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# Economic Policy Responses to the COVID-19 Pandemic: The Role of the Central Bank Independence

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#### **Abstract**

Is central bank independence (CBI) associated with economic policy responses to mitigate the adverse economic effects of the COVID 19 pandemic? In this paper, we provide cross-country evidence that it does. Our results generally indicate that more independent monetary policy authorities have adopted smaller cuts in the policy rate and reserve requirements. However, fiscal and macro-financial packages are relatively larger in countries with more independent central banks. These results are robust to different sets of control variables and different econometric specifications that include an instrumental variable estimation.

Keywords: COVID-19; Central Bank Independence; Monetary Policy; Fiscal Policy

JEL Classification: E43; E58; E60.

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# Economic Policy Responses to the COVID-19 Pandemic: The Role of Central Bank Independence

#### **Abstract**

Is central bank independence (CBI) associated with economic policy responses to mitigate the adverse economic effects of the COVID 19 pandemic? In this paper, we provide cross-country evidence that it does. Our results generally indicate that more independent monetary policy authorities have adopted smaller cuts in the policy rate and reserve requirements. However, fiscal and macro-financial packages are relatively larger in countries with more independent central banks. These results are robust to different sets of control variables and different econometric specifications that include an instrumental variable estimation.

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#### 1 Introduction

Political leaders worldwide have been very vocal about how effective their policies in response to the COVID-19 pandemic have been. Voters usually hold politicians, especially those in power, rather than technocrats, responsible for economic downturns during or after crises. Therefore, following a disaster or crisis, governments seeking re-election tend to respond more aggressively to these catastrophic events by adopting expansionary policies to improve economic conditions. However, this motivation of politicians may clash with the targets and mandates of monetary authorities, especially those that are more immune to political pressure and tend to adopt more conservative policies (Ismihan and Ozkan, 2004; Adam and Billi, 2014). Specifically, in countries where central banks are more independent, politicians' and monetary authorities' motivations might conflict.

The COVID-19 pandemic caused along a major economic contraction for all economies, albeit to different degrees, and this implied a large exogenous shock and created grounds for a laboratory-like experiment for researchers of economic policy. Economic theory, Keynesian or neoclassical, generally suggests that optimal economic policy should follow a counter-cyclical pattern. Namely, if a government respects these prescriptions, the optimal policy should be expansionary in *bad* times and contractionary in *good* times. However, contrary to this theory, several recent contributions have found evidence that the cyclicality of monetary policy differs significantly across countries (Kim, 2006). Moreover, other studies have suggested that counter-cyclical monetary policy in the form of increasing interest rates during booms may not be optimal, as it is more likely to trigger crises than to prevent them (Schularick et al., 2020). Finally, similar results have been obtained for fiscal policy (Alesina et al., 2008).

Nevertheless, we lack an understanding of the interplay between national fiscal and monetary policies during the pandemic. In this paper, we review 168 central banks' monetary responses to the pandemic and document that in countries where central banks are more independent, monetary policymakers tend to implement less expansionary monetary policies. However, we also observe that in countries with more independent central banks, the macro-financial and fiscal policy packages' sizes are larger.

#### 2 Data

We use two different monetary policy variables: First, the conventional monetary policy tool, the percentage cut in the policy rate by the monetary policy authority, is coded as a percentage of the ongoing rate of February 1st, 2020. For example, if the policy rate was 10% on February 1st and was reduced to 8% at some point during the pandemic, we note it down as a 20% reduction. Next, as a macro-prudential policy tool a similar percentage cut in the reserve requirements is our second monetary policy variable. Nevertheless, for a robustness check, which is presented in the appendix (Table B.2, lower panel), we also use an alternative measure with percentage point cuts (i.e., noting it as a 2 percentage point cut in the above example). In yet another robustness check, for a number of countries for which the policy rate has reached the lower bound, we include the widely used Krippner-Wu shadow rate and present the regressions results for this in the appendix (See Table B.2. upper panel).

 $<sup>^{1}</sup>$ We started to collect data series on reserve requirements from version 2 onwards.

<sup>&</sup>lt;sup>2</sup>The data series for the shadow rate in European Monetary Zone members, Switzerland, USA, UK, Japan, New Zealand, Australia, and Canada came from https://www.ljkmfa.com/test-test/international-ssrs/.

