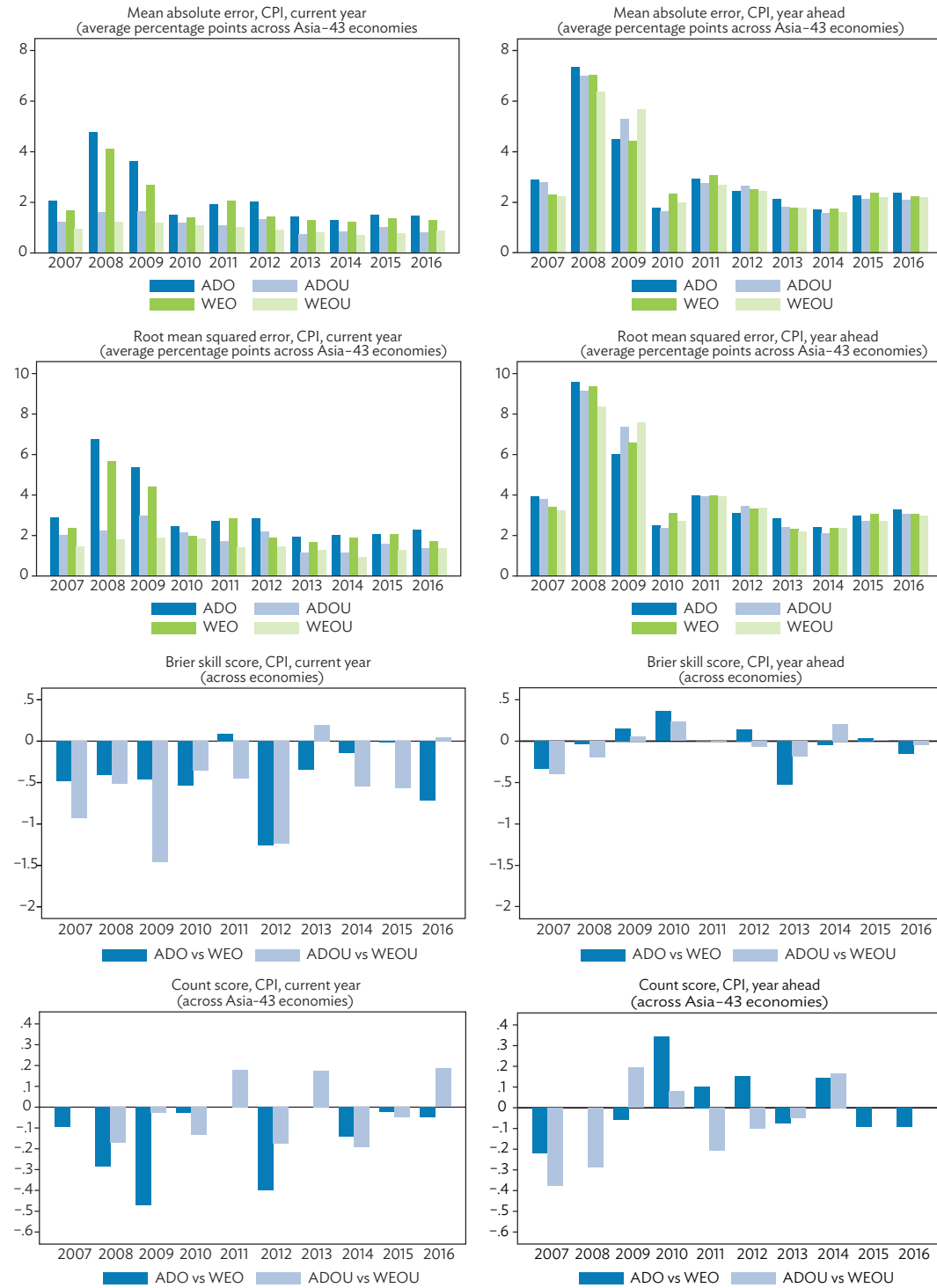
Appendix 5: Asia-43 Forecast Errors and Brier Scores by Years

Figure A5.1: Asia-43 Gross Domestic Product Growth, Current Year and Year Ahead



ADO = Asian Development Outlook, ADUO = Asian Development Outlook Update, GDP = gross domestic product, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A5.2: Asia-43 Inflation (Consumer Price Index) Current Year and Year Ahead



ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Appendix 6: Asia-43 Forecast Errors and Brier Scores by Economies

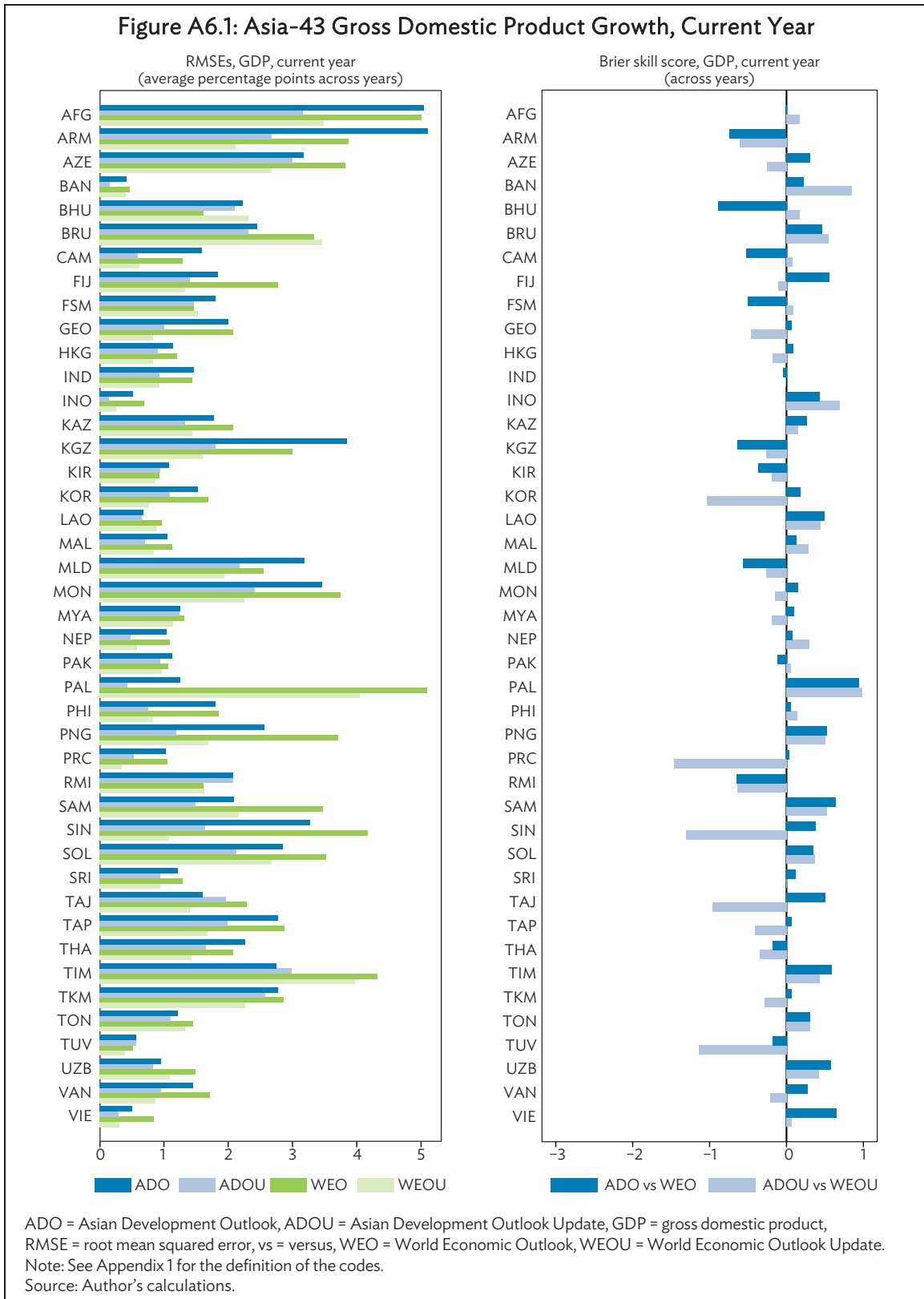
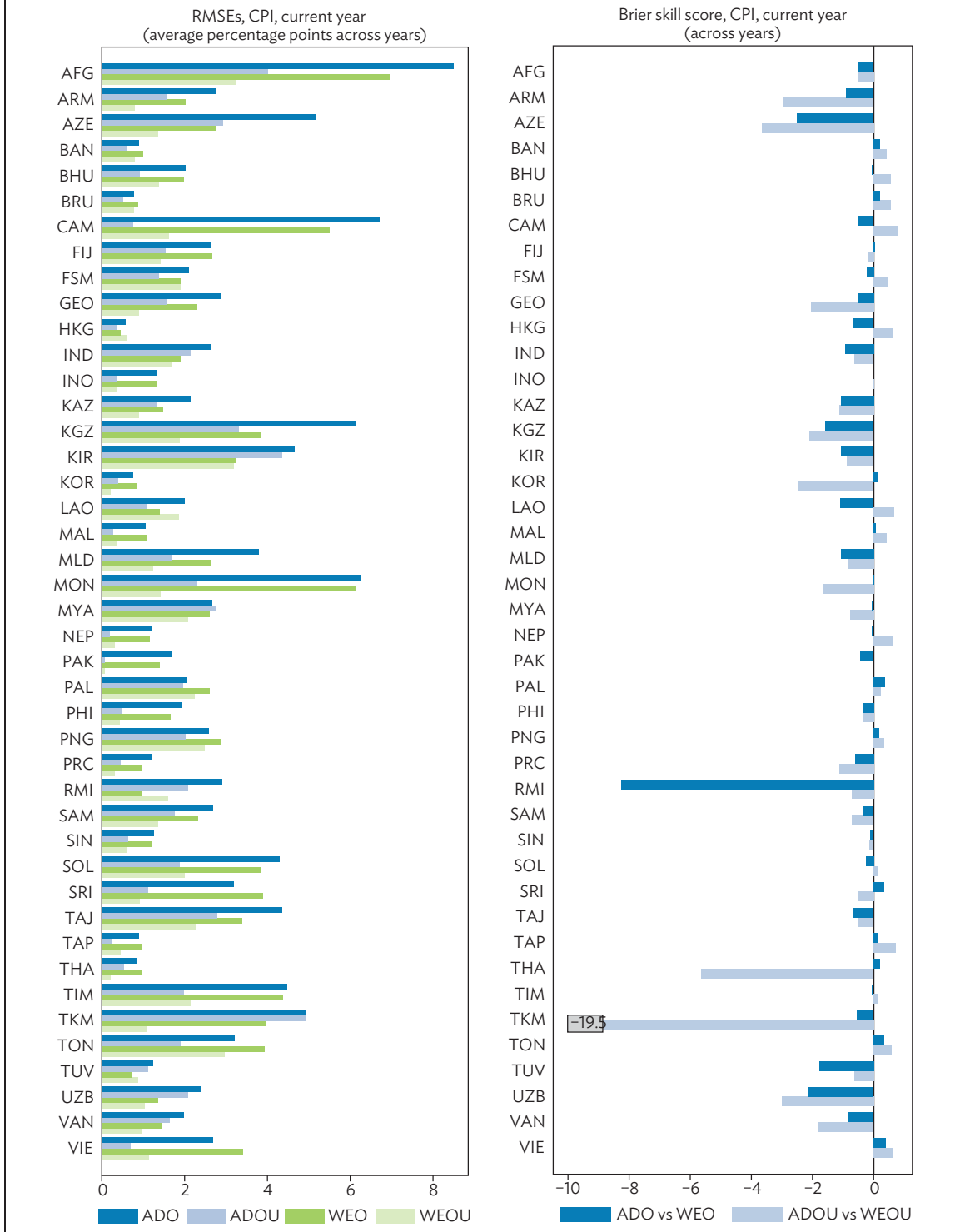


