

Planning Ahead: Measuring Fiscal Cyclical-ity With News

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Abstract

I contribute to a literature on fiscal cyclical-ity by measuring ex-ante and contemporaneous budget responses to the business cycle separately. This is accomplished by measuring the effects of output growth and ex-ante news on fiscal balances using 2SLS with trade shock instruments. In addition to replicating results from previous work finding countercyclical budget responses to contemporaneous output changes in wealthy OECD and middle-income developing countries, I also offer evidence that countries in these two groups react countercyclically to output forecasts to a degree nearly as large by planning future budget measures.

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1 Introduction

A substantial literature exists comparing the cyclical properties of fiscal policy in industrial and developing countries, where countercyclical fiscal policy expands (contracts) the fiscal deficit in response to a recession (boom) and procyclical fiscal policy does the exact opposite. The bulk of this work finds that while fiscal policy in industrial countries tends to respond counter- or acyclically to business cycles, fiscal policy in developing countries tends to be procyclical. Many of the papers that find fiscal procyclicality in developing countries (e.g. Frankel, Vegh and Vuletin (2013), Gavin, Hausmann, Perotti and Talvi (1996), Gavin and Perotti (1997), Kaminsky, Reinhart and Vegh (2004), Talvi and Vegh (2000), and Vegh and Vuletin (2014)) do so in a descriptive sense in that they rely on correlations between fiscal and business cycle indicators.

A number of papers also estimate causal fiscal response functions by using an instrument for output growth or output gap. Gali and Perotti (2003) and Rigobon (2004) use output growth of a large trade partner and terms of trade as instruments, respectively, but neither are able to produce precise estimates. Jaimovich and Panizza (2007) refines the instrument used in Gali and Perotti (2003) into a country- and year-specific export shock and finds that both industrial and developing countries have countercyclical fiscal deficits, but is not able to precisely estimate the cyclical response of primary expenditures. Ilzetzki and Vegh (2008) use the export shock from Jaimovich and Panizza (2007) and U.S. Treasury bill rates as instruments to estimate the cyclicity of primary expenditures via GMM and find that while their estimate for industrial countries is indeterminate, developing countries' primary expenditures are highly procyclical.

I extend upon this work by using instrumental variables regression to examine how fiscal cyclicity differs by the timing of budgeting decisions. In a given year, a government's fiscal policy is affected not only by automatic stabilizers and ad-hoc legislation targeting current output, but also by budgeting decisions either planned in the past or preempting expected future conditions. To distinguish between these forms of budgeting, in addition to

contemporaneous output growth, I also measure the responses of fiscal policy to prior news shocks regarding current output and to news observed in the present about future growth.

As in previous work (e.g. Jaimovich and Panizza (2007), Kaminsky et al. (2004)), I perform my analyses on separate sub-samples of wealthy OECD countries, middle-income developing countries, and low-income developing countries. I find that OECD countries practice countercyclical fiscal policy with respect to expected future output growth in addition to contemporaneous output growth. My results for medium-income developing countries also affirm that their contemporaneous fiscal responses are countercyclical, although evidence is mixed as to whether their ex-ante fiscal responses are counter- or acyclical. Weak identification issues afflict most of my analysis on low-income developing countries, but the few reliable results I obtain suggest that like OECD members, these countries practice countercyclical contemporaneous and ex-ante fiscal policy.

2 Defining Fiscal Reaction Functions With News

I measure fiscal cyclicity using data on national governments' primary balance, which is their total annual revenue minus total annual expenditures plus annual net interest payments, all expressed as shares of GDP. The primary balance accurately represents the component of a government's budget under its control by leaving out debt servicing costs, which depend directly on interest rates and budgeting decisions from previous years. I define a government budget as procyclical (countercyclical) if its primary balance responds negatively (positively) to realized or predicted increases in output.¹

When estimating the distinct contemporaneous and pre-planned responses of fiscal policy to the business cycle, I use specifications of the following form:

$$primbal_{i,t} = \alpha^T \vec{News}_i(t) + \beta * g_{i,t} + \gamma_1 * \% \Delta TOT_{i,t} + \gamma_2 * primbal_{i,t-1} + \mu_i + \epsilon_{i,t} \quad (1)$$

where $primbal_{i,t}$ is primary balance, $g_{i,t}$ is real output growth, $\% \Delta TOT_{i,t}$ is the percent change of a terms of trade index, and μ_i is a country fixed effect. \vec{News}_i is an operator which maps the time index t to a vector of one or more of the news variables from [Table 1](#).

¹This is a different conception of fiscal cyclicity than the one used by Kaminsky et al. (2004) and Ilzetzi and Vegh (2008), which take the tax rate and not the level of tax revenue as the government's revenue control variable. For example, if a country experiencing a boom cuts the income tax rate, ceteris paribus, by a small enough amount so that it still experiences an increase in revenue, I would classify this behavior as countercyclical while Kaminsky et al. (2004) and Ilzetzi and Vegh (2008) would classify it as procyclical. Nevertheless I repeat my analysis with the alternative view in [Appendix B](#).

Table 1: News variable definitions

News variable	Symbol	Definition
1-Year prior output growth forecast	$News_{i,t-1}(t)$	$(\mathbb{E}_{i,S,t-1}(g_{i,t}) + \mathbb{E}_{i,F,t-1}(g_{i,t}))/2$
2-Year prior output growth forecast	$News_{i,t-2}(t)$	$(\mathbb{E}_{i,S,t-2}(g_{i,t}) + \mathbb{E}_{i,F,t-2}(g_{i,t}))/2$
1-Year prior output growth differenced forecast	$\Delta News_{i,t-1}(t)$	$(\mathbb{E}_{i,S,t-1}(g_{i,t}) + \mathbb{E}_{i,F,t-1}(g_{i,t}) - \mathbb{E}_{i,S,t-2}(g_{i,t}) - \mathbb{E}_{i,F,t-2}(g_{i,t}))/2$
2-Year prior output growth differenced forecast	$\Delta News_{i,t-2}(t)$	$(\mathbb{E}_{i,S,t-2}(g_{i,t}) + \mathbb{E}_{i,F,t-2}(g_{i,t}) - \mathbb{E}_{i,S,t-3}(g_{i,t}) - \mathbb{E}_{i,F,t-3}(g_{i,t}))/2$
1-Year forward output growth forecast	$News_{i,t}(t+1)$	$(\mathbb{E}_{i,S,t}(g_{i,t+1}) + \mathbb{E}_{i,F,t}(g_{i,t+1}))/2$
2-Year forward output growth forecast	$News_{i,t}(t+2)$	$(\mathbb{E}_{i,S,t}(g_{i,t+2}) + \mathbb{E}_{i,F,t}(g_{i,t+2}))/2$
1-Year forward output growth differenced forecast	$\Delta News_{i,t}(t+1)$	$(\mathbb{E}_{i,S,t}(g_{i,t+1}) + \mathbb{E}_{i,F,t}(g_{i,t+1}) - \mathbb{E}_{i,S,t-1}(g_{i,t+1}) - \mathbb{E}_{i,F,t-1}(g_{i,t+1}))/2$
2-Year forward output growth differenced forecast	$\Delta News_{i,t}(t+2)$	$(\mathbb{E}_{i,S,t}(g_{i,t+2}) + \mathbb{E}_{i,F,t}(g_{i,t+2}) - \mathbb{E}_{i,S,t-1}(g_{i,t+2}) - \mathbb{E}_{i,F,t-1}(g_{i,t+2}))/2$

Note: $\mathbb{E}_{t,S/F,t-k}(g_{i,t})$ is the forecast of country i 's real output growth in year t from the IMF WEO report released in Spring/Fall of year $t - k$.

When $g_{i,t}$ is controlled for, the fiscal response to a backward-looking news variable like $News_{i,t-k}(t)$ can be interpreted as the result of budgeting decisions made in year $t - k$ but scheduled to take effect in year t . In contrast, the fiscal response to a forward-looking news variable like $News_{i,t}(t + k)$ can be interpreted as the result of budgeting decisions made and implemented in the present to preempt expected economic conditions in future year $t + k$. Also, level news variables like $News_{i,t-1}$ can be used to describe a government with a consistently anchored policy reaction function, while differenced news variables like $\Delta News_{i,t-1}$ can be used to describe a government which re-anchors its policy reaction function frequently and only notices changes in expected output growth.