Third, we also collected information about various macro-financial measures, including bond buying by the central bank and provision of cheap credit by relevant government authorities or publicly owned banks, as well as fiscal measures. Both are coded as percentages of GDP.

In our empirical analysis, we used fiscal and monetary policy measures that primarily came from the IMF database. However, to improve data validity, we cross-checked the information provided by the IMF Tracker with additional sources. Appendix A provides a complete description of our data sources.

**Table 1:** Summary Statistics

Version 1	Mean	Weighted Mean	Median	Std. Dev.	Min	Max
Interest Rate Cut (%)	11.63		0.00	21.46	-30.00	100.00
Interest Rate Cut (% Points)	0.44		0.00	0.90	-1.00	7.25
Cut in the Res. Req. (%) (Version 2)	13.93		0.00	26.39	0.00	100.00
Cut in the Res. Req. (%) Points (Version 2)	0.10		0.00	0.22	0.00	6.00
Macro-Financial Package (% of GDP)	1.83	4.25	0.00	3.98	0.00	26.00
Fiscal Policy Stimulus (% GDP)	2.05	3.80	0.50	3.63	-7.00	18.00
Infection Rate	0.11		0.009	0.30	0.00	2.28
Case-Fatality Rate	37.34		26.50	35.60	0.00	100.00
Stringency Index	64.75		69.44	22.85	8.33	100.00
Version 14	Mean	Weighted Mean	Median	Std. Dev.	Min	Max
Interest Rate Cut (%)	23.03		15.56	28.52	-105.56	100.00
Interest Rate Cut (% Points)	0.98		0.64	1.54	-9.50	6.25
Cut in the Res. Req. (%)	20.53		0.00	29.95	-7.69	100.00
Macro-Financial Package (% of GDP)	6.71	12.26	2.86	9.78	0.00	64.64
Fiscal Policy Stimulus (% GDP)	6.33	10.27	4.00	6.85	-5.00	42.20
Infection Rate (per 000)	11.06		6.34	12.93	0.004	57.07
Case-Fatality Rate	5.66		2.24	15.47	0.00	100.00
Stringency Index	54.78		57.41	17.62	8.33	85.19
Central Bank Independence	0.62		0.62	0.19	0.13	0.98
Inflation (%)	5.07		2.60	7.86	-0.20	63.30
GDP per capita (000 USD)	14.77		5.90	20.09	0.21	110.74
2020 Growth Forecast (%)	-3.41		-3.74	7.06	-58.67	52.77
Policy Rate	4.66		3.25	6.18	-0.75	36.00
Developed Country Dummy	0.16		0.00	0.09	0.00	1.00
Lower Bound Dummy	0.24		0.00	0.43	0.00	1.00

Table 1 reports descriptive summary statistics for all economic policy measures for Version 1 of our dataset dated March 25th, 2020, as well as for Version 14 dated November 20th, 2020. For each version, our time window is February 1, 2020 to the version's date. Specifically, in this time interval, we calculate the cut in interest rate, comparing the rates on February 1, 2020 and the date of the version. Even though we use all the 14 versions in our panel regressions, we only report statistics for the first and the last versions. In the bottom panel, we also report summary statistics for CBI, (real) GDP per capita, inflation (%), and the nominal policy rate on February 1st, 2020. In addition, we include two dummies for developed countries and those that have reached the lower bound of the nominal policy rate (defined as having a policy rate of less than or equal to 0.5% on February 1st, 2020) of the GDP growth forecast of the IMF for 2020 (from the Spring edition of World Economic Outlook in April), for all countries in our dataset. Moreover, we also control for dummies for regions, versions of the policy data series, and exchange rate regimes.