Figure A6.2: Asia-43 Gross Domestic Product Growth, Year Ahead



ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, GDP = gross domestic product, RMSE = root mean squared error, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update. Note: See Appendix 1 for the definition of the codes. Source: Author's calculations.

Figure A6.3: Asia-43 Inflation (Consumer Price Index) Current Year



ADO = Asian Development Outlook, AD OU = Asian Development Outlook Update, CPI = Consumer Price Index, RMSE = root mean squared error, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update. Note: See Appendix 1 for the definition of the codes. Source: Author's calculations.

Figure A6.4: Asia-43 Inflation (Consumer Price Index) Year Ahead



ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, RMSE = root mean squared error, vs = versus, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Note: See Appendix 1 for the definition of the codes.
 Source: Author's calculations.

Appendix 7: Asia-11 Growth and Inflation Forecast Errors by Economies, Reports, and Years

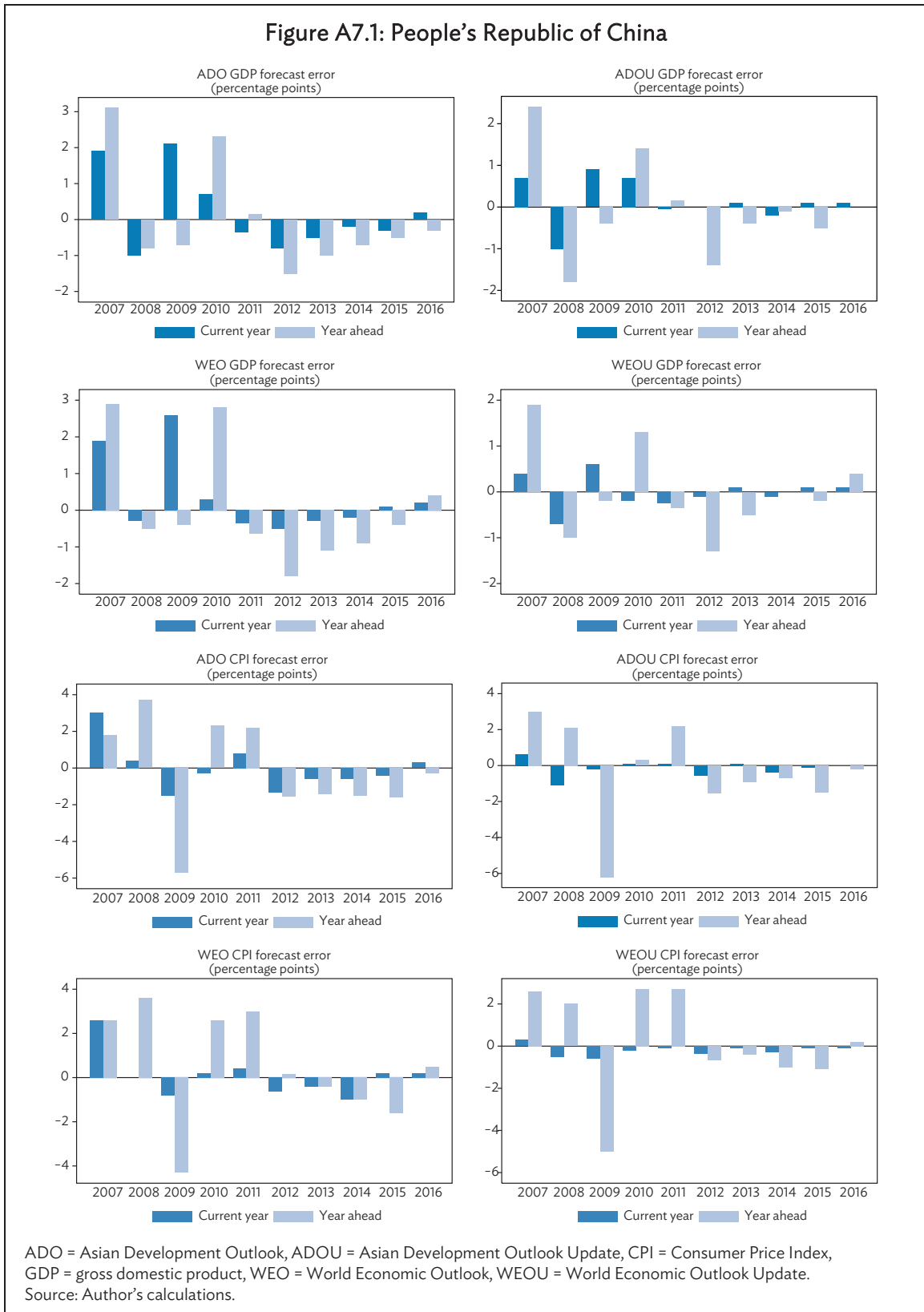
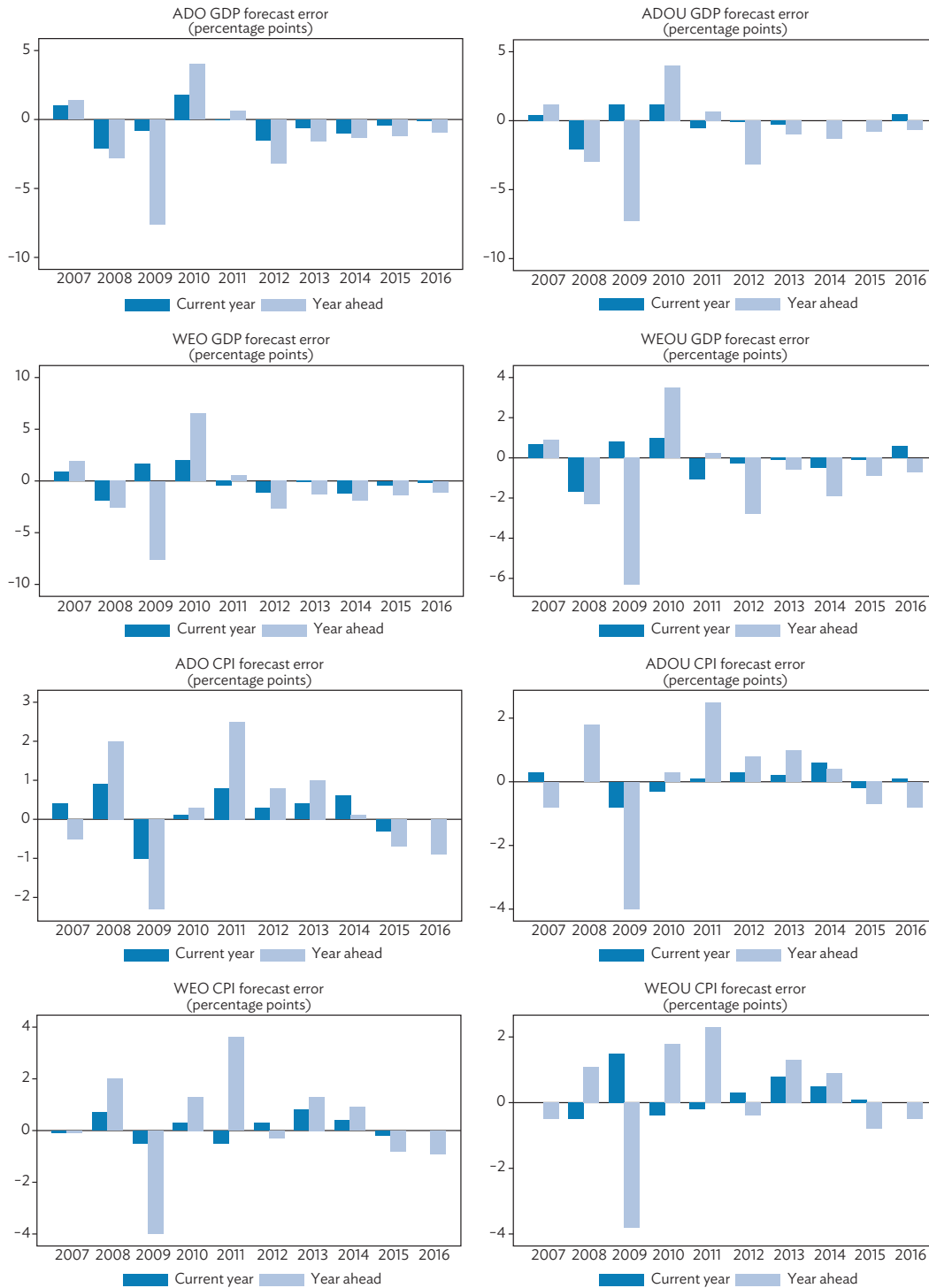
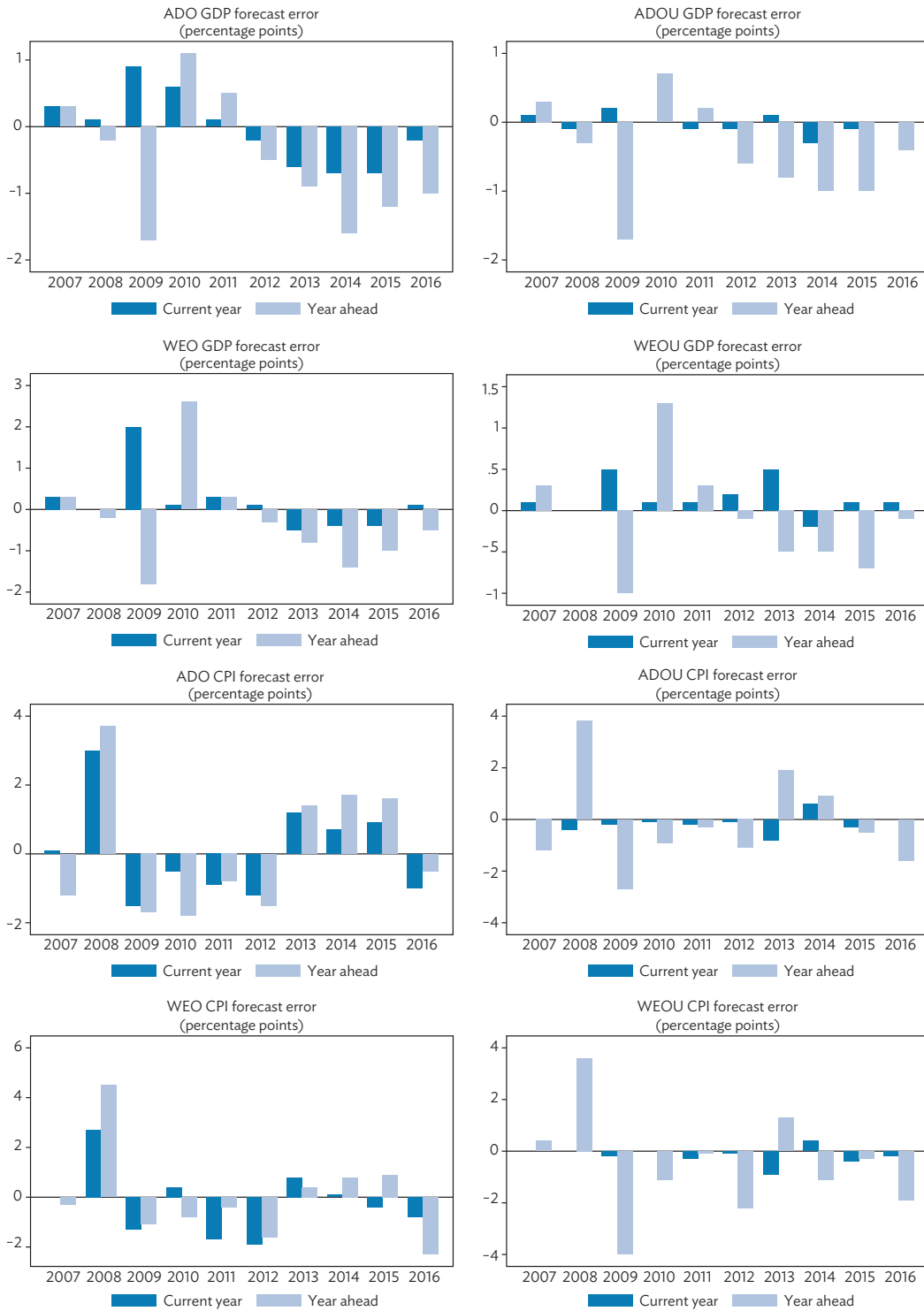


Figure A7.2: Hong Kong, China



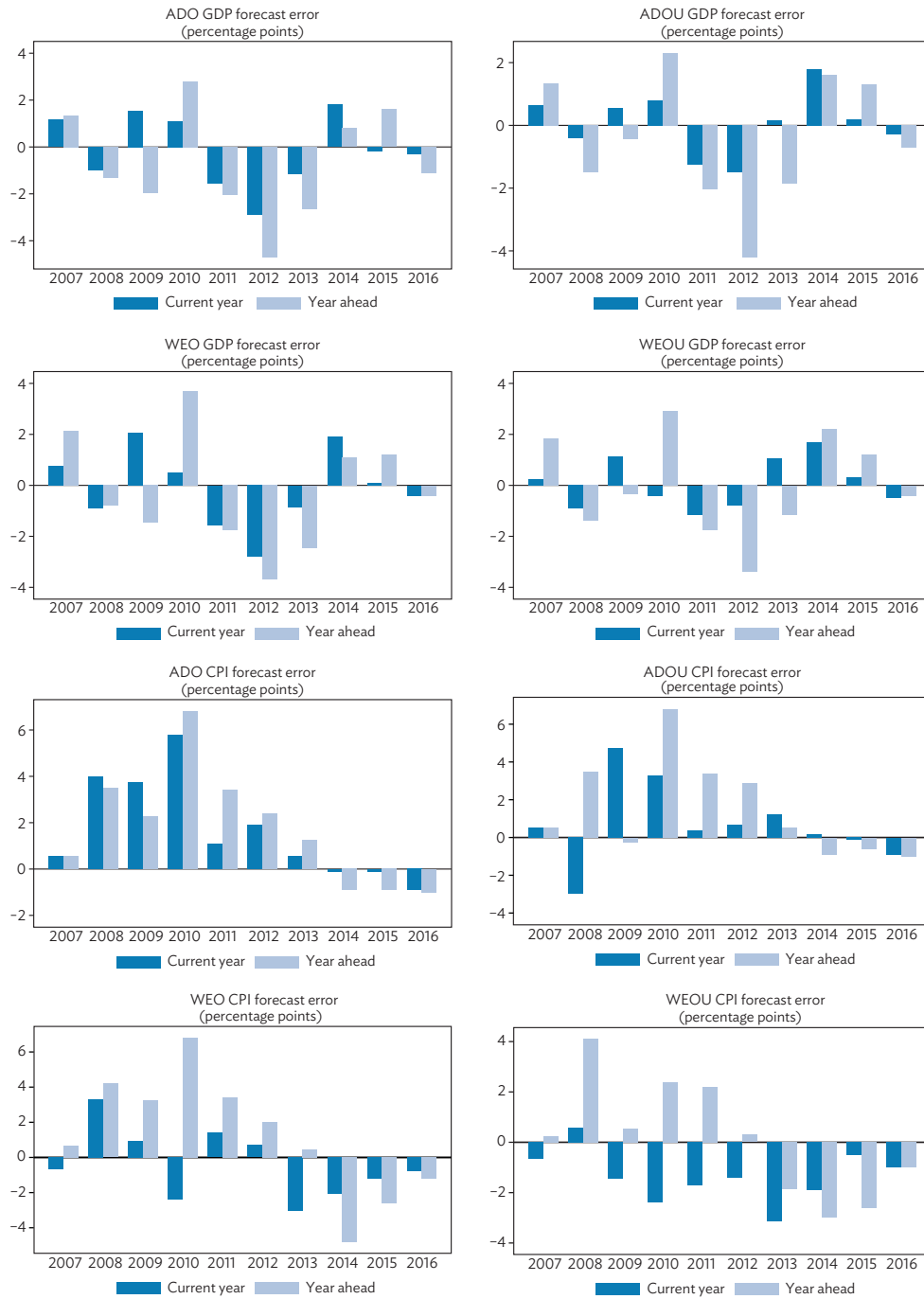
ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update. Source: Author's calculations.