3 Exogenous Instruments for Contemporaneous and Forecasted Output Growth

To identify a government’s reaction function, OLS estimation is not sufficient. While output changes affect the fiscal surplus, the fiscal surplus also affects output growth. To address this source of simultaneity, an instrument for real GDP growth exogenous to the fiscal stance is needed.

Jaimovich and Panizza (2007) approach this issue by instrumenting output growth using an export shock (2), where $(\frac{EXP}{GDP})_i$ is the average of country i ’s export share of GDP across all years in the sample, $dests_{i,t}$ is the set of indices for countries receiving country i ’s exports in year t , $g_{j,t}$ is real output growth for country j in year t , and $w_{i,j,t}$ are weights proportional to country i ’s exports to country j in year t with $\sum_{j \in dests_{i,t}} w_{i,j,t} = 1$.

$$ExpShock_{i,t} = (\frac{EXP}{GDP})_i \sum_{j \in dests_{i,t}} w_{i,j,t} g_{j,t} \quad (2)$$

Jaimovich and Panizza (2007) reason that for most countries A and B in their sample, A’s exports to B make up a relatively small share of B’s total imports, so a change in A’s fiscal stance should have little effect on B’s total output growth.² I use the same measure as in Jaimovich and Panizza (2007) wherever I instrument for contemporaneous output growth in this paper.

Just as a country’s contemporaneous output growth can be endogenous to its fiscal stance, so can news about that country’s output growth. For example, for some country i , a permanent cut to tax rates announced in year $t - k$ and planned for year t would affect k year-ahead growth forecasts for country i in year $t - k$ while being correlated with i ’s fiscal stance in year t .

To address this endogeneity concern, I generate a forecast export shock instrument for

²This exogeneity claim might not hold for large exporters like the United States. In [Appendix A](#), I repeat my analysis omitting the largest exporters from my sample and find similar results.

each news variable. The reasoning behind the exogeneity of $ExpShock_{i,t}$ also applies to these instruments for news; for typical countries A and B, forecasters shouldn't expect a planned future change to A's fiscal stance to have much effect on B's future output growth.

The vector of forecast export shock instruments for $News_i(t)$ is given by (3). $W_{ij}(t)$ is a matrix which weights each news variable in $News_j(t)$ based on the year in which it was first observed. For example, $News_{j,t-1}(t)$ would receive the weight $w_{ij,t-1}$, $\Delta News_{j,t-2}$ would receive the weight $w_{ij,t-2}$, and $News_{j,t}(t+1)$ would receive the weight $w_{ij,t}$.

$$Fct\vec{Shock}_i(t) = \left(\frac{EXP}{GDP}\right)_i \sum_{j \in dests_{i,t}} W_{ij}(t) \vec{News}_j(t) \quad (3)$$

4 Data

Real GDP growth and terms of trade index data are provided by the World Bank World Development Indicators Databank, and the primary balance data are calculated using data from the same source. All news variables are functions of real GDP forecasts from the International Monetary Fund's Historical World Economic Outlook Forecasts Database. Trade data used to compute the average export shares and export weights for the shock instruments are provided by the International Monetary Fund's Direction of Trade Statistics database.

All continuous variables used to produce regression tables in this paper are winsorized at the 1st and 99th percentiles. My regression sample includes data from 1990 through 2019.³

I conduct my regression analyses for three sub-samples - the majority of OECD countries, medium-income developing countries, and low-income developing countries. My classifications are similar to those used by Jaimovich and Panizza (2007) and Kaminsky et al. (2004). I include a table matching countries to their categories and explain my grouping choices further in [Appendix D](#).

³2020 data is also available, but I explain why these data are omitted in [Appendix C](#).

Table 2: Summary Statistics

	mean	sd	N	p1	p25	p50	p75	p99
Primary balance (% GDP)	0.29	6.22	2908	-10.72	-1.60	0.17	1.86	14.84
Real YoY GDP Growth (%)	3.69	5.12	6227	-10.95	1.48	3.81	6.05	17.12
% Change in terms-of-trade index	0.63	12.77	3586	-31.55	-3.85	0.00	4.06	38.33
$News_{i,t-1}(t)$ (%)	3.92	2.76	3747	-0.73	2.63	3.82	5.00	8.52
$News_{i,t-2}(t)$ (%)	4.07	2.21	3632	0.50	2.81	4.00	5.10	8.10
$\Delta News_{i,t-1}(t)$ (%)	-0.18	2.33	3516	-4.57	-0.64	-0.09	0.29	3.76
$\Delta News_{i,t-2}(t)$ (%)	-0.04	1.64	3402	-3.27	-0.41	-0.01	0.25	3.17
$Shock_{i,t}$ (%)	1.09	1.04	6410	-1.59	0.51	0.96	1.54	4.38
$FctShock_{i,t-1}(t)$ (%)	1.17	0.70	3338	0.23	0.71	1.00	1.49	3.70
$FctShock_{i,t-2}(t)$ (%)	1.25	0.70	3228	0.27	0.79	1.08	1.60	3.82
$\Delta FctShock_{i,t-1}(t)$ (%)	-0.09	0.31	3241	-1.18	-0.16	-0.06	0.00	0.99
$\Delta FctShock_{i,t-2}(t)$ (%)	-0.04	0.12	3131	-0.47	-0.07	-0.02	0.01	0.28

Note: Source: World Bank WDI, IMF WEO and author's calculations.

5 Contemporaneous Fiscal Reaction Functions

I begin my analysis by estimating contemporaneous fiscal reaction functions of the form (4) with first stage (5).

$$primbal_{i,t} = \alpha_1 * g_{i,t} + \alpha_2 * \% \Delta TOT_{i,t} + \alpha_3 * primbal_{i,t-1} + \mu_i + \epsilon_{i,t} \quad (4)$$

$$g_{i,t} = \beta_1 * ExpShock_{i,t} + \beta_2 * \% \Delta TOT_{i,t} + \beta_3 * primbal_{i,t-1} + \phi_i + \epsilon_{i,t} \quad (5)$$

The results in Table 3 affirm those of Jaimovich and Panizza (2007) with estimates for the effect of contemporaneous output growth similar in direction, magnitude, and statistical significance. Like in the other paper, the excluded instrument F-statistics for the OECD and middle-income sub-samples easily clear Stock and Yogo (2005)'s suggested critical value of 10, while the F-statistic for the low-income sub-sample's first stage does not.

Table 3: Contemporaneous Fiscal Response Functions

	(1) OECD	(2) Dev., Mid.-Inc.	(3) Dev., Low-Inc.
Real YoY GDP Growth (%)	0.532*** (0.044)	0.314*** (0.056)	1.808* (0.987)
Differenced terms-of-trade index (%)	0.053* (0.030)	0.019* (0.011)	0.061* (0.034)
Lagged primary balance (% GDP)	0.643*** (0.058)	0.579*** (0.046)	0.143 (0.237)
Mean Y	0.80	0.61	-0.24
Observations	381	982	374
Exc. Inst. F-stat	91.139	118.550	3.005

Note: All reported estimates are 2SLS results using first stages of the form (5). Dependent variable is government's primary balance is given as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

6 The Non-Structural, Exogenous Fiscal Response to Growth Forecasts

Next, I estimate (1) via 2SLS with first stage (6) to isolate news variation exogenous from period t fiscal policy changes. While (1) can't be interpreted as a structural fiscal reaction function without an instrument for $g_{i,t}$, the use of exogenous instruments for the news variables still allows me to demonstrate the effect of growth forecasts on the current fiscal stance distinct from contemporaneous output changes.

$$\vec{News}_i(t) = \Pi Fct\vec{Shock}_i(t) + \delta_1 * g_{i,t} + \delta_2 * \% \Delta TOT_{i,t} + \delta_3 * primbal_{i,t-1} + \kappa_i + \nu_{i,t} \quad (6)$$

Table 4 and Table 5 show that OECD and middle-income developing countries tend to respond countercyclically to forecasted real GDP growth within a 1-year window. In these tables, the response of primary balances to news from one year prior or looking one year ahead is positive and stronger in OECD countries. The only results in Table 6 which aren't weakly identified⁴ are the responses of the fiscal balance to the one year prior and one year ahead differenced forecasts which are too imprecise to suggest a cyclical fiscal response.