Figure 1: Evolution of the Cuts in the Policy Rate and Reserve Requirements





#### (b) Reserve Requirement Cut

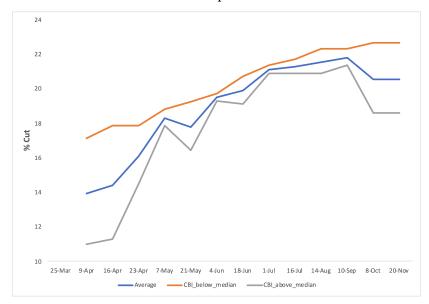
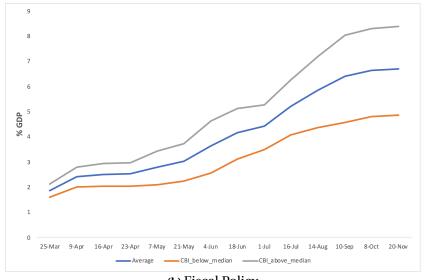


Figure 1 presents the evolution of the average policy rate cut and reserve requirement cut for the whole dataset, as well as the averages of two subsets of the data that we created according to the median level of CBI (0.62, which is also approximately equal to the mean). In both figures, we observe that in countries where the central banks are more independent relative to the median, the cuts in the policy rate and reserve requirements are somewhat more conservative. Moreover, throughout the pandemic, the difference between these two subsets is more significant for the policy rate cut than the cut in the reserve requirements.

**Figure 2:** Evolution of the Macro-Financial and Fiscal Policy Packages

#### (a) Macro-Financial Policy



#### (b) Fiscal Policy

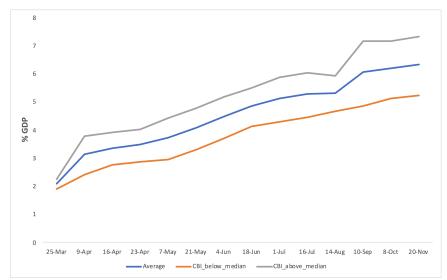


Figure 2 illustrates two other stimulus packages' evolutions, the macro-financial and fiscal policy packages. Figure 2 shows exactly the opposite of Figure 1. Specifically, the average macro-financial and fiscal policy packages for countries with a CBI above the median are significantly larger than for those below the median.

#### 2.1 Methodology

Our benchmark analysis uses the following panel fixed-effects regression:

$$Stimulus_{it} = \alpha_0 + \alpha_1 CBI_i + \alpha_k \sum_{k=2}^{n} X_{k_{it}} + \alpha_j \sum_{j=n+1}^{m} Z_{j_i} + \gamma_t + \epsilon_{it}$$

 $Stimulus_{it}$ , is the stimulus package in country i for year t.  $CBI_i$  is the main independent variable of interest and it denotes the central bank independence index in country i for the most recent year.  $X_{k_{it}}$  and  $Z_{ij}$  denote the control variables, which are available as both panel and cross-sectional data.

#### 3 Results

Table 2: Panel Regressions of Rate Cuts

	Policy Rate	Policy Rate	Policy Rate	Res. Req.	Res. Req.	Res. req.
CBI	-19.79***	-22.51***	-32.77***	-15.43***	-19.17***	-25.91***
	(-5.19)	(-5.45)	(-7.36)	(-3.76)	(-4.70)	(-5.72)
Infection rate		0.72***	0.29**		-0.46***	-0.71***
		(3.79)	(1.99)		(-3.35)	(-4.62)
Case-Fatality		319.71	758.31**		728.02*	1047.22**
		(0.87)	(1.99)		(1.75)	(2.46)
GDP per capita		0.29***	0.28***		0.35***	0.43***
		(5.03)	(4.40)		(5.45)	(5.40)
Growth Forecast		-0.22	-0.72***		-0.13	-0.17
		(-1.19)	(-3.18)		(-0.60)	(-0.78)
Inflation			-0.36***			-0.70***
			(-3.95)			(-6.38)
Stringency			0.08***			-0.04
			(2.70)			(-0.86)
Developed			-6.48			-25.33***
•			(-1.32)			(-4.83)
Lower Bound			-5.84*			7.59**
			(-1.71)			(2.55)
Interest Rate			-0.63***			0.35**
			(-4.19)			(2.11)
Observations	2252	2052	1902	2091	1948	1802
R-squared	0.06	0.12	0.25	0.09	0.12	0.17
Exchange Rate Regime	NO	NO	YES	NO	NO	YES
1 44 0 0 = 411		1 1	1 1			

<sup>\*\*\*</sup>p<0.01 and \*\*p<0.05. All regressions include regional, and version dummies. Robust t statistics are in parentheses.