Figure A7.3: Indonesia



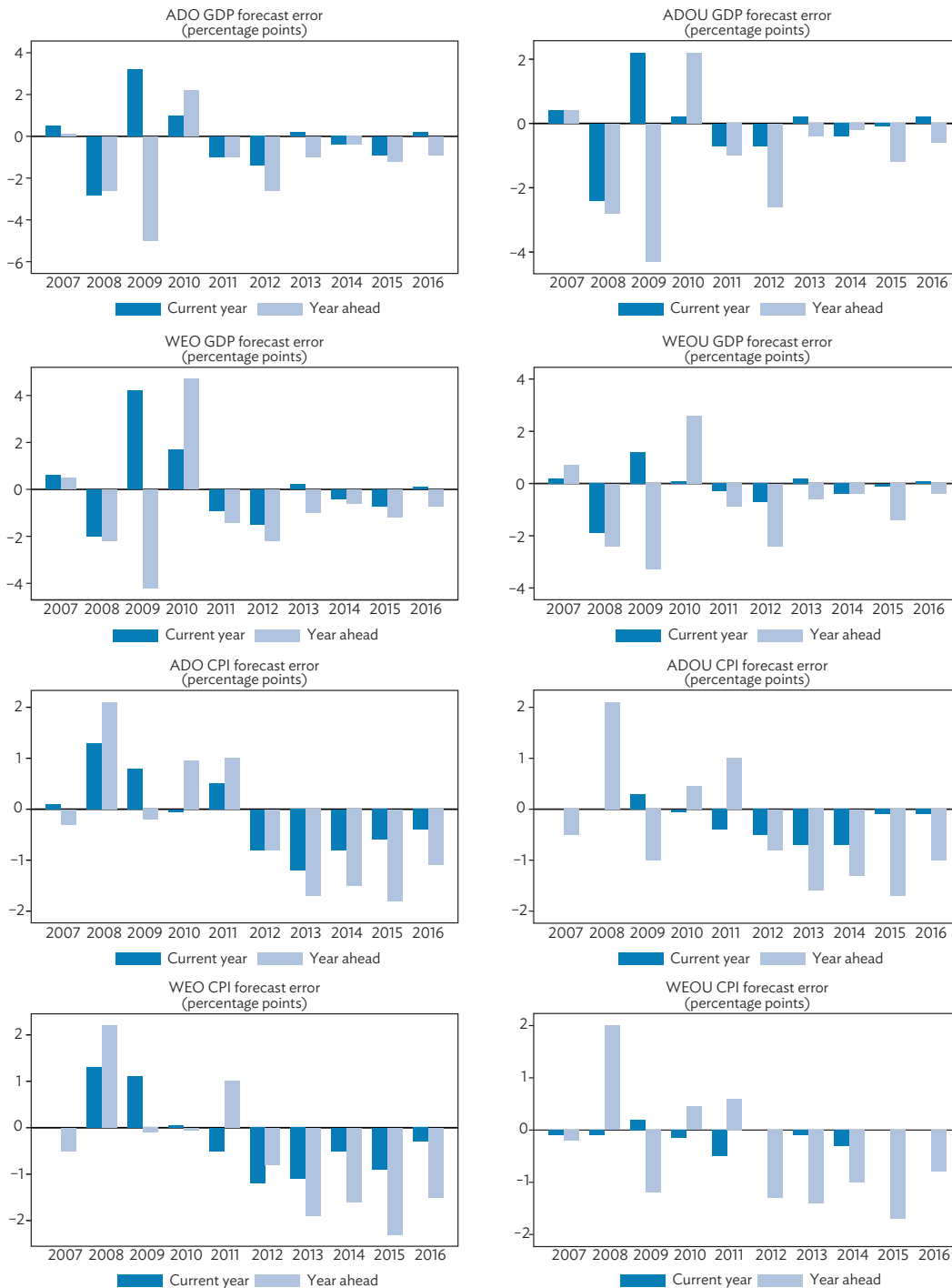
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A7.4: India



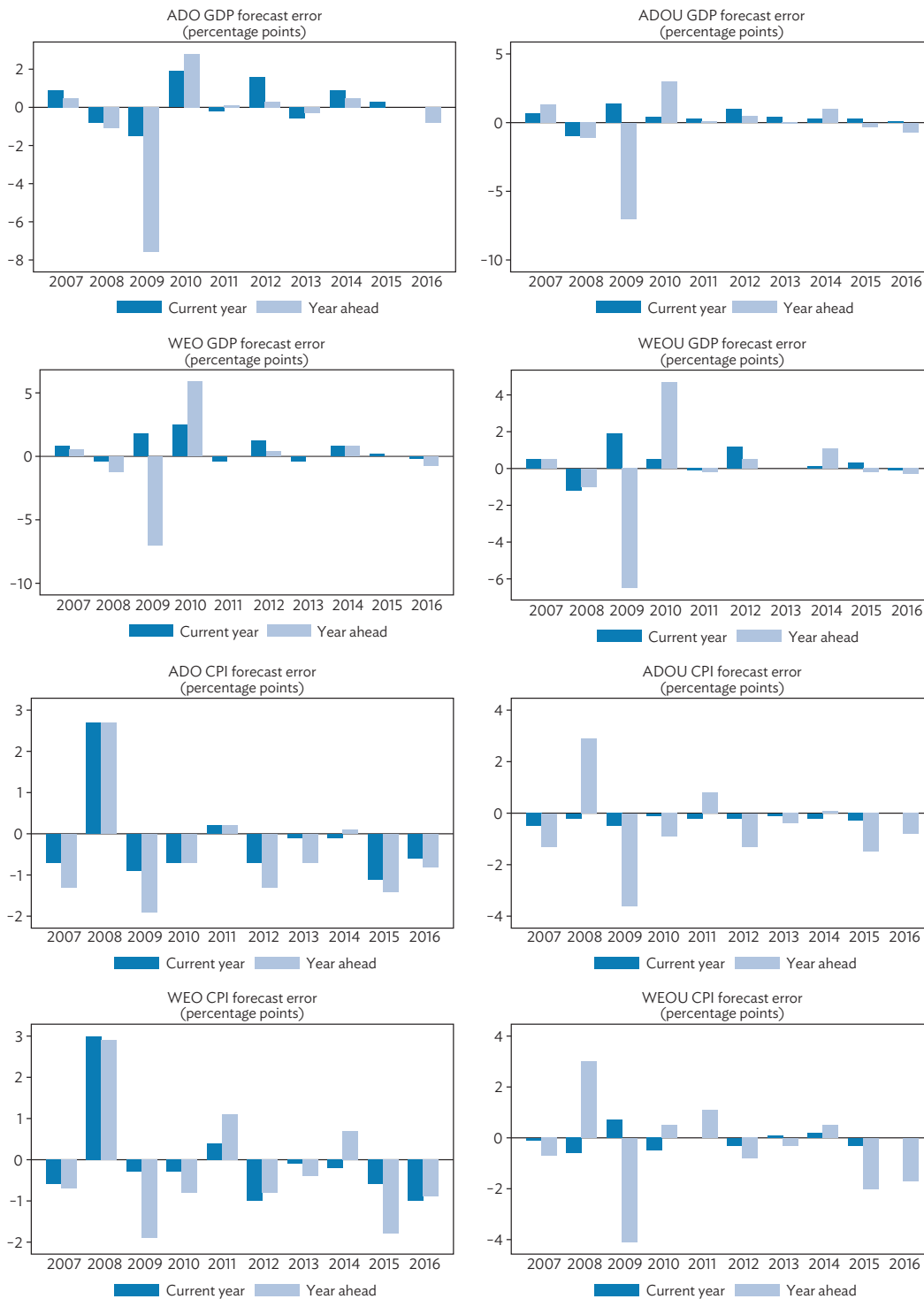
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update. Source: Author's calculations.