In contrast, the estimates in Table 4 and Table 5 for the primary balance response to output forecasts from two years prior are not statistically significant, suggesting that fiscal policy does not react cyclically to information at this horizon.

⁴Weakly identified defined as having an excluded instrument F-statistic below the threshold of 10 suggested by Stock and Yogo (2005)

Table 4: Non-Structural Fiscal Responses, OECD

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real YoY GDP Growth (%)	0.244** (0.098)	0.253*** (0.093)	0.248** (0.097)	0.241** (0.095)	0.037 (0.217)	0.019 (0.167)	-0.191 (0.351)	0.031 (0.170)
$News_{i,t-1}(t)$ (%)	0.405** (0.202)		0.444** (0.187)					
$News_{i,t-2}(t)$ (%)			-0.226 (0.283)					
$\Delta News_{i,t-1}(t)$ (%)		0.449*** (0.154)		0.506** (0.200)				
$\Delta News_{i,t-2}(t)$ (%)				0.273 (0.755)				
$News_{i,t}(t+1)$ (%)					1.045* (0.563)		2.555* (1.387)	
$News_{i,t}(t+2)$ (%)							-2.332* (1.250)	
$\Delta News_{i,t}(t+1)$ (%)						1.244*** (0.454)		1.108 (0.715)
$\Delta News_{i,t}(t+2)$ (%)								0.311 (1.345)
% Change in terms-of-trade index	-0.001 (0.024)	0.002 (0.023)	0.000 (0.023)	0.002 (0.023)	-0.007 (0.024)	-0.010 (0.027)	-0.006 (0.024)	-0.007 (0.032)
Lagged government debt (% GDP)	0.021** (0.010)	0.015* (0.008)	0.018* (0.010)	0.015* (0.009)	0.025** (0.011)	0.010 (0.007)	0.008 (0.012)	0.010 (0.007)
Lagged primary balance (% GDP)	0.622*** (0.068)	0.630*** (0.053)	0.626*** (0.063)	0.612*** (0.068)	0.640*** (0.075)	0.692*** (0.052)	0.684*** (0.083)	0.681*** (0.089)
Mean Y	-0.28	-0.28	-0.28	-0.27	-0.28	-0.28	-0.28	-0.28
Observations	257	256	256	255	258	257	258	257
Exc. Inst. F-stat	52.072	61.890	22.114	14.914	15.160	36.253	6.666	4.063

Note: All reported estimates are 2SLS results using first stages of the form (6). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table 5: Non-Structural Fiscal Responses, Mid-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real YoY GDP Growth (%)	0.154*** (0.036)	0.151*** (0.037)	0.151*** (0.036)	0.156*** (0.037)	0.091 (0.059)	0.098* (0.055)	0.098 (0.066)	0.112 (0.120)
$News_{i,t-1}(t)$ (%)	0.280** (0.117)		0.336** (0.137)					
$News_{i,t-2}(t)$ (%)			-0.127 (0.234)					
$\Delta News_{i,t-1}(t)$ (%)		0.323** (0.142)		0.307** (0.130)				
$\Delta News_{i,t-2}(t)$ (%)				-0.187 (0.361)				
$News_{i,t}(t+1)$ (%)					0.384* (0.197)		0.653* (0.348)	
$News_{i,t}(t+2)$ (%)							-0.603 (0.467)	
$\Delta News_{i,t}(t+1)$ (%)						0.397* (0.235)		0.485 (0.639)
$\Delta News_{i,t}(t+2)$ (%)								-0.304 (2.015)
% Change in terms-of-trade index	0.015 (0.015)	0.012 (0.014)	0.015 (0.015)	0.011 (0.011)	0.009 (0.013)	0.003 (0.013)	0.004 (0.014)	0.002 (0.013)
Lagged government debt (% GDP)	0.034*** (0.008)	0.031*** (0.006)	0.037*** (0.009)	0.032*** (0.006)	0.032*** (0.008)	0.023*** (0.006)	0.024*** (0.007)	0.024*** (0.008)
Lagged primary balance (% GDP)	0.448*** (0.034)	0.437*** (0.036)	0.430*** (0.035)	0.442*** (0.043)	0.465*** (0.029)	0.485*** (0.033)	0.472*** (0.033)	0.493*** (0.049)
Mean Y	0.58	0.55	0.54	0.50	0.60	0.59	0.60	0.59
Observations	519	506	505	492	521	520	521	520
Exc. Inst. F-stat	52.583	39.565	13.771	20.185	25.052	28.841	12.613	2.065

Note: All reported estimates are 2SLS results using first stages of the form (6). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table 6: Non-Structural Fiscal Responses, Low-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real YoY GDP Growth (%)	0.134 (0.129)	0.037 (0.060)	0.101 (0.081)	0.140 (0.166)	-0.023 (0.107)	-0.098 (0.236)	0.036 (0.341)	-0.206 (0.551)
$News_{i,t-1}(t)$ (%)	-0.798 (1.320)		-0.779 (1.187)					
$News_{i,t-2}(t)$ (%)			0.187 (0.713)					
$\Delta News_{i,t-1}(t)$ (%)		-0.019 (0.429)		-1.912 (2.219)				
$\Delta News_{i,t-2}(t)$ (%)				-3.512 (4.439)				
$News_{i,t}(t+1)$ (%)					0.451 (0.309)		5.866 (9.280)	
$News_{i,t}(t+2)$ (%)							-7.070 (11.415)	
$\Delta News_{i,t}(t+1)$ (%)						2.281 (1.606)		8.370 (12.286)
$\Delta News_{i,t}(t+2)$ (%)								-6.229 (10.896)
% Change in terms-of-trade index	0.003 (0.031)	0.013 (0.014)	-0.002 (0.031)	-0.071 (0.118)	0.020 (0.018)	0.048 (0.037)	0.057 (0.099)	0.165 (0.205)
Lagged government debt (% GDP)	0.053** (0.023)	0.052*** (0.020)	0.052** (0.023)	0.068 (0.045)	0.053*** (0.017)	0.039*** (0.014)	0.024 (0.041)	0.030 (0.049)
Lagged primary balance (% GDP)	0.306*** (0.058)	0.272*** (0.091)	0.302*** (0.056)	0.288 (0.193)	0.255*** (0.064)	0.316*** (0.088)	0.471 (0.314)	0.483 (0.373)
Mean Y	-0.49	-0.42	-0.42	-0.32	-0.49	-0.49	-0.49	-0.49
Observations	100	95	95	91	100	100	100	100
Exc. Inst. F-stat	1.530	26.100	2.244	0.483	4.728	11.058	0.458	0.268

Note: All reported estimates are 2SLS results using first stages of the form (6). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

7 Forward-looking fiscal policy response functions

I estimate (1) using 2SLS again, but in addition to using instruments for the news variables in each specification I also add the contemporaneous export shock instrument (2) and include a first stage for the output growth variable. As such, all results reported in this section are from specifications with the first stages (7) and (8).

$$g_{i,t} = \pi^T Fct\vec{Shock}_i(t) + \theta * ExpShock_{i,t} + \rho_1 * \% \Delta TOT_{i,t} + \rho_2 * primbal_{i,t-1} + \xi_i + \nu_{i,t} \quad (7)$$

$$News_i(t) = \Pi Fct\vec{Shock}_i(t) + \eta * ExpShock_{i,t} + \lambda_1 * \% \Delta TOT_{i,t} + \lambda_2 * primbal_{i,t-1} + \psi_i + \xi_{i,t} \quad (8)$$

While more specifications are weakly identified than in [section 6](#), the estimates from those that can be considered reliable still suggest countercyclical responses to forecasts. [Table 7](#) and [Table 8](#) show that the one year prior news variables still positively affect the primary balance for OECD and mid-income developing countries, although the fiscal response estimates for level news in OECD countries and differenced news in middle-income developing countries are no longer statistically significant, suggesting that OECD countries' ex-ante fiscal is based on forecast changes while that of middle-income developing countries is based on forecast levels.

