

The political economy of reforms in central bank design: evidence from a new database

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Motivation

- **Central Bank Independence over the past 3 decades**
 - ▶ Large academic literature: why? how? what?
 - ▶ Policy side: central banks around the world have gradually become more independent
- Despite the wide consensus on CBI, large worldwide differences in the timing and magnitude of reforms

“Monetary policy independence remains of the highest importance, and it is important that we preserve monetary policy independence to help foster desirable macroeconomic outcomes and financial stability.”

— Stanley Fisher (Nov 2015)

- No systematic study on the drivers of reforms in central bank institutional design

The evolution of central banking

- **How to measure central bank independence?**

- ① *De jure* CBI indices: Bade and Parkin (1982), Grilli et al. (1991), Cukierman (1992) and Cukierman et al. (1992)
- ② *De facto* CBI indices: Cukierman et al. (1992)

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- **Impact of central bank independence on macroeconomic outcomes**

- ▶ Negative relationship between CBI and inflation: Grilli et al. (1991), Cukierman et al. (1992), Acemoglu et al. (2008), Arnone et al. (2009).

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- **Changing role of Central Banks after the crisis**

- ▶ Central bank financial independence
- ▶ Central bank accountability

- **Main empirical challenge**

- ▶ Lack of data on the timing, size and evolution of reforms in central bank design

This paper

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 - ▶ The *dynamics* of CBI since 1970s in 154 countries
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- Propose an extended index of central bank independence by taking into account:
 - ▶ The *dynamics* of CBI since 1970s in 154 countries
 - ▶ New data on financial independence and accountability
- Using the newly created index of CBI, I identify when, by how much and why did countries reform their central banks
 - ▶ Initial reforms, regional convergence and external pressure to reform increase the likelihood of reforms
 - ▶ Political factors or crises episodes have little impact

Institutional characteristics of the ECBI index

Criteria	GMT	CWN	ECBI
Governor and Central Bank Board			
Who appoints the governor	*	*	*
Term of office of governor	*	*	*
Reappointment option for governor			*
Dismissal of governor		*	*
Governor allowed to hold another office in government		*	*
Qualification requirements for governor			*
Who appoints the board members	*		*
Term of office of board members	*		*
Reappointment option for board members			*
Dismissal of board members			*
Board Members allowed to hold another office in government			*
Qualification requirements for board members			*
Staggering term of office for board members			*
Government representatives in the board	*		*
Monetary Policy and Conflicts Resolution			
Who formulates monetary policy	*	*	*
Central bank responsible to fix key policy rates	*		*
Banking sector supervision	*		*
Central bank role in government's budget and/or debt	*		*
Final authority in monetary policy	*	*	*
Objectives			
Central bank's statutory goals	*	*	*

Institutional characteristics of the ECBI index

Criteria	GMT	CWN	ECBI
Lending to the Government			
Direct credit: not automatic	*	*	*
Direct credit: market of lending		*	*
Who decides financing conditions to government		*	*
Beneficiaries of central bank lending		*	*
Direct credit: type of limit	*	*	*
Direct credit: maturity of loans	*	*	*
Direct credit: interest rates	*	*	*
Prohibition from buying government securities in primary market	*	*	*
Financial Independence			
Payment of the initial capital of the central bank			*
Authorized capital of the central bank			*
Central bank financial autonomy			*
Arrangements for automatic recapitalization			*
Transfers of money from the treasury			*
Central bank approves its annual budget			*
Central bank adopt its annual balance sheet			*
Auditing agency			*
Allocation of the net profits			*
Allocation of profits to the general reserve fund			*
Partial payments of dividends before the end of the fiscal year			*
Unrealized profits included in the calculation of distributable profits			*
Central Bank Reporting and Accountability			
Central bank reporting			*
Central bank financial statements			*

Notes: ECBI = Extended CBI Index; GMT = Grilli et al. (1991); CWN = Cukierman et al. (1992).