Figure A7.5: Republic of Korea



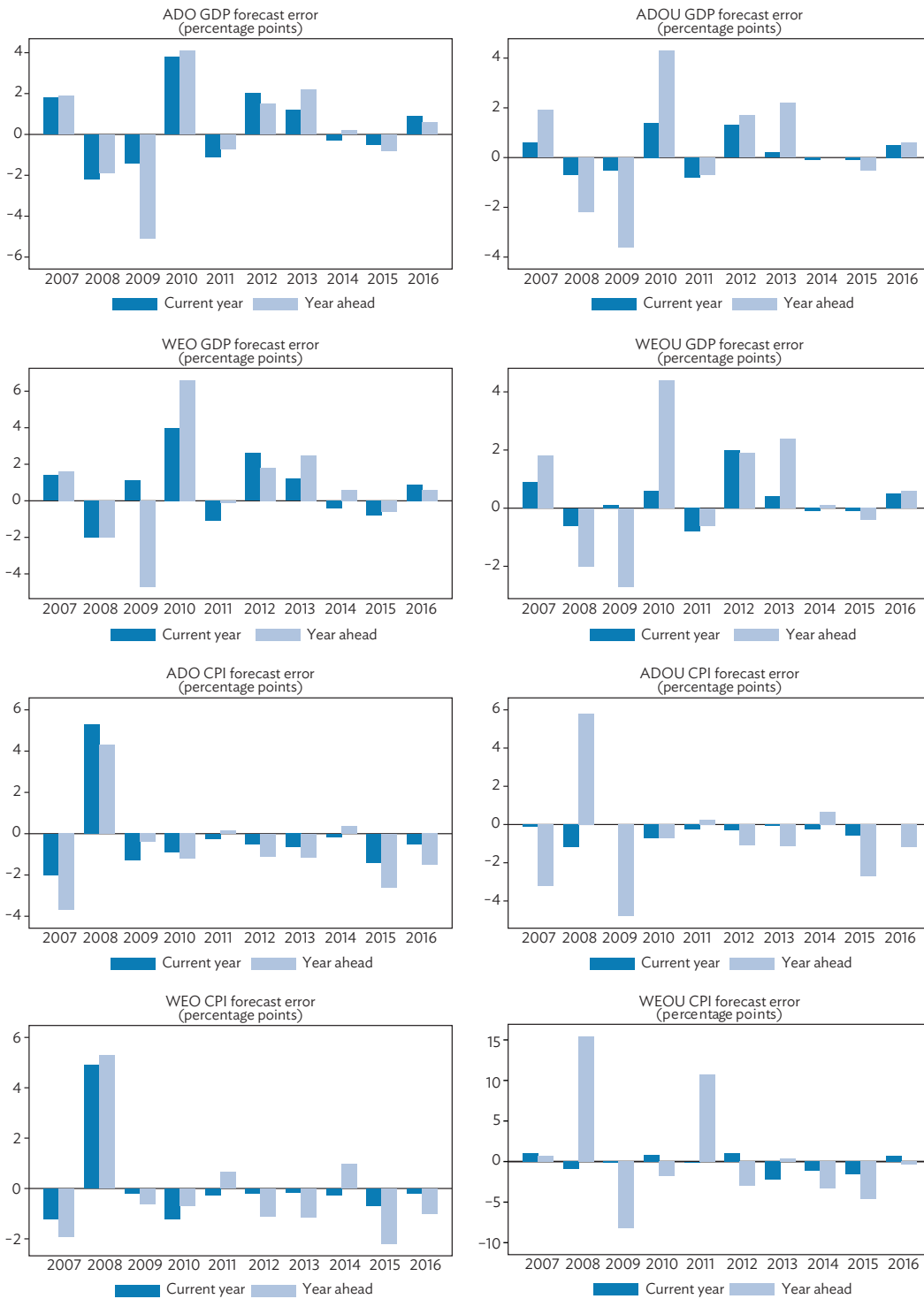
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A7.6: Malaysia



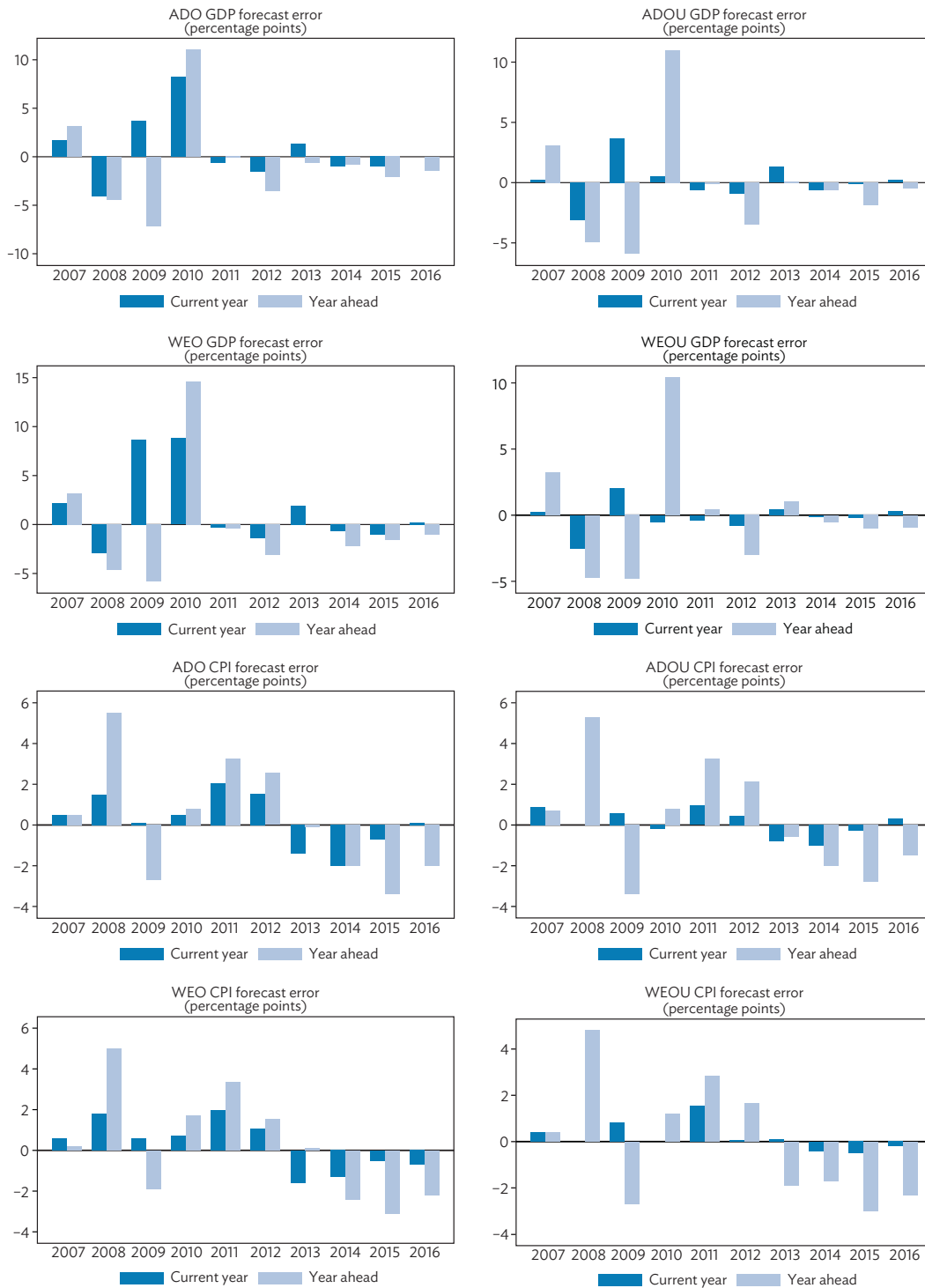
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A7.7: Philippines