Taking this as an accurate specification of OECD and middle-income countries' fiscal response functions, pre-planned budgeting appears relatively more important for the latter than the former; middle-income countries' news coefficient is nearly as great as their contemporaneous growth response, while OECD countries' news coefficient is between only half and three quarters of their respective contemporaneous growth response. As [Appendix A](#) shows, this difference is largely driven by the three largest exporters in the OECD sub-sample, however. Without these large exporters, OECD countries' fiscal response to forecasted output is also nearly as large as its contemporaneous response and fiscal responses to both level and differenced news is substantial.

With contemporaneous output instrumented for, only the OECD sub-sample has a speci-

fication with forward-looking news that is not weakly identified, and the estimated coefficient suggests that fiscal policy doesn't noticeably respond to this type of news.

Table 7: Fiscal Response Functions, OECD

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	0.533*** (0.069)	0.507*** (0.075)	0.512*** (0.073)	0.506*** (0.074)	0.503*** (0.076)	0.650*** (0.173)	0.834 (0.713)	0.766* (0.404)	0.597 (0.373)
$News_{i,t-1}(t)$ (%)		0.229 (0.181)		0.239 (0.158)					
$News_{i,t-2}(t)$ (%)				-0.041 (0.331)					
$\Delta News_{i,t-1}(t)$ (%)			0.247** (0.121)		0.369** (0.181)				
$\Delta News_{i,t-2}(t)$ (%)					0.666 (0.858)				
$News_{i,t}(t+1)$ (%)						-0.349 (0.406)		-0.850 (1.350)	
$News_{i,t}(t+2)$ (%)								0.554 (1.285)	
$\Delta News_{i,t}(t+1)$ (%)							-0.840 (1.843)		-0.739 (1.249)
$\Delta News_{i,t}(t+2)$ (%)									1.504 (1.127)
% Change in terms-of-trade index	0.002 (0.024)	0.004 (0.024)	0.006 (0.023)	0.004 (0.024)	0.007 (0.025)	0.003 (0.026)	0.008 (0.029)	0.004 (0.027)	0.013 (0.027)
Lagged government debt (% GDP)	0.012* (0.007)	0.015** (0.007)	0.012 (0.007)	0.015* (0.008)	0.011 (0.009)	0.009 (0.007)	0.015* (0.008)	0.012 (0.009)	0.015* (0.008)
Lagged primary balance (% GDP)	0.618*** (0.072)	0.587*** (0.087)	0.593*** (0.074)	0.588*** (0.089)	0.545*** (0.098)	0.622*** (0.067)	0.579*** (0.152)	0.610*** (0.085)	0.569*** (0.111)
Mean Y	-0.28	-0.28	-0.28	-0.28	-0.27	-0.28	-0.28	-0.28	-0.28
Observations	258	257	256	256	255	258	257	258	257
Exc. Inst. F-stat	57.526	31.760	28.686	19.773	10.157	37.571	0.373	0.656	0.601

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table 8: Fiscal Response Functions, Mid-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	0.287*** (0.052)	0.268*** (0.049)	0.275*** (0.048)	0.272*** (0.048)	0.271*** (0.045)	0.464*** (0.175)	0.390*** (0.125)	0.571* (0.322)	0.446** (0.208)
$News_{i,t-1}(t)$ (%)		0.210* (0.110)		0.234* (0.129)					
$News_{i,t-2}(t)$ (%)				-0.000 (0.234)					
$\Delta News_{i,t-1}(t)$ (%)			0.188 (0.130)		0.185 (0.124)				
$\Delta News_{i,t-2}(t)$ (%)					-0.129 (0.343)				
$News_{i,t}(t+1)$ (%)						-0.506 (0.447)		-1.028 (1.254)	
$News_{i,t}(t+2)$ (%)								0.560 (0.930)	
$\Delta News_{i,t}(t+1)$ (%)							-0.334 (0.392)		-0.090 (0.477)
$\Delta News_{i,t}(t+2)$ (%)									-0.972 (1.795)
% Change in terms-of-trade index	0.013 (0.015)	0.011 (0.015)	0.008 (0.014)	0.011 (0.016)	0.007 (0.012)	0.007 (0.016)	0.013 (0.018)	0.011 (0.018)	0.012 (0.019)
Lagged government debt (% GDP)	0.028*** (0.006)	0.033*** (0.008)	0.032*** (0.006)	0.039*** (0.009)	0.032*** (0.006)	0.021*** (0.007)	0.032*** (0.009)	0.025*** (0.009)	0.034*** (0.012)
Lagged primary balance (% GDP)	0.533*** (0.055)	0.446*** (0.033)	0.441*** (0.035)	0.430*** (0.033)	0.442*** (0.040)	0.509*** (0.046)	0.474*** (0.033)	0.516*** (0.048)	0.497*** (0.043)
Mean Y	0.72	0.58	0.55	0.54	0.50	0.60	0.59	0.60	0.59
Observations	546	519	506	505	492	521	520	521	520
Exc. Inst. F-stat	68.984	28.782	31.754	8.753	12.883	5.907	8.823	1.055	1.208

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table 9: Fiscal Response Functions, Low-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	1.030 (0.854)	1.608 (2.326)	1.094 (1.021)	2.723 (4.579)	4.219 (5.389)	-2.213 (2.858)	-0.708 (0.781)	1.882 (8.935)	1.285 (2.342)
$News_{i,t-1}(t)$ (%)		-1.431 (4.216)		-2.746 (9.051)					
$News_{i,t-2}(t)$ (%)				-1.435 (1.894)					
$\Delta News_{i,t-1}(t)$ (%)			1.228 (1.142)		-5.945 (14.038)				
$\Delta News_{i,t-2}(t)$ (%)					-17.404 (33.731)				
$News_{i,t}(t+1)$ (%)						3.998 (3.483)		3.998 (10.664)	
$News_{i,t}(t+2)$ (%)								-8.511 (29.966)	
$\Delta News_{i,t}(t+1)$ (%)							2.588 (1.845)		-2.989 (6.738)
$\Delta News_{i,t}(t+2)$ (%)									4.724 (6.593)
% Change in terms-of-trade index	0.105 (0.082)	0.116 (0.105)	0.100 (0.100)	0.104 (0.123)	-0.063 (0.614)	-0.112 (0.195)	-0.001 (0.059)	0.175 (0.669)	0.063 (0.091)
Lagged government debt (% GDP)	0.068*** (0.025)	0.073** (0.035)	0.058** (0.025)	0.071 (0.046)	0.159 (0.203)	0.033 (0.049)	0.028 (0.030)	0.035 (0.056)	0.068 (0.046)
Lagged primary balance (% GDP)	0.360*** (0.138)	0.472 (0.399)	0.374** (0.154)	0.712 (0.923)	1.080 (0.865)	-0.074 (0.516)	0.262*** (0.068)	0.790 (2.163)	0.306 (0.202)
Mean Y	-0.50	-0.49	-0.42	-0.42	-0.32	-0.49	-0.49	-0.49	-0.49
Observations	110	100	95	95	91	100	100	100	100
Exc. Inst. F-stat	4.996	0.472	1.445	0.202	0.104	0.111	2.745	0.030	0.364

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

8 Conclusion

As in Jaimovich and Panizza (2007), I find that once the endogeneity of output growth to fiscal policy is accounted for, both wealthy OECD countries and middle-income developing countries exhibit countercyclical fiscal policy. In addition, my results offer evidence that wealthy OECD countries and middle-income developing countries respond countercyclically to expected economic conditions by planning future budgetary changes, and that these pre-planned responses are nearly as large as contemporaneous responses to output changes.

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Appendix

A OECD results excluding large exporters

The justification for the exogeneity of the contemporaneous and forecast export shocks outlined in [section 3](#) may not hold for countries that contribute an outsized share of exports to the countries they trade with. To address this concern, I repeat my analysis without the largest exporters in my sample, the United States, Germany and Japan as shown in [Table A1](#). These are the same countries that Jaimovich and Panizza (2007) omit to perform a similar robustness check.

As shown in [Table A2](#) and [Table A3](#), the fiscal responses to news are noticeably larger than their counterparts in [Table 4](#) and [Table 7](#). Without the three largest exporters, the OECD sample shares the property of the middle-income developing sample that the fiscal reaction to forecasted output is nearly as large as the fiscal reaction to contemporaneous output.