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 - ▶ 2490 changes to central bank legislation, of which **286 changed the degree of CBI**

Data

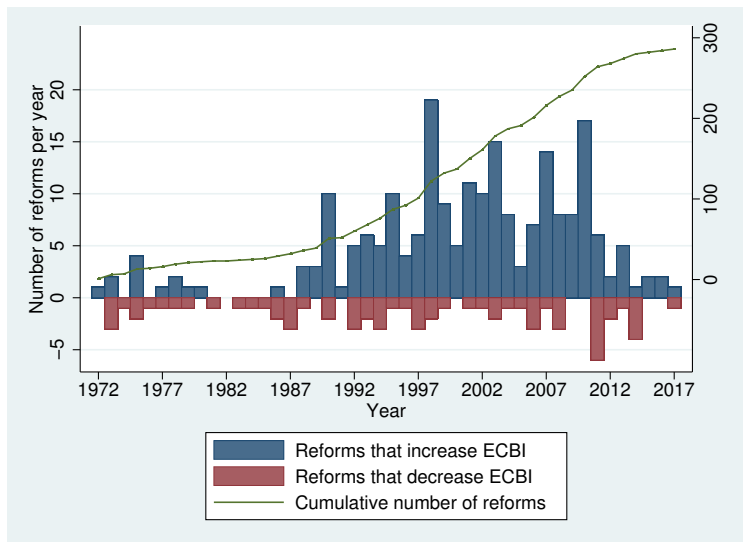
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Table: Measures of Central Bank Independence and Reforms

Paper	Index Name	Variables	Countries	Period	Nr. of reforms
Grilli et al. (1991)	GMT	16	18	1989	–
Cukierman et al. (1992)	CWN	16	72	1950-1989	35
Cukierman et al. (2002)	CWN	16	26	1991-1998	9
Polillo and Guillén (2005)	CWN	16	91	1989-2000	60
Jacome and Vazquez (2008)	CWNE	17	24	1990-2002	13
Acemoglu et al. (2008)	CWN	16	52	1972-2005	40
Dincer and Eichengreen (2014)	CBIU	24	85	1998-2010	44
Bodea and Hicks (2015)	CWN	16	83	1972-2010	108
This paper	ECBI	42	154	1972-2017	286

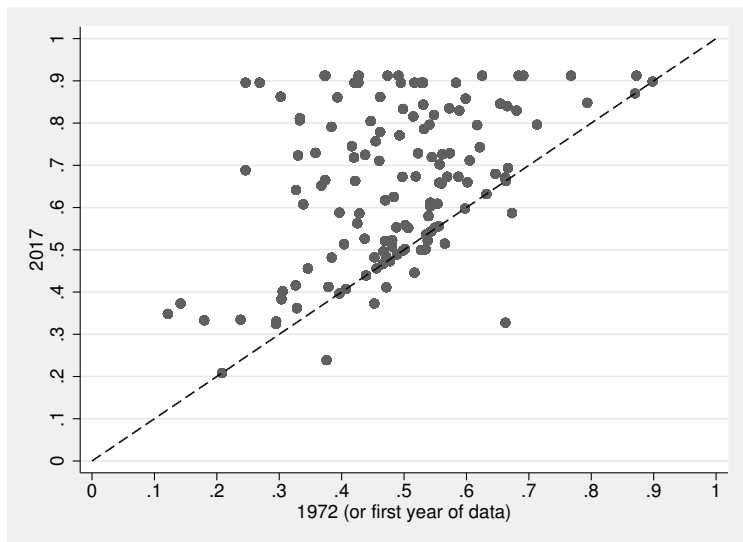
Note: Number of countries and reforms in CBI identified in previous works and in this paper.