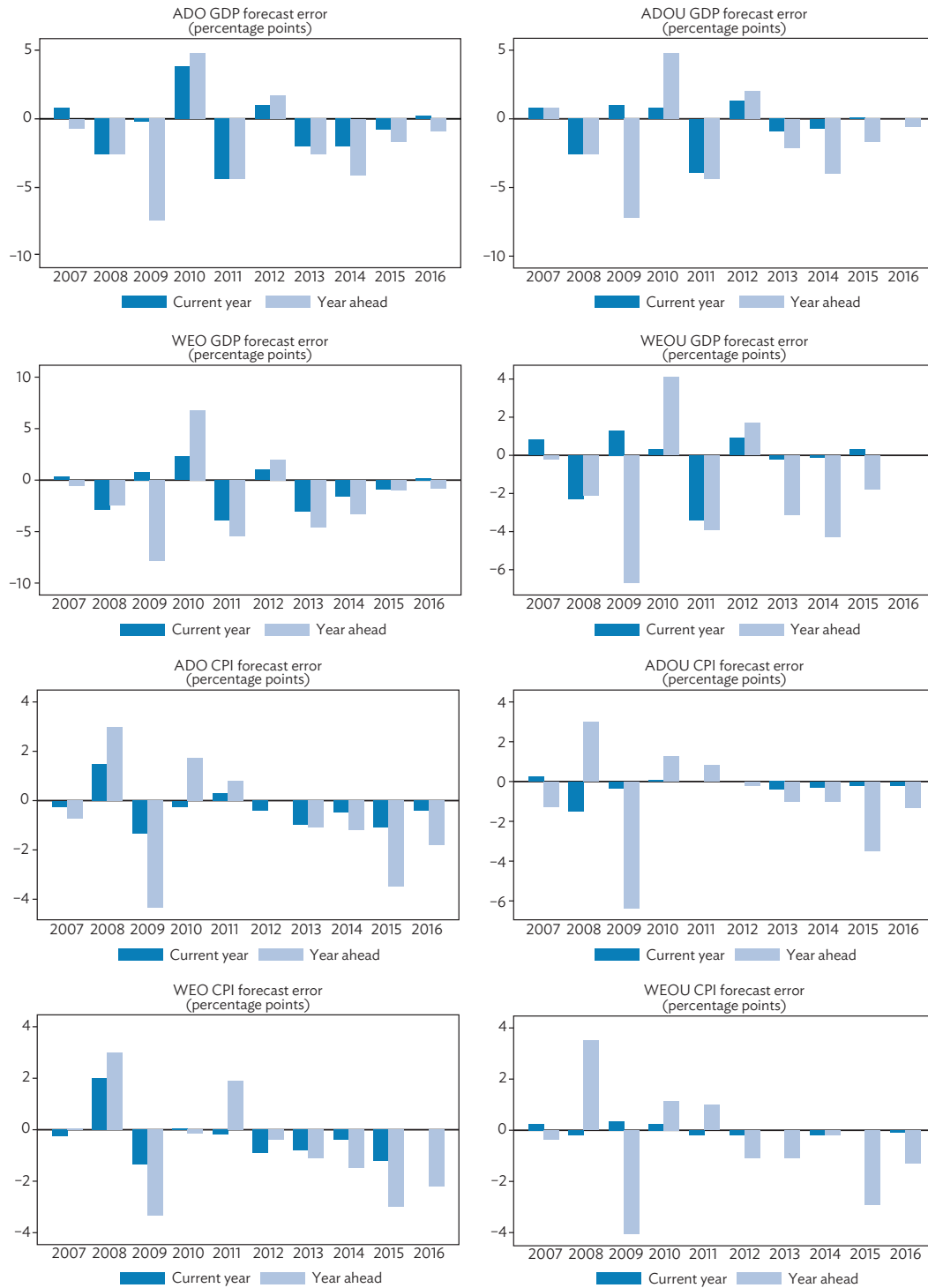
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A7.8: Singapore



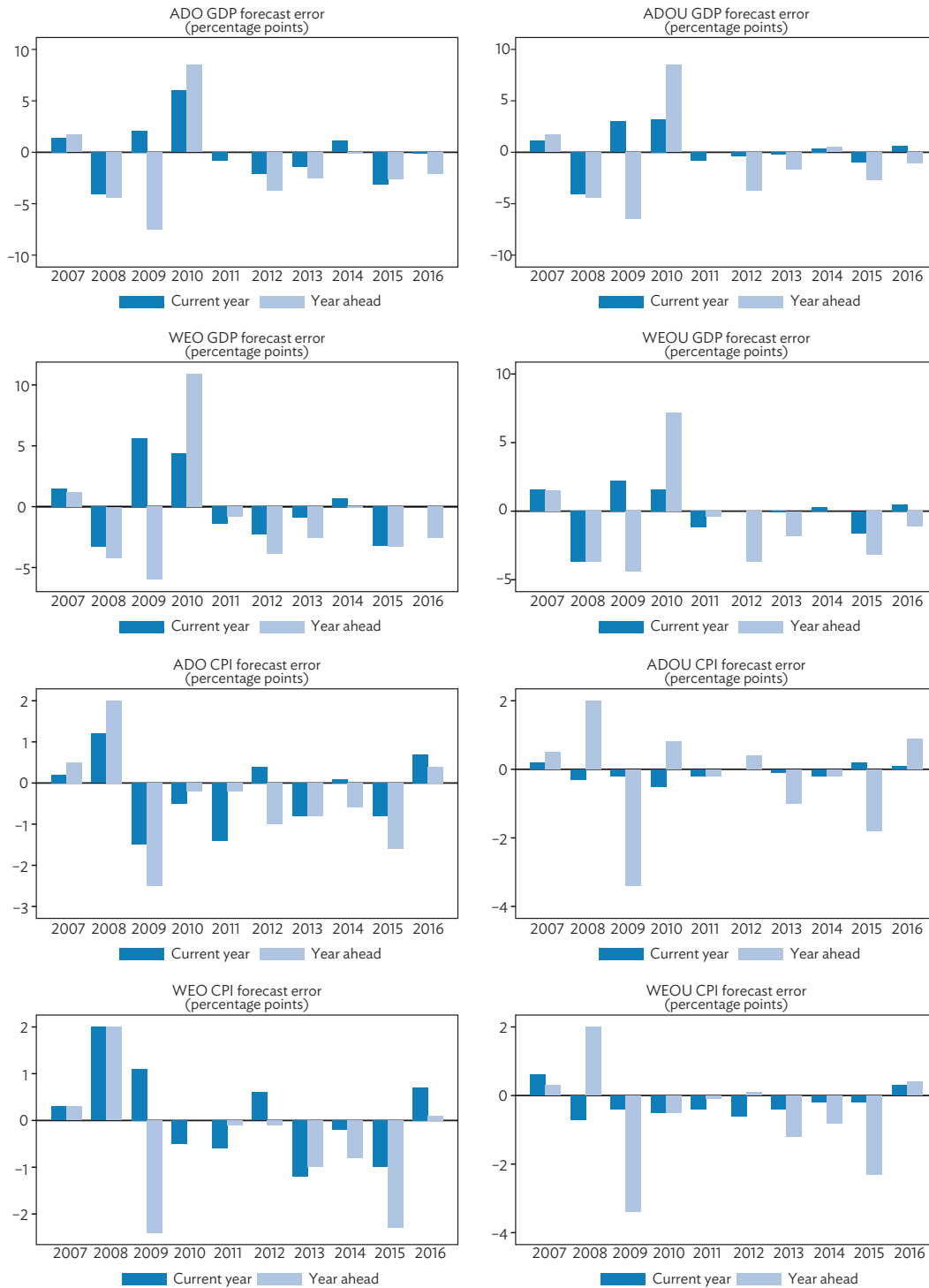
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A7.9: Thailand