Table A1: Top 20 Largest Exporters

Country	Average Share of Total Exports (Top 20)
United States	12.93
Germany	11.8
Japan	7.56
France	5.51
Italy	4.72
United Kingdom	4.68
Netherlands	4.64
Canada	4.23
Belgium	3.73
Korea, Rep.	3.3
Mexico	2.62
Saudi Arabia	2.36
Spain	2.28
Switzerland	1.93
Malaysia	1.63
Sweden	1.54
Australia	1.47
Austria	1.41
Brazil	1.4
Thailand	1.38

Table A2: Non-Structural Fiscal Responses, OECD Ex-G3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real YoY GDP Growth (%)	0.166* (0.097)	0.201** (0.084)	0.166* (0.094)	0.165** (0.084)	-0.099 (0.215)	-0.042 (0.142)	-0.252 (0.331)	-0.029 (0.127)
$News_{i,t-1}(t)$ (%)	0.678*** (0.216)		0.680*** (0.214)					
$News_{i,t-2}(t)$ (%)			-0.027 (0.245)					
$\Delta News_{i,t-1}(t)$ (%)		0.522*** (0.145)		0.664*** (0.147)				
$\Delta News_{i,t-2}(t)$ (%)				0.701 (0.664)				
$News_{i,t}(t+1)$ (%)					1.393** (0.589)		2.539** (1.254)	
$News_{i,t}(t+2)$ (%)							-1.884* (0.982)	
$\Delta News_{i,t}(t+1)$ (%)						1.267*** (0.390)		1.017 (0.664)
$\Delta News_{i,t}(t+2)$ (%)								0.642 (1.416)
% Change in terms-of-trade index	0.020 (0.024)	0.022 (0.024)	0.021 (0.024)	0.023 (0.026)	0.013 (0.025)	0.014 (0.029)	0.008 (0.030)	0.020 (0.035)
Lagged government debt (% GDP)	0.036*** (0.010)	0.025** (0.010)	0.036*** (0.009)	0.027** (0.010)	0.040*** (0.010)	0.020*** (0.007)	0.028*** (0.009)	0.020*** (0.008)
Lagged primary balance (% GDP)	0.540*** (0.076)	0.597*** (0.061)	0.542*** (0.075)	0.555*** (0.050)	0.577*** (0.087)	0.686*** (0.067)	0.638*** (0.107)	0.666*** (0.105)
Mean Y	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Observations	209	209	209	209	209	209	209	209
Exc. Inst. F-stat	45.646	57.006	17.062	18.446	12.896	33.190	4.871	4.352

Note: OECD Ex-G3 refers to the OECD subsample except for the United States, Japan, and Germany. All reported estimates are 2SLS results using first stages of the form (6). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and Standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table A3: Fiscal Reaction Functions, OECD Ex-G3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	0.520*** (0.073)	0.470*** (0.070)	0.496*** (0.075)	0.468*** (0.069)	0.481*** (0.077)	0.560*** (0.156)	0.954 (0.697)	0.720** (0.355)	0.572** (0.266)
$News_{i,t-1}(t)$ (%)		0.449*** (0.170)		0.437*** (0.167)					
$News_{i,t-2}(t)$ (%)				0.167 (0.296)					
$\Delta News_{i,t-1}(t)$ (%)			0.296*** (0.107)		0.510*** (0.127)				
$\Delta News_{i,t-2}(t)$ (%)					1.253 (0.781)				
$News_{i,t}(t+1)$ (%)						-0.119 (0.386)		-0.824 (1.158)	
$News_{i,t}(t+2)$ (%)								0.802 (1.073)	
$\Delta News_{i,t}(t+1)$ (%)							-1.191 (1.692)		-1.054 (0.990)
$\Delta News_{i,t}(t+2)$ (%)									2.361** (1.084)
% Change in terms-of-trade index	0.007 (0.030)	0.013 (0.029)	0.013 (0.029)	0.012 (0.030)	0.014 (0.034)	0.007 (0.031)	0.002 (0.041)	0.008 (0.032)	0.029 (0.033)
Lagged government debt (% GDP)	0.020* (0.010)	0.027*** (0.009)	0.019* (0.011)	0.029*** (0.007)	0.021* (0.013)	0.018* (0.009)	0.021* (0.013)	0.020* (0.011)	0.022* (0.012)
Lagged primary balance (% GDP)	0.573*** (0.075)	0.501*** (0.097)	0.544*** (0.078)	0.490*** (0.107)	0.459*** (0.089)	0.576*** (0.072)	0.493*** (0.177)	0.550*** (0.086)	0.502*** (0.093)
Mean Y	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Observations	209	209	209	209	209	209	209	209	209
Exc. Inst. F-stat	61.273	35.621	30.468	16.513	11.523	30.426	0.587	1.199	1.204

Note: OECD Ex-G3 refers to the OECD subsample except for the United States, Japan, and Germany. All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

B Government Expense Responses

Kaminsky et al. (2004) and Ilzetzki and Vegh (2008) argue that tax revenues can't represent a government's fiscal policy responses because revenues can either increase or decrease in response to a tax rate increase depending on how national income is changing. As such, they measure governments' fiscal policy position through only their primary expenditures, or total government spending minus debt service. While this is not the framework I use for my baseline analysis, I consider it here by estimating fiscal reaction functions for government primary expenditures.

Like in , in any specification which is not weakly identified, responses to contemporaneous output are all countercyclical for both the OECD and middle-income sub-samples, although the responses for the latter sub-sample are no longer statistically significant. The news coefficients for the OECD sub-sample are also now much larger than the coefficients on contemporaneous GDP, suggesting that expenditures play a much larger role in stabilization policy than revenues for these countries.

Table B1: Expenditure Reaction Functions, OECD

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	-0.414*** (0.069)	-0.244* (0.143)	-0.299*** (0.114)	-0.266* (0.143)	-0.298*** (0.111)	-0.115 (0.313)	-0.109 (0.815)	0.583 (1.394)	0.448 (1.750)
$News_{i,t-1}(t)$ (%)		-1.555* (0.831)		-1.782* (0.996)					
$News_{i,t-2}(t)$ (%)				1.836 (1.145)					
$\Delta News_{i,t-1}(t)$ (%)			-1.470** (0.748)		-1.505** (0.691)				
$\Delta News_{i,t-2}(t)$ (%)					-0.185 (0.813)				
$News_{i,t}(t+1)$ (%)						-0.889 (0.745)		-4.021 (5.584)	
$News_{i,t}(t+2)$ (%)								3.713 (5.340)	
$\Delta News_{i,t}(t+1)$ (%)							-0.846 (2.084)		-1.526 (4.353)
$\Delta News_{i,t}(t+2)$ (%)									-2.317*** (0.777)
% Change in terms-of-trade index	0.015 (0.029)	-0.008 (0.018)	-0.010 (0.014)	-0.014 (0.014)	-0.011 (0.015)	0.017 (0.028)	0.021 (0.039)	0.018 (0.031)	0.018 (0.059)
Lagged government debt (% GDP)	-0.007 (0.011)	-0.017 (0.026)	-0.001 (0.011)	-0.000 (0.014)	0.000 (0.013)	-0.015 (0.021)	-0.008 (0.013)	-0.007 (0.024)	-0.009 (0.018)
Lagged primary balance (% GDP)	0.626*** (0.051)	0.432*** (0.097)	0.517*** (0.063)	0.514*** (0.073)	0.500*** (0.099)	0.616*** (0.046)	0.665*** (0.136)	0.673*** (0.139)	0.697*** (0.258)
Mean Y	31.02	31.08	31.13	31.13	31.19	31.02	31.08	31.02	31.08
Observations	218	217	216	216	215	218	217	218	217
Exc. Inst. F-stat	57.929	28.929	27.477	8.117	6.003	26.701	0.205	0.729	0.183