In Table 2, we report the results of six panel regressions. The first three use the percentage cut in the policy rate as the dependent variable and the remaining three the cut in the reserve requirements. First, we observe that the coefficient of the CBI is consistently negative in all regressions, suggesting that in countries where CBI was relatively higher, the policy rate cuts and reserve requirement ratios were significantly more limited. Second, we report that the coefficient of GDP per capita is significantly positive in all regressions, indicating that richer countries have adopted larger percentage cuts in the policy rate and the reserve requirement ratio. Third, we show that countries that had a higher prepandemic policy rate and those that have reached the lower bound of the policy rate could adopt lower rate cuts, but larger cuts in the reserve requirements. Inflation has a negative estimated coefficient in both regressions, implying that countries with a higher 2019 inflation rate could not be as expansionary as countries with lower inflation.

Table 3 reports the same set of regressions with macro-financial and fiscal policy packages as dependent variables. As in the different messages of Figures 1 and 2, we observe a more positive sign for the coefficients of the CBI than in Table 2, indicating that countries with more independent monetary authorities have adopted larger fiscal and macro-financial packages. Other than the CBI, two other variables with a consistently significant coefficient are GDP per capita and infection rate, and both are positive, except for GDP per capita in Column 4.

Table 3: Panel Regressions of Macro-Financial and Fiscal Policy Measures

	Macro-Fin.	Macro-Fin.	Macro-Fin.	Fiscal	Fiscal	Fiscal
CBI	5.52***	5.67***	3.83***	3.16***	3.00***	2.51***
	(7.00)	(7.69)	(4.96)	(5.37)	(5.83)	(4.91)
Infection rate		0.13***	0.20***		0.04**	0.10***
		(3.22)	(5.34)		(2.12)	(4.78)
Case-Fatality		284.80***	274.60***		-62.84	-112.05***
		(3.56)	(3.58)		(-1.46)	(2.65)
GDP per capita		0.03**	-0.06***		0.15***	0.09***
		(2.10)	(-3.91)		(12.53)	(8.85)
Growth Forecast		-0.20***	-0.08**		-0.22***	-0.12***
		(-4.68)	(-2.10)		(-8.43)	(-5.36)
Inflation			-0.002			0.06***
			(-0.14)			(5.44)
Stringency			-0.01**			-0.004
			(-2.02)			(-0.90)
Developed			4.77***			2.88**
•			(4.10)			(2.10)
Lower Bound			2.50***			3.82***
			(5.82)			(12.91)
Interest Rate			-0.13***			-0.05***
			(-7.68)			(-4.24)
Observations	2252	2053	1902	2252	2053	1902
R-squared	0.35	0.39	0.46	0.34	0.53	0.65
Exchange Rate Regime	NO	NO	YES	NO	NO	YES

<sup>\*\*\*</sup>p<0.01, \*\*p<0.05. All regressions include regional, and version dummies. Robust t statistics are in parentheses.

Finally, in line with the results above, Tables B.1 and B.3 in the Appendix present additional estimations using the robust two-stage least squares estimator and systems estimations. Moreover, the regressions presented in Table B.2 indicate that our results are robust to different definitions of the cut in the policy rate and reserve requirements.

### 4 Concluding Remarks

In this study, we find that in countries with more independent central banks, cuts in the monetary policy rate and reserve requirement ratios were more limited. Instead, governments with more independent monetary authorities have adopted larger fiscal and macro-financial policy packages. Our results are robust to the inclusion of different time-varying or cross-sectional control variables. In this regard, we believe that our findings will be helpful for policymakers through and after the pandemic.

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#### **A Data Sources**

Data collection dates for the economic policy variables (versions) are as follows: Version 1 March 25th, Version 2 April 9th, Version 3 April 16th, Version 4 April 23rd, Version 5 May 7th, Version 6 May 21st, Version 7 June 4th, Version 8 June 18th, Version 9 July 1st, Version 10 16th July, Version 11 August 14th, Version 12 September 10th, Version 13 October 8th, and Version 14 November 20th.