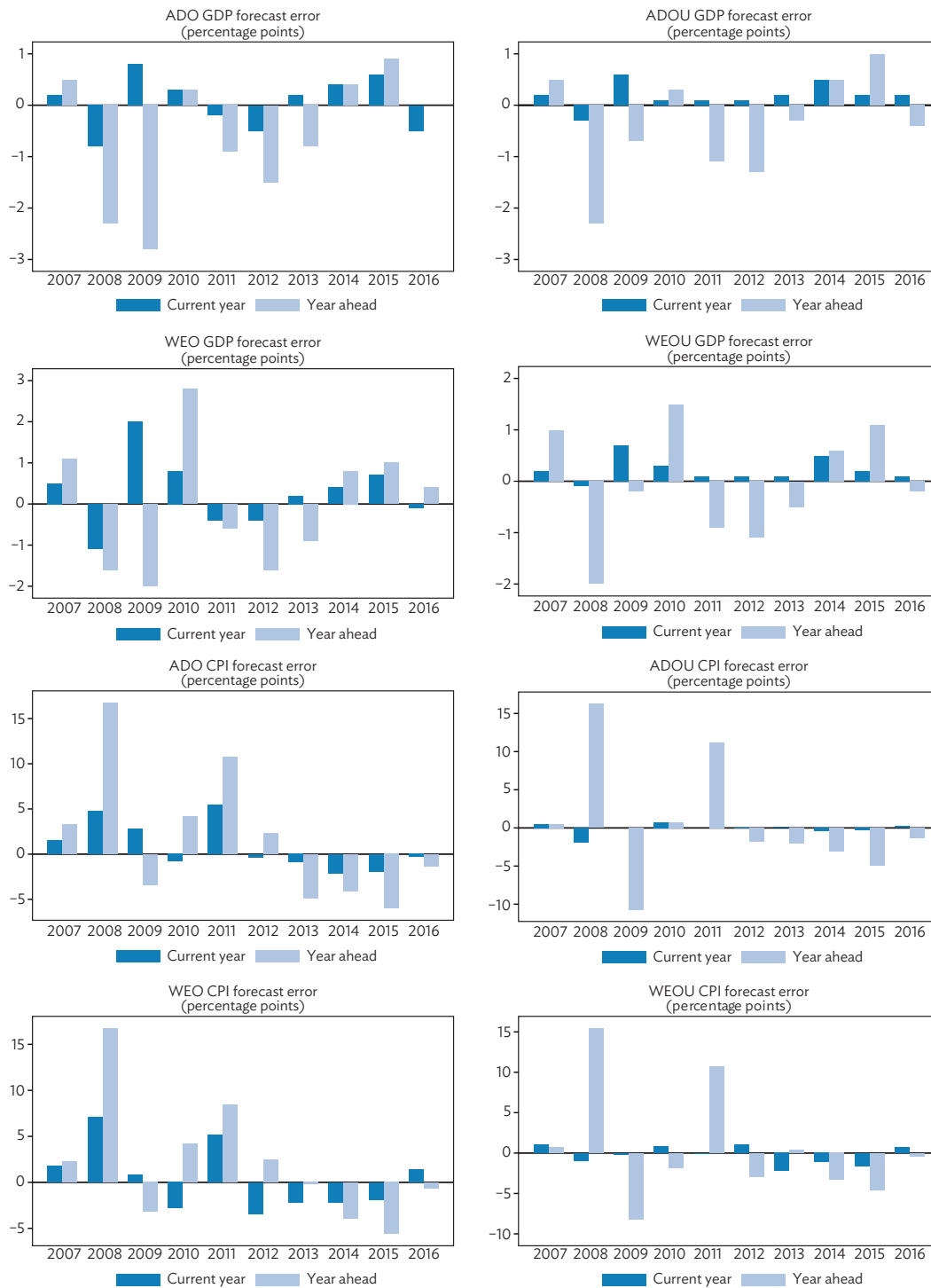
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A7.10: Taipei,China



ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A7.11: Viet Nam



ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, CPI = Consumer Price Index, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Appendix 8: G3 Growth and Inflation Forecast Errors

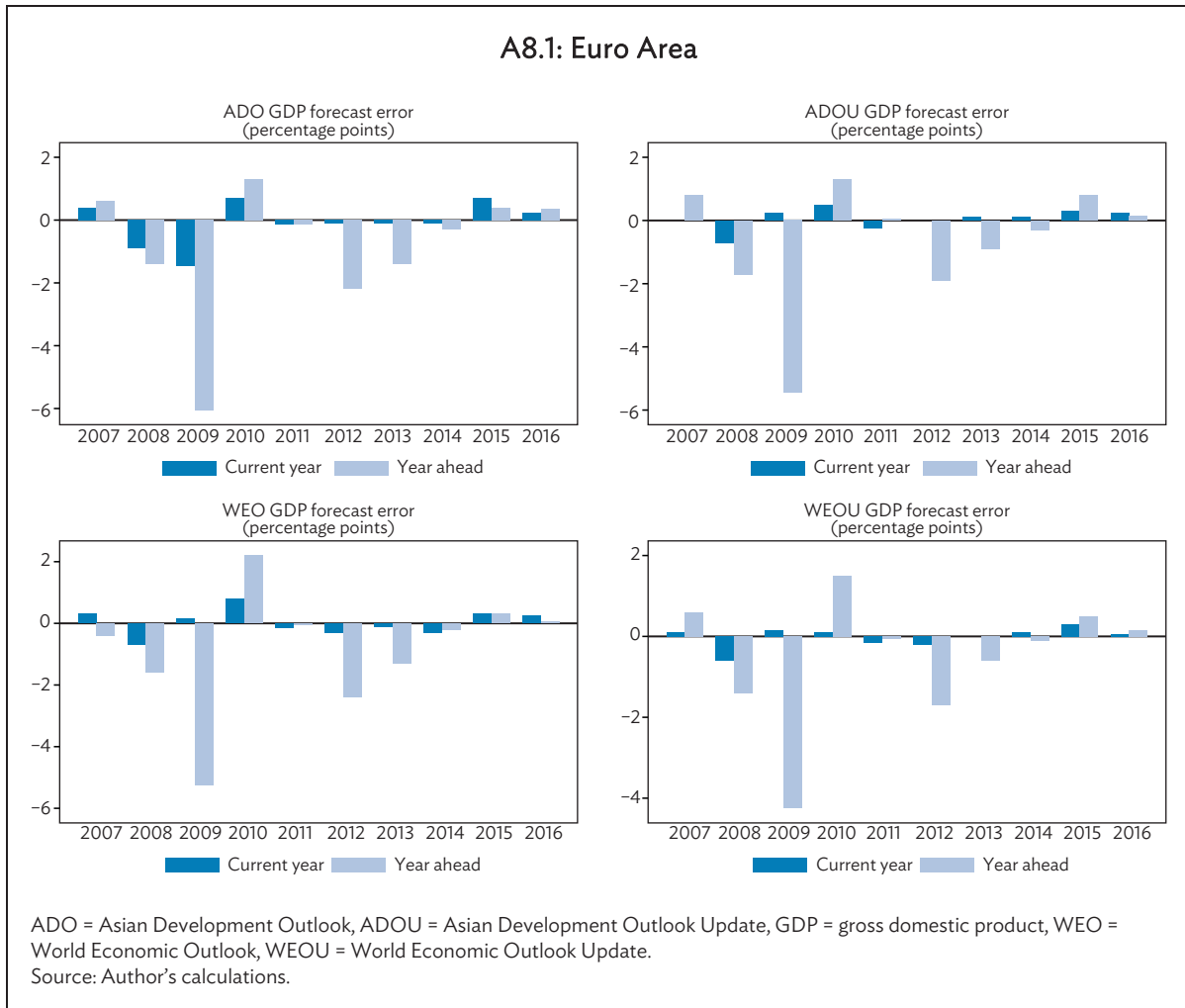
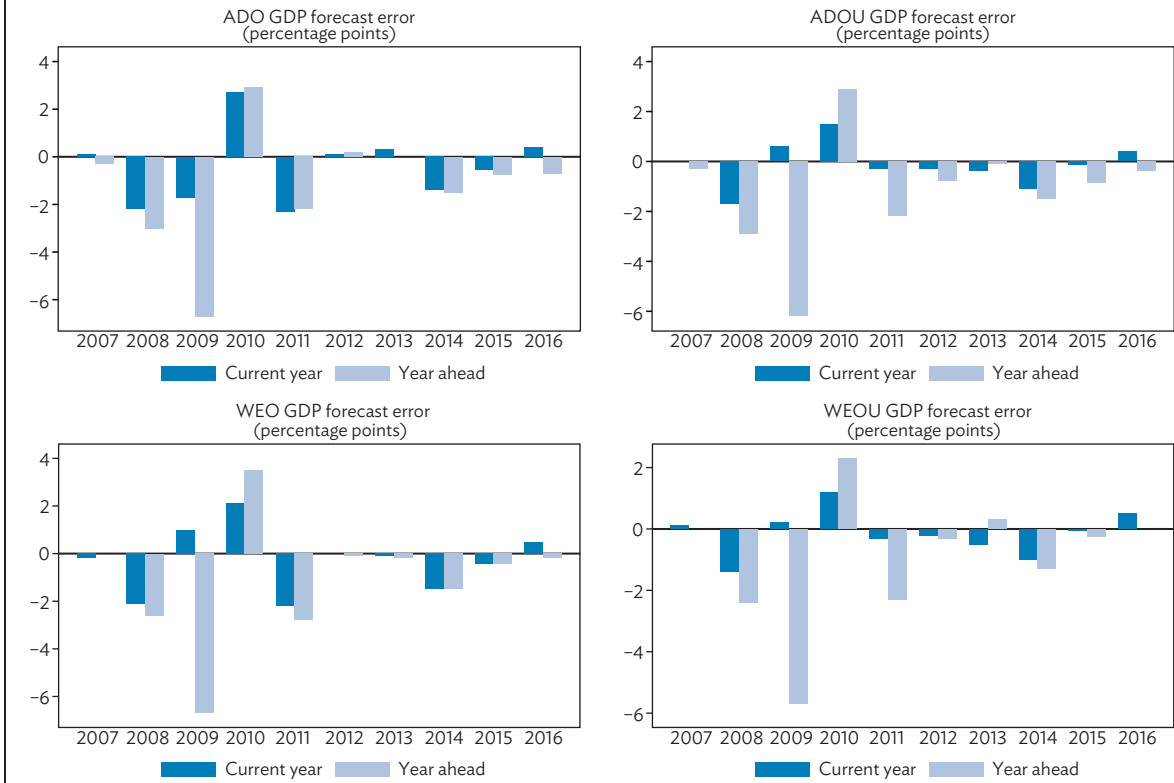
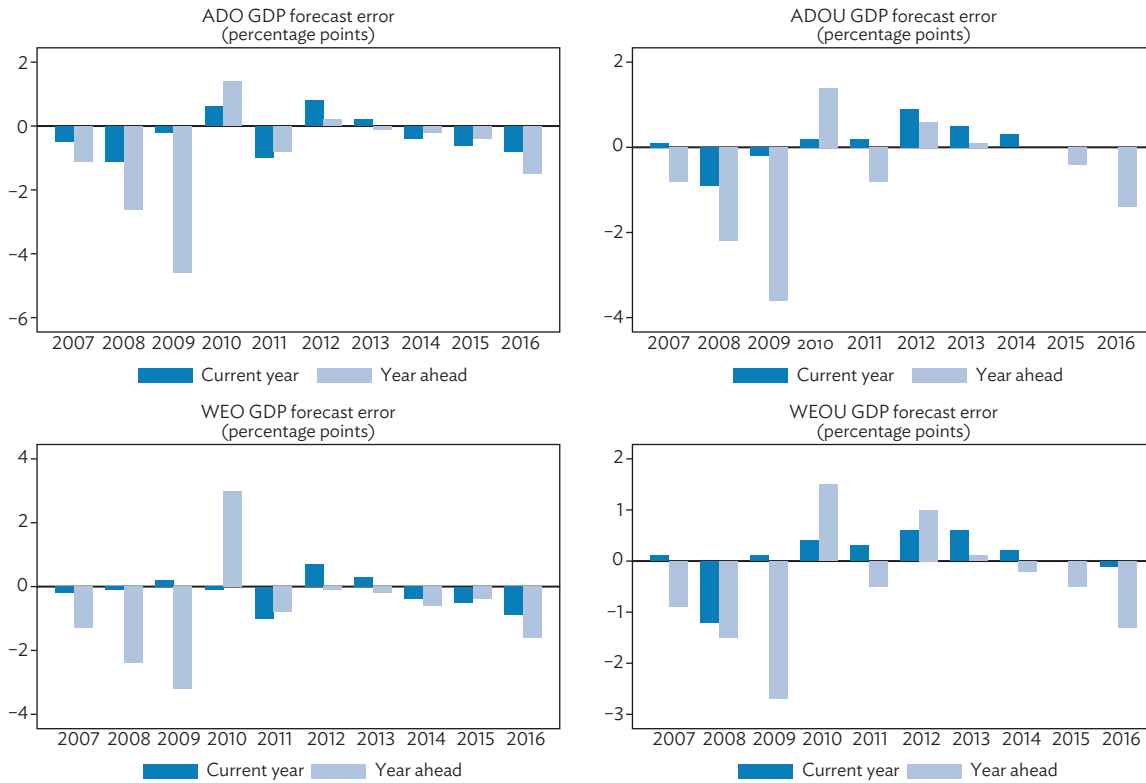