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary expenditure as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table B2: Expenditure Reaction Functions, Mid.-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	-0.388*** (0.057)	-0.399*** (0.057)	-0.401*** (0.059)	-0.396*** (0.054)	-0.400*** (0.057)	-0.610** (0.277)	-0.407** (0.180)	-0.647* (0.332)	-0.566* (0.306)
$News_{i,t-1}(t)$ (%)		0.207 (0.168)		0.264 (0.178)					
$News_{i,t-2}(t)$ (%)				-0.684 (0.450)					
$\Delta News_{i,t-1}(t)$ (%)			0.284 (0.179)		0.283 (0.188)				
$\Delta News_{i,t-2}(t)$ (%)					0.026 (0.370)				
$News_{i,t}(t+1)$ (%)						0.637 (0.750)		0.864 (1.215)	
$News_{i,t}(t+2)$ (%)								-0.309 (1.006)	
$\Delta News_{i,t}(t+1)$ (%)							0.058 (0.507)		-0.527 (0.706)
$\Delta News_{i,t}(t+2)$ (%)									2.586 (2.571)
% Change in terms-of-trade index	0.019 (0.015)	0.023 (0.015)	0.021 (0.016)	0.016 (0.018)	0.024 (0.015)	0.019 (0.017)	0.020 (0.014)	0.017 (0.017)	0.023 (0.017)
Lagged government debt (% GDP)	-0.024*** (0.008)	-0.019** (0.009)	-0.022** (0.011)	-0.032* (0.017)	-0.021* (0.012)	-0.017 (0.012)	-0.023** (0.010)	-0.020 (0.014)	-0.030* (0.016)
Lagged primary balance (% GDP)	0.697*** (0.057)	0.735*** (0.070)	0.715*** (0.064)	0.687*** (0.083)	0.702*** (0.064)	0.760*** (0.096)	0.704*** (0.059)	0.756*** (0.094)	0.761*** (0.076)
Mean Y	23.76	23.75	23.95	23.96	24.16	23.72	23.74	23.72	23.74
Observations	493	467	454	453	440	469	468	469	468
Exc. Inst. F-stat	62.406	25.087	23.234	5.778	10.705	3.770	6.006	1.048	1.025

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary expenditure as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table B3: Expenditure Reaction Functions, Low-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	-0.135 (0.515)	-0.307 (0.425)	-0.049 (0.667)	-0.180 (0.763)	1.445 (9.662)	-1.725 (2.223)	-2.731 (4.041)	0.450 (0.587)	0.017 (0.469)
$News_{i,t-1}(t)$ (%)		0.709 (1.697)		0.919 (1.442)					
$News_{i,t-2}(t)$ (%)				-0.412 (1.210)					
$\Delta News_{i,t-1}(t)$ (%)			0.450 (0.955)		-4.089 (32.434)				
$\Delta News_{i,t-2}(t)$ (%)					-15.244 (102.550)				
$News_{i,t}(t+1)$ (%)						2.358 (4.240)		-2.656 (1.958)	
$News_{i,t}(t+2)$ (%)								4.121* (2.429)	
$\Delta News_{i,t}(t+1)$ (%)							3.491 (5.158)		-1.616* (0.850)
$\Delta News_{i,t}(t+2)$ (%)									2.759** (1.095)
% Change in terms-of-trade index	-0.016 (0.050)	-0.016 (0.065)	-0.002 (0.076)	0.001 (0.092)	-0.115 (0.934)	-0.124 (0.145)	-0.216 (0.313)	0.014 (0.058)	-0.034 (0.046)
Lagged government debt (% GDP)	-0.018 (0.012)	-0.017 (0.015)	-0.018 (0.011)	-0.019 (0.014)	0.023 (0.268)	-0.026 (0.046)	-0.044 (0.073)	-0.007 (0.008)	-0.022 (0.016)
Lagged primary balance (% GDP)	0.472*** (0.057)	0.410*** (0.106)	0.453*** (0.064)	0.420*** (0.091)	0.597 (1.399)	0.274 (0.351)	0.298 (0.454)	0.457*** (0.078)	0.390*** (0.102)
Mean Y	19.92	19.86	20.08	20.08	20.20	19.86	19.86	19.86	19.86
Observations	78	70	66	66	63	70	70	70	70
Exc. Inst. F-stat	6.692	0.884	2.371	1.415	0.006	0.338	0.203	0.919	1.880

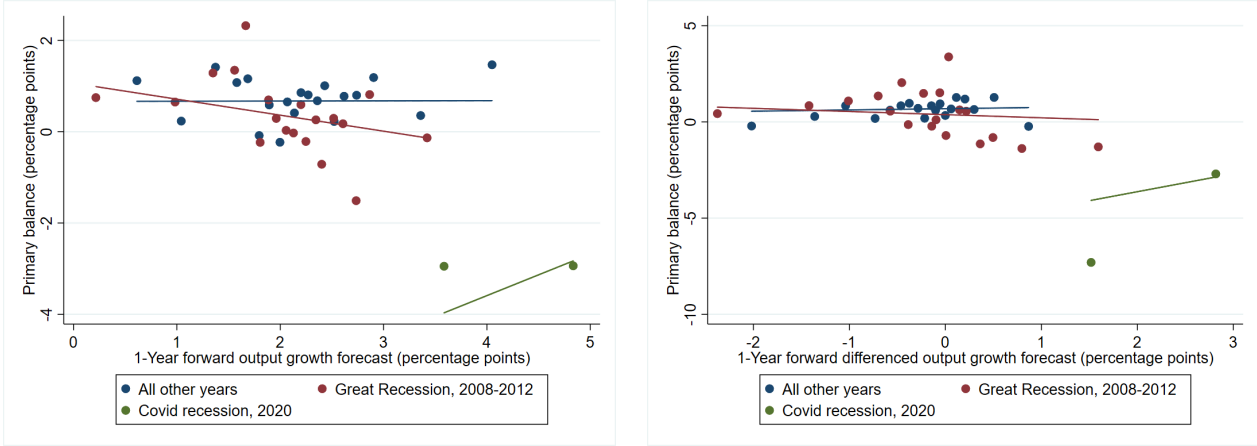
Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

C Covid inclusion

Data points from the year 2020 are starkly different from those of previous years and affect the IV results in [section 6](#) and [Appendix B](#). Binscatter plots [Figure C1](#) and [Figure C2](#) show that for OECD and middle-income developing countries, forecasts of one year-ahead level or differenced real GDP growth was especially high given how low primary balances were. As a result, the most prominent change when estimating the IV reaction functions with 2020 data is that the effect of the forward news variables is now negative and statistically significant rather than being indeterminate.

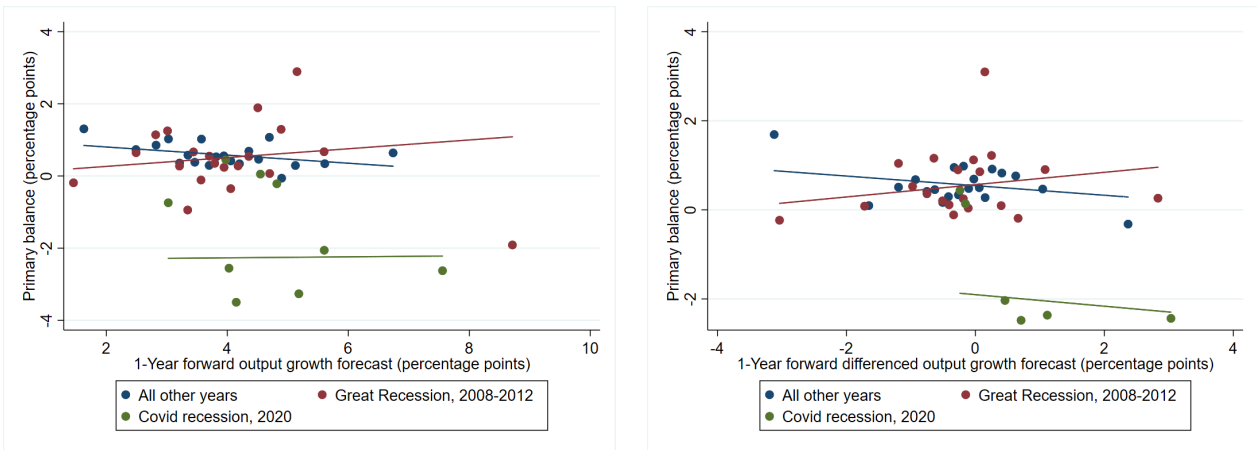
A naive interpretation of the results with the 2020 data included is that in response to good (bad) news about growth in the following year, an OECD or middle-income government will initiate expansionary (contractionary) fiscal policy, perhaps in order to create fiscal space for pushing the fiscal balance in the opposite direction later. However, the fact that these results hinge on the inclusion of data from 2020 suggests that there is something particular about the relationship between forward-looking news and the fiscal balance in this year. An alternate explanation would be that fiscal balances fell substantially in response to the rapid onset of the Covid recession while future forecasts incorporated information about rapid recoveries without the latter causing the former.