We obtained the CBI index from Garriga (2016), who reports the evolution of the  $CBI^3$  on an annual basis from 1970 to 2012 for a large cross-section of countries. We use the latest reported unweighted average (LVAU) data series from Garriga; however, the results are highly similar when the weighted average (LVAW) series is used. GDP per capita and annual inflation data series (both for 2019) came from the Economic Freedom Index database of the Heritage Foundation. Finally, we collected data (corresponding to the dates at which the different versions of the policy variables were constructed) for the infection and mortality rates for COVID-19 (defined as the number of total COVID-19 cases per 1,000 population and number of deaths due to COVID-19 per one million population). Policy variables, an index for government stringency measures (as reported by Oxford, 2020), as well as the infection and mortality rate series, are available in panel data format, as we have data for all countries and at different times corresponding to each version from Version 1 to Version 14. However, CBI, growth forecast for 2020 (from the April 2020 edition of the World Economic Outlook), interest rate, GDP per capita, inflation data series, and dummy variables are only available in cross-sectional form. The dummy variables are time dummies for the 14 versions of the data, regional dummies for OECD-EU, Sub-Saharan Africa, the Middle East and North Africa, Latin America, Post-socialist transition countries, and Asia and Oceania in addition to a dummy for developed countries and exchange rate dummies. The exchange rate regimes are having no domestic currency, currency board, conventional peg, stabilized arrangement, crawling peg and crawl-like arrangements, other managed arrangements, floating with monetary and inflation targets, and free-floating regimes, respectively. These came from the IMF.

#### **B** Additional Estimations

Here, following Crowe and Meade (2008), we use dummies for the legal system (UK, French, German, Scandinavian, and others) as well as the latitude as instruments for the CBI and GDP per capita. The upper panel in Table B.1 reports Panel IV regressions results, whereas the bottom panel presents the results using cross-sectional data.

Next, Table B.2 presents the results of two robustness checks using panel regressions. The upper panel of the table uses the percentage cut of the Krippner-Wu shadow rates (from the ongoing rate of February 1st, 2020) for European Monetary Union member countries, Australia, New Zealand, Japan, Switzerland, the UK, the United States, and Canada, while using standard policy rates for the rest of the world. The lower panel, on the other hand, shows cuts denominated in percentage points rather than the percentage cut of the ongoing rate of February 1st. As is evident from Table B.2, the results are highly similar to those presented in Table 2.

Finally, we run some systems estimations using the full information maximum likelihood estimator. The main motive for these regressions is to explore whether we can identify two different effects of the CBI on policy package size: a direct effect and an indirect effect. In Table B.3, we run a systems estimation with two equations. In the first, we regress the relevant policy measure on the CBI, inflation,

<sup>&</sup>lt;sup>3</sup>When we used the de-jure or de-facto CBI series constructed by Bodea and Hicks (2015a, 2015b), we obtained qualitatively similar results.

Table B.1: IV Regressions

	Panel Regressions			
	Policy Rate	Res. Req.	Macro-Financial	Fiscal
CBI	-106.29***	-86.70***	8.26**	17.47***
	(-8.07)	(-4.85)	(1.96)	(6.01)
GDP per capita	0.29	1.32***	0.39***	0.24***
	(1.44)	(5.45)	(5.33)	(5.92)
Infection rate	0.64***	-1.36***	-0.12	-0.02
	(2.69)	(-4.31)	(-1.34)	(-0.48)
Case-Fatality	-292.30	999.65**	592.18***	118.26
	(-0.71)	(1.99)	(4.98)	(1.62)
Stringency	-0.05	-0.04	$0.02^{*}$	0.02***
	(-1.07)	(-0.77)	(1.83)	(2.96)
Growth Forecast	-0.28	$1.40^{***}$	0.05	-0.28***
	(-1.06)	(4.31)	(0.67)	(-6.71)
Observations	1895	1797	1895	1895
J-test (p-value)	0.19	0.31	0.30	0.07
Underidentification (p-value)	0.00	0.00	0.00	0.00
	Cross-Sectional Regressions			
	Policy Rate	Res. Req.	Macro-Financial	Fiscal
CBI	-164.94***	-174.63***	50.11*	47.27**
	(-3.29)	(-2.92)	(1.85)	(2.29)
Infection rate	0.92***	-0.07	0.04	0.03
	(2.67)	(-0.20)	(0.35)	(0.33)
Case-Fatality	726.14	4.07	821.66	-5.30
	(0.40)	(0.20)	(1.08)	(-0.01)
Stringency	-0.12	-0.22	0.05	-0.02
	(-0.46)	(-0.94)	(0.80)	(-0.25)
Growth Forecast	-0.05	-0.65	-0.24	-0.33
	(0.04)	(-0.66)	(-0.99)	(-1.39)
Developed Country Dummy	1.84	-32.97*	19.92***	20.71***
	(0.11)	(-1.86)	(3.74)	(3.09)
Observations	135	135	135	135
J-test (p-value)	0.70	0.54	0.26	0.81
Under-identification (p-value)	0.00	0.00	0.02	0.02