Central bank Legislative reforms



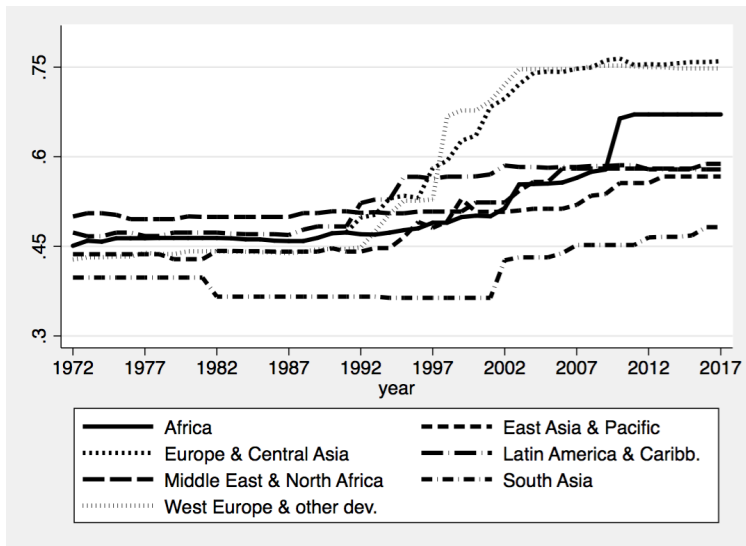
Note: Frequency of reforms that increased/decreased the ECBI index, together with the cumulative number of reforms in CBI between 1972 and 2017.

Comparison of ECBI Index in 1972 and 2017



Note: Level of central bank independence proxied by the ECBI index in 1972 (or the first year available) and 2017.

Average degree of ECBI across regions



Note: Evolution of the average index of CBI by regional clusters.

Drivers of reforms in central bank independence

- Endogenous Political Institutions (Aghion et al., 2004, QJE): political institutions such as central banks evolve endogenously in response to changing political and economic conditions.

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$$\Delta ECBI_{it} = \beta_1 ECBI_{i,t-1}(1 - ECBI_{i,t-1}) + \beta_2(REG_{i,t-1} - ECBI_{i,t-1}) + \beta_3' \phi^{Crises} + \beta_4' \phi^{Int} + \beta_5' \phi^{Pol} + \beta_6' \phi^{Econ} + \epsilon_{it}$$

Drivers of reforms in CB design: ordered logit estimates

- Previous levels of independence, regional convergence and external pressures represent important drivers of changes in CBI

	Full sample				Advanced	Developing
	(1)	(2)	(3)	(4)	(5)	(6)
$ECBI_{t-1}(1- ECBI_{t-1})$	2.404* (1.456)	2.506* (1.410)	4.503*** (1.180)	8.065*** (1.561)	8.378*** (2.421)	9.842*** (2.380)
$REG_{t-1} - ECBI_{t-1}$	2.238*** (0.477)	2.242*** (0.477)	3.326*** (0.456)	3.157*** (0.474)	2.580*** (0.910)	3.824*** (0.510)
Financial crisis		0.189 (0.256)	-0.006 (0.247)	-0.103 (0.250)	-0.348 (0.540)	-0.022 (0.285)
Inflation crisis		0.097 (0.236)	0.084 (0.265)	0.134 (0.270)	0.562 (0.632)	-0.030 (0.303)
Recession		0.027 (0.156)	-0.085 (0.161)	-0.011 (0.176)	0.191 (0.286)	-0.068 (0.228)
IMF programs			0.633*** (0.156)	0.814*** (0.196)	1.203* (0.622)	0.713*** (0.202)
Currency union			3.312*** (0.189)	2.819*** (0.223)	2.826*** (0.343)	2.982*** (0.332)
Additional controls:						
Ideology and political factors				Yes	Yes	Yes
Economic conditions				Yes	Yes	Yes
Observations	5,752	5,752	5,366	4,264	1,034	3,230
Number of countries	153	153	151	135	32	111

Drivers of reforms in CB design: alternative learning proxies

	Alternative domestic learning				Alternative domestic and regional learning			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ECBI _{t-1}	6.287*** (2.341)	6.387*** (2.336)	8.686*** (2.349)	9.733*** (2.584)	6.323*** (2.297)	6.413*** (2.287)	8.544*** (2.314)	9.621*** (2.592)
ECBI _{t-1} ²	-4.592** (1.823)	-4.670*** (1.799)	-6.879*** (1.723)	-8.938*** (1.944)	-4.480** (1.797)	-4.549** (1.767)	-6.690*** (1.697)	-8.808*** (1.953)
REG _{t-1} – ECBI _{t-1}	3.548*** (0.865)	3.572*** (0.869)	4.744*** (0.912)	3.779*** (0.963)				
REG _{2t-1} – ECBI _{t-1}					3.728*** (0.894)	3.754*** (0.899)	4.792*** (0.937)	3.823*** (0.973)
IMF programs			0.669*** (0.159)	0.803*** (0.196)			0.647*** (0.158)	0.801*** (0.196)
Currency union			3.263*** (0.196)	2.838*** (0.221)			3.262*** (0.196)	2.834*** (0.222)
Additional controls:								
Crisis		Yes	Yes	Yes		Yes	Yes	Yes
Ideology and political factors				Yes				Yes
Economic conditions				Yes				Yes
Observations	5,752	5,752	5,366	4,264	5,770	5,770	5,384	4,280
Number of countries	153	153	151	135	153	153	151	135