Figure C1: Primary Balance and News, OECD



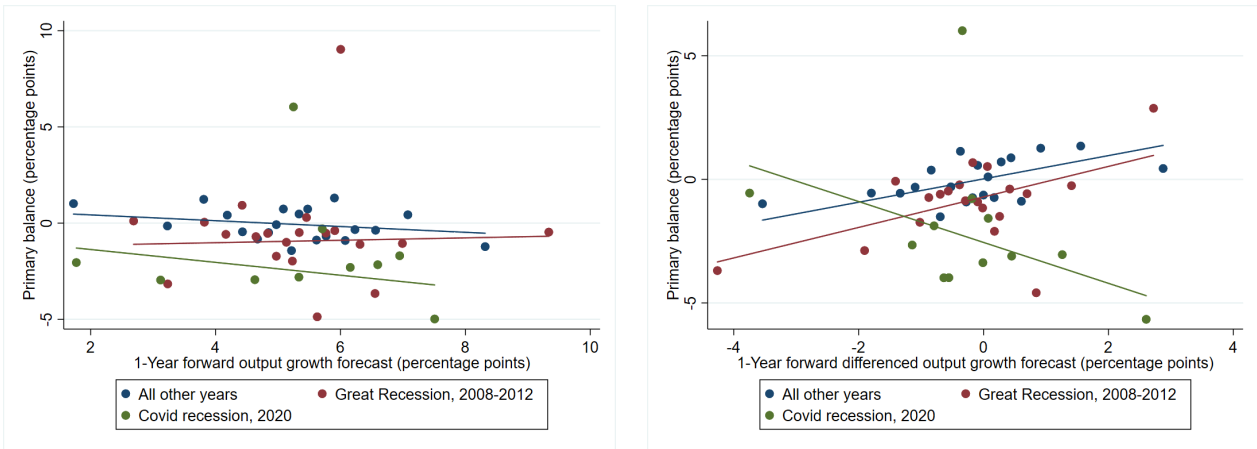
News variables are residuals with real output growth, lagged primary balance, % change in terms of trade, and country FEs partialled out. Source: World Bank WDI, IMF WEO and author's calculations.

Figure C2: Primary Balance and News, Mid.-Income Developing



News variables are residuals with real output growth, lagged primary balance, % change in terms of trade, and country FEs partialled out. Source: World Bank WDI, IMF WEO and author's calculations.

Figure C3: Primary Balance and News, Low-Income Developing



News variables are residuals with real output growth, lagged primary balance, % change in terms of trade, and country FEs partialled out. Source: World Bank WDI, IMF WEO and author's calculations.

Table C1: Fiscal Response Functions, OECD

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	0.790*** (0.050)	0.761*** (0.058)	0.789*** (0.057)	0.750*** (0.057)	0.789*** (0.052)	0.782*** (0.064)	0.749*** (0.058)	0.777*** (0.263)	0.850* (0.465)
$News_{i,t-1}(t)$ (%)		0.324** (0.162)		0.145 (0.188)					
$News_{i,t-2}(t)$ (%)				0.576* (0.309)					
$\Delta News_{i,t-1}(t)$ (%)			0.025 (0.165)		0.028 (0.191)				
$\Delta News_{i,t-2}(t)$ (%)					0.033 (1.036)				
$News_{i,t}(t+1)$ (%)						-0.684*** (0.167)		-0.801 (0.941)	
$News_{i,t}(t+2)$ (%)								0.385 (0.824)	
$\Delta News_{i,t}(t+1)$ (%)							-0.643*** (0.154)		-1.039 (1.109)
$\Delta News_{i,t}(t+2)$ (%)									0.238 (1.527)
% Change in terms-of-trade index	0.086* (0.045)	0.090** (0.044)	0.086* (0.045)	0.089** (0.045)	0.086* (0.046)	0.085* (0.048)	0.089* (0.048)	0.068 (0.045)	0.078 (0.049)
Lagged primary balance (% GDP)	0.623*** (0.082)	0.572*** (0.097)	0.620*** (0.087)	0.562*** (0.101)	0.618*** (0.123)	0.697*** (0.066)	0.651*** (0.071)	0.665*** (0.056)	0.620*** (0.087)
Mean Y	0.49	0.49	0.49	0.49	0.50	0.49	0.49	0.81	0.81
Observations	401	400	399	399	398	401	400	381	380
Exc. Inst. F-stat	62.342	41.610	39.604	22.890	7.802	46.315	39.896	1.028	0.614

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table C2: Fiscal Response Functions, Mid-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	0.409*** (0.038)	0.405*** (0.040)	0.410*** (0.037)	0.399*** (0.042)	0.395*** (0.039)	0.467*** (0.042)	0.431*** (0.036)	0.956 (0.815)	0.407* (0.209)
$News_{i,t-1}(t)$ (%)		0.067 (0.137)		0.037 (0.148)					
$News_{i,t-2}(t)$ (%)				0.191 (0.301)					
$\Delta News_{i,t-1}(t)$ (%)			-0.053 (0.155)		-0.083 (0.162)				
$\Delta News_{i,t-2}(t)$ (%)					-0.550 (0.370)				
$News_{i,t}(t+1)$ (%)						-0.571*** (0.163)		-2.373 (3.232)	
$News_{i,t}(t+2)$ (%)								1.010 (1.891)	
$\Delta News_{i,t}(t+1)$ (%)							-0.401*** (0.154)		0.003 (0.574)
$\Delta News_{i,t}(t+2)$ (%)									-0.823 (1.510)
% Change in terms-of-trade index	0.021 (0.014)	0.025* (0.015)	0.024 (0.015)	0.026* (0.015)	0.018 (0.014)	0.023 (0.015)	0.031** (0.015)	0.012 (0.024)	0.028* (0.016)
Lagged primary balance (% GDP)	0.564*** (0.047)	0.553*** (0.054)	0.565*** (0.053)	0.555*** (0.054)	0.593*** (0.059)	0.589*** (0.050)	0.568*** (0.050)	0.604*** (0.052)	0.587*** (0.054)
Mean Y	0.39	0.28	0.24	0.23	0.19	0.30	0.28	0.53	0.51
Observations	1020	953	933	932	912	968	953	930	915
Exc. Inst. F-stat	252.266	23.846	37.429	7.816	6.761	24.200	49.028	0.410	3.056

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

Table C3: Fiscal Response Functions, Low-Income Developing

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Real YoY GDP Growth (%)	1.001*** (0.262)	1.070*** (0.257)	1.076*** (0.394)	1.166*** (0.296)	1.125** (0.484)	0.551 (0.531)	0.622*** (0.130)	2.168 (2.053)	0.366* (0.222)
$News_{i,t-1}(t)$ (%)		-0.707 (0.774)		-0.911 (0.581)					
$News_{i,t-2}(t)$ (%)				-0.580 (0.683)					
$\Delta News_{i,t-1}(t)$ (%)			1.883* (1.126)		3.264 (3.128)				
$\Delta News_{i,t-2}(t)$ (%)					1.857 (2.322)				
$News_{i,t}(t+1)$ (%)						1.829 (2.703)		0.759 (4.109)	
$News_{i,t}(t+2)$ (%)								-4.121 (3.048)	
$\Delta News_{i,t}(t+1)$ (%)							1.996** (0.951)		2.227* (1.320)
$\Delta News_{i,t}(t+2)$ (%)									1.125 (2.232)
% Change in terms-of-trade index	0.065** (0.028)	0.048 (0.035)	0.089*** (0.034)	0.041 (0.030)	0.126** (0.052)	0.095 (0.061)	0.064*** (0.021)	0.053 (0.064)	0.062*** (0.024)
Lagged primary balance (% GDP)	0.277*** (0.101)	0.283*** (0.104)	0.165 (0.217)	0.278** (0.112)	0.121 (0.360)	0.276*** (0.103)	0.222** (0.108)	0.199 (0.164)	0.213* (0.121)
Mean Y	-0.41	-0.41	-0.42	-0.41	-0.39	-0.39	-0.40	-0.22	-0.23
Observations	394	379	373	371	364	383	381	364	362
Exc. Inst. F-stat	17.604	2.318	3.257	4.115	1.087	1.087	7.427	0.594	1.417

Note: All reported estimates are 2SLS results using first stages of the form (7) and (8). Dependent variable is government's primary balance as a percentage of GDP. Country fixed effects are included and standard errors are clustered at the country level. Kleibergen-Paap F-statistics shown. Source: World Bank WDI, IMF WEO and author's calculations.