<sup>\*\*\*</sup> p<0.01, \*\* p<0.05, \* p<0.1. All regressions include a constant and regional dummies. Panel regressions also include version dummies. Robust t statistics are reported in parentheses.

and some additional variables, including the government stringency index, infection rate, case-fatality rate, GDP per-capita, and the growth forecast of the IMF, as well as version fixed effects, regional dummies, and dummies for the exchange rate systems. Then, in the second one, we run a cross-sectional estimation and regress inflation on the CBI and the three sets dummies again. Here, we find that in all three regressions, a larger value for the CBI is associated with less inflation in the second equation, as less inflation implies a larger cut in the policy rate and the reserve requirement ratio as well as a

larger macro-financial policy package. We interpret this as the indirect role the CBI plays in the stimulus packages. However, there is also an independent and direct role for the CBI in all three systems, as it is directly associated with cuts in the policy rate and reserve requirements, as well as the size of the macro-financial policy package, as in the regressions reported in Tables 2 and 3.

Table B.2: Robustness Checks

Robustness Checks with Shadow Rates Included				
	Policy Rate	Policy Rate	Policy Rate	
CBI	-85.70**	-80.73***	-75.69***	
	(-2.22)	(-2.58)	(-3.11)	
GDP per capita	( =.==)	1.87	0.39***	
GDT per cupitu		(1.17)	(5.33)	
Infection rate		-0.04	0.23	
inioction rate		(-0.48)	(0.62)	
Case-Fatality		31.84**	21.78*	
ouse rutuity		(2.53)	(1.73)	
Growth Forecast		-3.09*	-1.95**	
Growarrorecust		(-1.79)	(-2.45)	
Developed		( 1.1.0)	254.35	
Бетогореа			(1.57)	
Lower Bound			-16.29	
Lower Bound			(-1.02)	
Interest Rate			0.12	
interest nate			(0.19)	
Stringency			0.21**	
Stringency			(2.09)	
Inflation			-0.41**	
iiiiatioii			(-2.16)	
Observations	2252	2053	1902	
R-squared	0.02	0.03	0.06	
Exch. Rate Dummies	NO	NO	YES	
Excii. Nate Dullillines	110			D. I. C. I
	D.11 D.		ecks with Percentag	
	Policy Rate	Policy Rate	Policy Rate	Reserve Requirements
CBI	-1.44***	-1.86***	-2.22***	-0.60**
	(-7.10)	(-8.08)	(-9.51)	(-2.11)
GDP per capita		-0.006***	0.05***	0.03***
		(-3.51)	(3.83)	
Infection rate				(3.44)
		-0.0009*	0.0004	0.001
		-0.0009* (1.85)	0.0004 (0.94)	0.001 (0.44)
Case-Fatality		-0.0009*	0.0004 (0.94) -0.07	0.001
Case-Fatality		-0.0009* (1.85) -0.15 (-1.20)	0.0004 (0.94) -0.07 (-0.61)	0.001 (0.44) 0.09 (0.37)
Case-Fatality Growth Forecast		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07	0.001 (0.44) 0.09
Growth Forecast		-0.0009* (1.85) -0.15 (-1.20)	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23)	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62)
·		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02	0.001 (0.44) 0.09 (0.37) -0.11
Growth Forecast  Developed		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04)	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00)
Growth Forecast		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82***	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04***
Growth Forecast  Developed		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67)	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00)
Growth Forecast  Developed		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56***	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11**
Growth Forecast  Developed  Lower Bound		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67)	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11** (1.97)
Growth Forecast  Developed  Lower Bound		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67) 0.07***	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11** (1.97) 0.08
Growth Forecast  Developed  Lower Bound  Interest Rate		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67) 0.07*** (4.13) 0.001 (0.57)	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11** (1.97) 0.08 (1.23)
Growth Forecast  Developed  Lower Bound  Interest Rate		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67) 0.07*** (4.13) 0.001	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11** (1.97) 0.08 (1.23) 0.002
Growth Forecast  Developed  Lower Bound  Interest Rate  Stringency		-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67) 0.07*** (4.13) 0.001 (0.57)	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11** (1.97) 0.08 (1.23) 0.002 (0.65)
Growth Forecast  Developed  Lower Bound  Interest Rate  Stringency	2252	-0.0009* (1.85) -0.15 (-1.20) 0.01	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67) 0.07*** (4.13) 0.001 (0.57) -0.03***	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11** (1.97) 0.08 (1.23) 0.002 (0.65) -0.02
Growth Forecast  Developed  Lower Bound  Interest Rate  Stringency  Inflation	2252 0.08	-0.0009* (1.85) -0.15 (-1.20) 0.01 (-0.01)	0.0004 (0.94) -0.07 (-0.61) -0.02 (-1.23) -0.82*** (-7.04) -0.56*** (-5.67) 0.07*** (4.13) 0.001 (0.57) -0.03*** (-3.69)	0.001 (0.44) 0.09 (0.37) -0.11 (-0.62) 0.04*** (3.00) 0.11** (1.97) 0.08 (1.23) 0.002 (0.65) -0.02 (-1.21)