Drivers of reforms in CB design: alternative specifications

$$Prob(Reform_{i,t} = 1) = F(\beta_1 ECBI_{i,t-1}(1 - ECBI_{i,t-1}) + \beta_2(REG_{t-1} - ECBI_{i,t-1}) + \beta_3\phi^{Crisis} + \beta_4\phi^{International} + \beta_5\phi^{Pol+} + \beta_6\phi^{Econ} + \epsilon_{i,t}),$$

	Reform				$\Delta ECBI$	
	(1) Cloglog	(2)	(3)	(4) Logit	(5) OLS	(6)
$ECBI_{t-1}(1 - ECBI_{t-1})$	3.693* (2.011)		3.954* (2.097)		0.054** (0.025)	
$ECBI_{t-1}$		5.393* (2.910)		5.655* (2.982)		-0.040 (0.048)
$ECBI_{t-1}^2$		-4.621** (2.342)		-4.852** (2.404)		-0.009 (0.029)
$REG_{t-1} - ECBI_{t-1}$	1.979*** (0.524)	2.590*** (0.897)	2.042*** (0.543)	2.681*** (0.942)	0.083*** (0.011)	0.046** (0.023)
IMF programs	0.622*** (0.189)	0.607*** (0.189)	0.639*** (0.195)	0.625*** (0.195)	0.004** (0.002)	0.004** (0.002)
Currency union	2.061*** (0.235)	2.077*** (0.236)	2.231*** (0.263)	2.248*** (0.264)	0.044*** (0.006)	0.044*** (0.006)
Additional controls:						
Crisis	Yes	Yes	Yes	Yes	Yes	Yes
Ideology and political factors	Yes	Yes	Yes	Yes	Yes	Yes
Economic conditions	Yes	Yes	Yes	Yes	Yes	Yes
Country FE					Yes	Yes
Year FE					Yes	Yes
Observations	4,264	4,264	4,264	4,264	4,264	4,264
R-squared					0.104	0.106
Number of countries	135	135	135	135	135	135

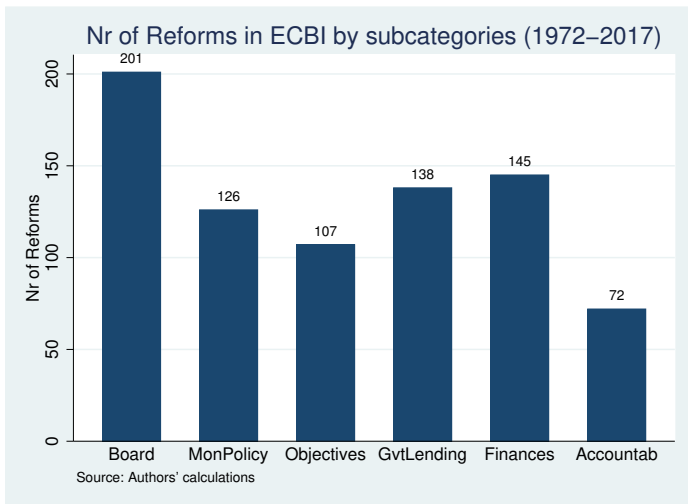
Direction and magnitude of reforms

- Do the drivers of reform differ depending on the direction of reforms?