D Country Sub-Sample Classifications

I use the OECD sub-sample defined in Kaminsky et al. (2004). This includes all OECD members as of 1990 except for Turkiye, which is instead grouped with the middle-income developing countries, and Iceland and Luxembourg which I omit entirely. The high-income sub-sample used by Jaimovich and Panizza (2007) includes my OECD sub-sample, Iceland, Luxembourg, and Malta. I find that including Malta changes the results for my OECD sub-sample substantially, although including Iceland and Luxembourg doesn't make a noticeable difference.

Table D1: Country Sub-Sample Classifications

OECD (21)	Developing, Middle-Income (61)		Developing, Low-Income (33)
Australia	Algeria	Argentina	Bangladesh
Austria	Bahrain	Barbados	Burkina Faso
Belgium	Belize	Bolivia	Burundi
Canada	Botswana	Brazil	Cameroon
Denmark	Bulgaria	Chile	Chad
Finland	Colombia	Costa Rica	Congo, Republic of the
France	Croatia	Cyprus	Cote d'Ivoire
Germany	Czech Republic	Dominican Republic	Ethiopia
Greece	Ecuador	Egypt, Arab Republic of	Gambia, The
Ireland	El Salvador	Estonia	Ghana
Italy	Eswatini	Fiji	Guinea-Bissau
Japan	Gabon	Grenada	Haiti
Netherlands	Guatemala	Honduras	India
New Zealand	Hungary	Indonesia	Kenya
Norway	Iran, Islamic Republic of	Israel	Lesotho
Portugal	Jamaica	Kazakhstan	Madagascar
Spain	Korea, Republic of	Kuwait	Malawi
Sweden	Latvia	Lithuania	Mali
Switzerland	Malaysia	Mauritius	Mongolia
United Kingdom	Mexico	Morocco	Namibia
United States	Oman	Panama	Nicaragua
	Paraguay	Peru	Nigeria
	Philippines	Poland	Pakistan
	Saudi Arabia	Seychelles	Papua New Guinea
	Slovak Republic	South Africa	Rwanda
	Sri Lanka	St. Kitts and Nevis	Senegal
	St. Vincent and the Grenadines	Syrian Arab Republic	Sierra Leone
	Thailand	Trinidad and Tobago	Solomon Islands
	Tunisia	Türkiye	Tanzania
	Uruguay	Vanuatu	Togo
	Venezuela, Bolivarian Republic		Uganda
			Zambia
			Zimbabwe

Table D2: Summary Statistics, OECD

	mean	sd	N	p1	p25	p50	p75	p99
Primary balance (% GDP)	0.54	3.88	896	-10.14	-1.24	0.45	2.16	12.83
Real YoY GDP Growth (%)	2.82	2.96	1196	-5.89	1.40	2.78	4.34	11.20
% Change in terms-of-trade index	0.09	4.73	439	-12.89	-1.71	-0.06	1.29	14.75
$News_{i,t-1}(t)$ (%)	2.36	1.16	693	-0.51	1.69	2.35	2.98	5.72
$News_{i,t-2}(t)$ (%)	2.45	0.87	672	0.52	1.82	2.40	2.99	4.91
$\Delta News_{i,t-1}(t)$ (%)	-0.16	0.92	651	-2.57	-0.57	-0.11	0.20	3.20
$\Delta News_{i,t-2}(t)$ (%)	-0.07	0.43	630	-1.30	-0.27	-0.02	0.15	0.99
$Shock_{i,t}$ (%)	1.08	0.89	1265	-1.64	0.61	1.00	1.47	3.72
$FctShock_{i,t-1}(t)$ (%)	1.03	0.51	644	0.27	0.70	0.91	1.25	2.57
$FctShock_{i,t-2}(t)$ (%)	1.10	0.49	623	0.37	0.79	1.00	1.29	2.66
$\Delta FctShock_{i,t-1}(t)$ (%)	-0.08	0.30	624	-0.97	-0.15	-0.07	0.00	1.07
$\Delta FctShock_{i,t-2}(t)$ (%)	-0.03	0.08	603	-0.31	-0.06	-0.02	0.00	0.17

Table D3: Summary Statistics, Mid.-Income Developing

	mean	sd	N	p1	p25	p50	p75	p99
Primary balance (% GDP)	0.33	7.49	1534	-10.18	-1.53	0.15	1.97	15.23
Real YoY GDP Growth (%)	4.01	5.50	3173	-12.02	1.71	4.18	6.40	18.01
% Change in terms-of-trade index	0.49	10.75	1909	-30.82	-3.62	-0.01	3.94	33.38
$News_{i,t-1}(t)$ (%)	3.87	3.02	1975	-0.94	2.86	3.82	4.86	8.00
$News_{i,t-2}(t)$ (%)	4.03	1.97	1914	0.52	3.05	4.00	5.00	7.40
$\Delta News_{i,t-1}(t)$ (%)	-0.20	2.89	1853	-4.65	-0.67	-0.11	0.27	3.57
$\Delta News_{i,t-2}(t)$ (%)	-0.10	1.55	1793	-2.85	-0.48	-0.02	0.25	2.25
$Shock_{i,t}$ (%)	1.22	1.18	3290	-2.16	0.57	1.10	1.74	4.97
$FctShock_{i,t-1}(t)$ (%)	1.33	0.73	1722	0.33	0.82	1.16	1.68	3.79
$FctShock_{i,t-2}(t)$ (%)	1.43	0.72	1665	0.43	0.90	1.25	1.79	3.97
$\Delta FctShock_{i,t-1}(t)$ (%)	-0.10	0.35	1675	-1.31	-0.19	-0.08	0.01	1.07
$\Delta FctShock_{i,t-2}(t)$ (%)	-0.05	0.13	1618	-0.54	-0.09	-0.03	0.01	0.29

Table D4: Summary Statistics, Low-Income Developing

	mean	sd	N	p1	p25	p50	p75	p99
Primary balance (% GDP)	-0.35	5.18	478	-15.31	-2.43	-0.48	1.17	16.19
Real YoY GDP Growth (%)	3.71	5.46	1858	-12.45	1.16	4.07	6.40	18.20
% Change in terms-of-trade index	1.05	16.91	1238	-33.26	-5.63	0.00	5.93	49.60
$News_{i,t-1}(t)$ (%)	5.01	2.48	1079	-0.50	3.93	4.98	6.02	11.36
$News_{i,t-2}(t)$ (%)	5.20	2.52	1046	0.41	4.19	5.05	6.07	10.64
$\Delta News_{i,t-1}(t)$ (%)	-0.14	1.72	1012	-5.44	-0.67	-0.02	0.40	4.35
$\Delta News_{i,t-2}(t)$ (%)	0.09	2.20	979	-5.02	-0.45	-0.00	0.41	5.29
$Shock_{i,t}$ (%)	0.87	0.82	1855	-0.64	0.39	0.72	1.17	3.67
$FctShock_{i,t-1}(t)$ (%)	0.97	0.70	972	0.20	0.50	0.80	1.17	3.61
$FctShock_{i,t-2}(t)$ (%)	1.03	0.70	940	0.23	0.56	0.85	1.21	3.71
$\Delta FctShock_{i,t-1}(t)$ (%)	-0.07	0.22	942	-0.95	-0.11	-0.05	-0.00	0.58
$\Delta FctShock_{i,t-2}(t)$ (%)	-0.03	0.11	910	-0.37	-0.05	-0.02	0.01	0.28