<sup>\*\*\*</sup> p<0.01, \*\* p<0.05, \* p<0.1. All regressions include a constant and regional dummies. Panel regressions also include version dummies. Robust t statistics are reported in parentheses.

**Table B.3:** Systems Regressions

<b>Equation 1</b>	Policy Rate	Res. Req.	Macro-Financial
Inflation	-0.66***	-0.39***	-0.11***
	(-7.68)	(-3.69)	(-5.43)
CBI	-32.39***	-23.95***	4.38***
	(-8.48)	(-4.90)	(4.70)
Stringency	0.08**	-0.04	-0.02*
	(2.19)	(-0.95)	(-1.80)
Infection rate	0.31**	-0.61***	$0.18^{***}$
	(2.45)	(-3.75)	(5.82)
Case-Fatality	718.55**	873.60**	352.44***
	(2.42)	(2.17)	(4.84)
GDP per capita	0.27***	0.34***	0.01
	(5.36)	(5.63)	(1.03)
<b>Growth Forecast</b>	-0.71***	0.04	-0.26***
	(-3.34)	(0.16)	(-5.22)
R-squared	0.24	0.14	0.39
Observations	1902	1802	1902
Equation 2	Inflation	Inflation	Inflation
CBI	-6.48***	-6.51***	-6.46***
	(-6.33)	(-6.20)	(-6.31)
R-squared	0.18	0.17	0.18
Observations	162	162	162
Exchange Rate	YES	YES	YES

<sup>\*\*\*</sup> p<0.01, \*\* p<0.05, \* p<0.1. All regressions include version dummies and regional effects. Robust t statistics are in parentheses.

#### C Countries included in the Analysis:

Afghanistan, Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Republic of Congo, Costa Rica, Cote Ivory, Croatia, Cyprus, Czech, Denmark, Djibouti, Dominican Republic, Ecuador, Egypt, El Salvador, Equitorial Guinea, Eritrea, Estonia, Eswatini, Ethiopia, Fiji, Finland, France, Gabon, The Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Guinea Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kosovo, Kuwait, Kyrgyz Republic, Laos, Latvia, Lebanon, Lesotho, Liberia, Libya, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, N. Macedonia, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, San Marino, Saudi Arabia, Senegal, Serbia, Seychelles, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, South Korea, Spain, Sri Lanka, Sudan, Suriname, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad Tobago, Tunisia, Turkey, Turkmenistan, UAE, Uganda, UK, Ukraine, United States, Uruguay, Uzbekistan, Vietnam, Yemen, Zambia, Zimbabwe, Democratic Republic of Congo