	<i>Reform > 0</i>		<i>Large Reform > 0.10</i>		<i>Reform < 0</i>	
	(1)	(2)	(5)	(6)	(3)	(4)
$ECBI_{t-1}*(1- ECBI_{t-1})$	7.761*** (2.565)		19.220*** (4.778)		-3.963 (4.146)	
$ECBI_{t-1}$		10.232*** (3.575)		21.970*** (5.914)		-2.785 (6.935)
$ECBI_{t-1}^2$		-9.150*** (2.963)		-20.788*** (5.187)		3.343 (5.113)
$REG_{t-1} - ECBI_{t-1}$	3.033*** (0.591)	3.871*** (0.993)	4.326*** (0.825)	5.184*** (1.332)	-2.417* (1.451)	-1.98 (2.496)
Financial crisis	0.103 (0.230)	0.082 (0.231)	0.005 (0.299)	-0.018 (0.300)	0.777* (0.402)	0.774* (0.402)
IMF programs	0.922*** (0.220)	0.900*** (0.220)	1.175*** (0.298)	1.156*** (0.297)	-0.266 (0.404)	-0.268 (0.403)
$Polity_{t-1}$	0.024 (0.018)	0.025 (0.018)	0.057** (0.024)	0.058** (0.024)	-0.021 (0.034)	-0.021 (0.034)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4264	4264	4264	4264	4138	4138
Number of countries	135	135	135	135	135	135

- Financial crises do seem to influence the probability of reducing the level of independence

Legislative reforms by subcategories



Reforms in central bank design by sub-categories

	Δ Board (1)	Δ Mon.Pol. (2)	Δ Objectives (3)	Δ Lending (4)	Δ Fin. Ind. (5)	Δ Account. (6)
$CBI_{t-1}*(1-CBI_{t-1})$	-0.370 (1.192)	6.258** (2.513)	4.762*** (1.305)	5.318*** (1.324)	3.530 (3.323)	7.647*** (2.664)
$REG_{t-1}-CBI_{t-1}$	2.614*** (0.572)	4.276*** (0.548)	3.615*** (0.392)	2.136*** (0.445)	0.547 (0.932)	2.028** (0.935)
Financial crisis	0.412 (0.270)	-0.999*** (0.387)	-0.133 (0.329)	0.115 (0.302)	-0.807* (0.453)	1.038*** (0.396)
Inflation crisis	0.013 (0.389)	-0.212 (0.343)	0.254 (0.363)	0.101 (0.455)	0.306 (0.671)	-0.851 (0.742)
Recession	-0.167 (0.197)	-0.001 (0.190)	0.231 (0.249)	-0.058 (0.222)	0.147 (0.285)	0.519 (0.366)
IMF programs	0.438* (0.244)	0.946*** (0.210)	1.025*** (0.298)	1.114*** (0.280)	0.267 (0.329)	0.217 (0.349)
Currency union	2.476*** (0.229)	2.246*** (0.319)	3.010*** (0.275)	2.447*** (0.301)	1.764*** (0.592)	1.452* (0.831)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,264	4,264	4,264	4,264	4,264	4,264
Number of countries	135	135	135	135	135	135

Central bank design and democracy

	Ologit (1) Δ ECBI	Logit (2) <i>Reform</i>	OLS (3) Δ ECBI	Ologit (4) Δ ECBI	Logit (5) <i>Reform</i>	OLS (6) Δ ECBI
$ECBI_{t-1}*(1 - ECBI_{t-1})$	7.941*** (1.549)	3.633* (2.009)	0.055** (0.025)	8.056*** (1.553)	3.760* (1.993)	0.058** (0.024)
$REG_{t-1} - ECBI_{t-1}$	3.153*** (0.478)	1.969*** (0.525)	0.083*** (0.011)	3.096*** (0.463)	1.914*** (0.521)	0.082*** (0.011)
$Democracy_t$	0.240 (0.205)	0.120 (0.207)	0.002 (0.003)			
$Democratic Reform_t$				1.508*** (0.519)	1.403*** (0.373)	0.024** (0.011)
IMF programs	0.829*** (0.195)	0.632*** (0.189)	0.004** (0.002)	0.845*** (0.194)	0.634*** (0.188)	0.005** (0.002)
Currency union	2.841*** (0.223)	2.077*** (0.235)	0.043*** (0.006)	2.871*** (0.221)	2.089*** (0.234)	0.043*** (0.006)
$GDP growth_{t-1}$	0.026*** (0.009)	0.017* (0.010)	0.001 (0.001)	0.026*** (0.008)	0.018* (0.010)	0.001 (0.001)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FE			Yes			Yes
Year FE			Yes			Yes
Observations	4,263	4,263	4,263	4,260	4,260	4,260
R-squared			0.104			0.109
Number of countries	135	135	135	135	135	135