Figure A8.2: Japan



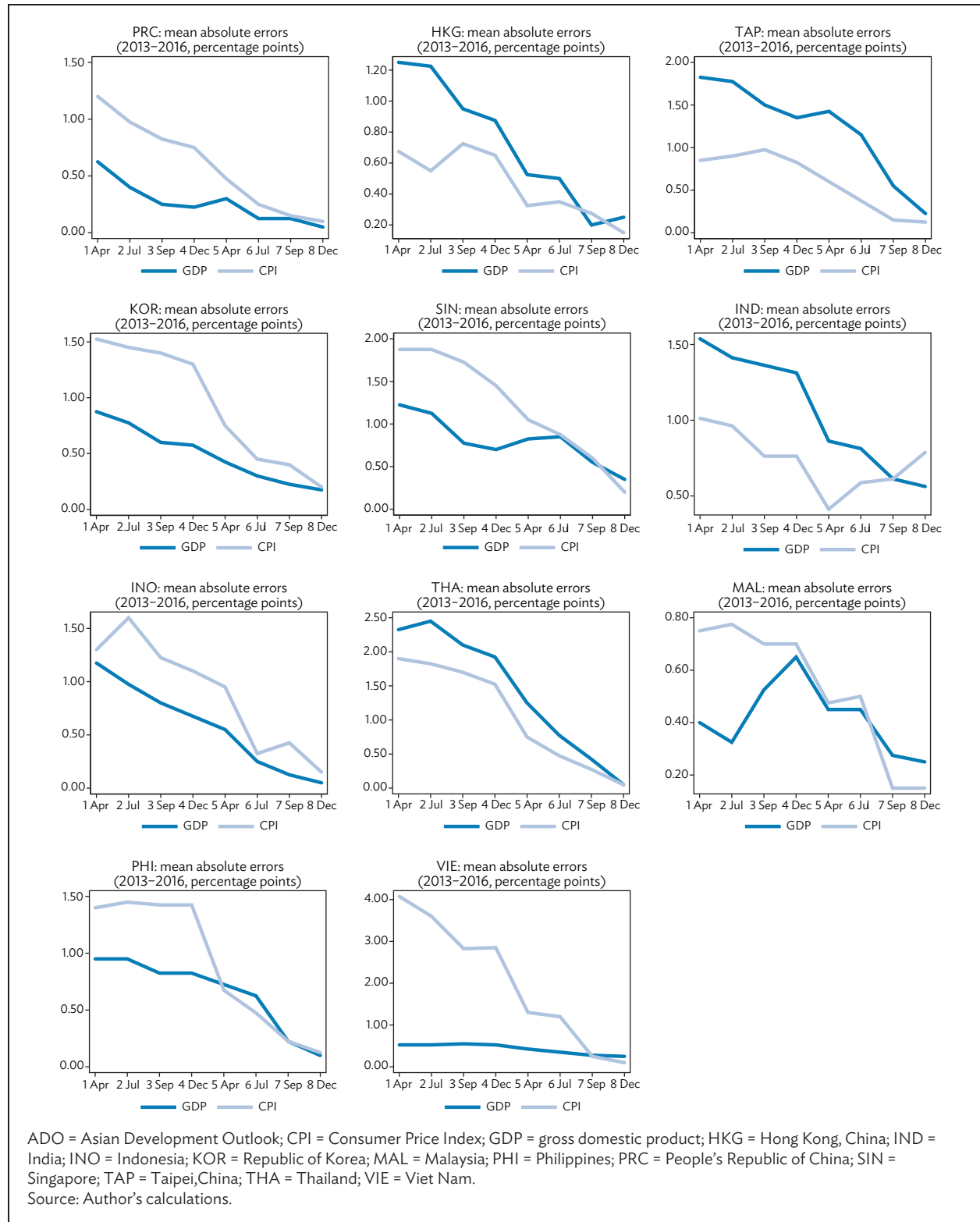
ADO = Asian Development Outlook, ADU = Asian Development Outlook Update, GDP = gross domestic product, WEO = World Economic Outlook, WEU = World Economic Outlook Update.
 Source: Author's calculations.

Figure A8.3: United States



ADO = Asian Development Outlook, ADOU = Asian Development Outlook Update, GDP = gross domestic product, WEO = World Economic Outlook, WEOU = World Economic Outlook Update.
 Source: Author's calculations.

Appendix 9: ADO Quarterly Updated GDP Forecast Errors, 2013–2016 Averages



REFERENCES

- Brier, Glenn W. 1950. "Verification of Forecasts Expressed in Terms of Probability." *Monthly Weather Review* 78 (1): 1-3.
- Ferrarini, Benno. 2014. "Asian Development Outlook Forecast Skill." ADB Economics Working Paper Series Number 386. Manila: Asian Development Bank.

Asian Development Outlook Forecast Accuracy 2007–2016

This report assesses the accuracy of the Asian Development Outlook (ADO) growth and inflation forecasts for 43 Asian economies from 2007 to 2016. This is done in relation to the benchmark of World Economic Outlook (WEO) projections by the International Monetary Fund. Amid much heterogeneity across countries and years, it has been found that ADO and WEO projections overlap quite closely. Both are inaccurate, especially during crisis years, suggesting that forecasters struggle to come up with reliable forecasts. Projections only sharpen when additional data and evidence become available over time and are incorporated during quarterly revisions.

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ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 67 members—48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



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