Crises, IMF programs and reforms

	Full sample (1)	Advanced (2)	Developing (3)	Full sample (4)	Advanced (5)	Developing (6)
$ECBI_{t-1}*(1- ECBI_{t-1})$	8.041*** (1.562)	8.424*** (2.480)	9.756*** (2.345)	7.252*** (1.509)	8.574*** (2.459)	8.603*** (2.205)
$REG_{t-1} - ECBI_{t-1}$	3.168*** (0.473)	2.448*** (0.863)	3.835*** (0.498)	3.065*** (0.494)	2.340*** (0.869)	3.749*** (0.515)
Crisis	0.045 (0.154)	0.115 (0.304)	0.019 (0.176)	0.116 (0.152)	0.193 (0.282)	0.102 (0.177)
IMF programs	0.798*** (0.192)	1.155** (0.539)	0.704*** (0.199)			
IMF programs (random)				0.067 (0.160)	0.065 (0.304)	0.048 (0.185)
Currency Union	2.811*** (0.226)	2.831*** (0.347)	2.970*** (0.325)	2.668*** (0.219)	2.706*** (0.351)	2.761*** (0.268)
Additional controls:						
Ideology and political factors	Yes	Yes	Yes	Yes	Yes	Yes
Economic conditions	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,264	1,034	3,230	4,264	1,034	3,230
Number of countries	135	32	111	135	32	111

Ordered logit estimates: alternative CBI indices

	Δ GMT		Δ CWN		Δ CWNE	
	(1)	(2)	(3)	(4)	(5)	(6)
$CBI_{t-1}*(1-CBI_{i,t-1})$	2.172 (1.487)		4.019*** (1.353)		2.780 (1.759)	
CBI_{t-1}		1.783 (2.334)		5.961*** (2.254)		3.040 (2.439)
CBI_{t-1}^2		-2.020 (1.734)		-4.871*** (1.655)		-2.888 (1.947)
$REG_{t-1}-CBI_{i,t-1}$	2.142*** (0.588)	1.928** (0.960)	1.885*** (0.495)	2.905*** (0.980)	3.317*** (0.506)	3.453*** (0.949)
Financial crisis	-0.134 (0.364)	-0.129 (0.368)	0.189 (0.315)	0.179 (0.316)	0.291 (0.316)	0.289 (0.318)
Inflation crisis	0.025 (0.377)	0.040 (0.378)	-0.094 (0.468)	-0.137 (0.471)	-0.478 (0.404)	-0.484 (0.406)
Recession	0.145 (0.186)	0.142 (0.189)	0.258 (0.215)	0.280 (0.217)	0.188 (0.222)	0.191 (0.224)
IMF programs	0.676*** (0.238)	0.679*** (0.238)	0.970*** (0.262)	0.958*** (0.261)	0.946*** (0.249)	0.942*** (0.247)
Currency union	2.814*** (0.284)	2.803*** (0.282)	2.677*** (0.315)	2.742*** (0.315)	2.726*** (0.290)	2.736*** (0.280)
Additional controls:						
Ideology and political factors	Yes	Yes	Yes	Yes	Yes	Yes
Economic conditions	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,906	2,906	2,906	2,906	2,906	2,906
Number of countries	132	132	132	132	132	132

Concluding remarks

- Large dataset on the timing, evolution and magnitude of reforms in central bank design
- I propose a new index of CBI that captures
 - ▶ the dynamics of CB legislative reforms
 - ▶ new information on the institutional design of central banks
- I find that the likelihood of CBs reforms is mainly driven by domestic and regional learning as well as an international pressure to reform such as IMF Loan Programs or joining monetary unions
- Contributes to a larger literature on political institutions by underscoring the importance of understanding the dynamics of the reform process

Thank you for your attention

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