Inflation Targeting as a Shock Absorber

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Background

- Inflation targeting has become a dominant framework for monetary policy since the 1980s.
- It is praised not just for its success in bringing down inflation, but also increasing the credibility and accountability of policymakers (Bernanke and Mishkin, 1997; Ball, 2010).
- However, the global financial crisis dramatically changed the perception of IT as an optimal framework for achieving macroeconomic stability, especially when the economy is confronting large real or financial shocks.
- Most papers in the literature is on the performance of IT during the relatively good times of the 1990s through the beginning of the 2008 global financial crisis.

Indroduction

Motivation

- **whether IT helps countries and their central banks in dealing with crises, that is, whether it allows stabilizing inflation and output in response to large adverse shocks.**
- This paper focuses on this question and analyzes whether countries operating under IT have a better macroeconomic performance in response to large adverse shocks than those with non-IT regimes.

The link between inflation targeting and natural disasters

Inflation targeting and the effects of large natural disasters
How IT can affect the policy response to, and propagation of, large natural disasters.

In the New Keynesian model:

- NKPC: inflation depends on future output gaps
- A natural disaster lowers potential output through the destruction of productive capital.
- This lowers potential output and employment while raising inflation.
- The central bank would like to **give the signal** that it will be tough in the future without reducing demand much today.
- This strategy can lower inflation today, while keeping output and employment closer to potential.
- However, such a strategy is **only credible under commitment**,which IT facilitates to attain.

The link between inflation targeting and natural disasters

Inflation targeting and the effects of large natural disasters

IT can affect the propagation of natural disaster shocks at least through **two channels.**

- In first the propagation channel, lower nominal uncertainty in wage contracts might allow for **higher employment** following disasters.
  - Strulik and Trimborn (2019): a disaster destroys physical capital and durable consumption goods, such as residential housing. Households want to provide more labor in order to rebuild housing, which enters their utility function directly and exhibits a high relative marginal utility. This response in labor supply partially off-sets the negative effect on GDP due to the destruction of physical capital.
- Along a second propagation channel, investment activities in are construction-led boom can be positively affected by IT through lower riskiness in nominal credit contracts and higher savings(Benson and Clay, 2004).
  - IT might lower credit constraints through higher savings and lower nominal uncertainty, supporting the recovery.

3. Empirical strategy and data

3.1. Large natural disaster shocks

- We use the EM-DAT database from the Center for Research on the Epidemiology of Disasters (CRED) to select large natural disasters
  - earthquakes, floods, and storms, among others
- 10 or more people are killed; 100 or more people are affected; there is adeclaration of a state of emergency; or there is a call for international assistance
- the disaster size /GDP
- The selection of disasters leaves us with 1375 events between **1980 and 2015.**
- The cross-section contains 76 countries, mostly advanced economies and emerging markets.
- We obtain real and seasonally adjusted data on output, private consumption, governmental consumption, investment, exports, and imports from **both OECD national accounts statistics and national sources**.

3.4. Empirical model and identification

$$\Delta y_{i,t} = c + \sum_{j=0}^{J} [\beta_j S_{i,t-j} + \delta_j IT_{i,t-j} + \gamma_j IT_{i,t-j} S_{i,t-j} + \vartheta_j GDPpc_{i,t-j} S_{i,t-j}]$$

$$+ \nu_i + \nu_Y + \phi X_{i,t-1} + \sum_{l=1}^{L} \mu_l \Delta y_{i,t-l} + \varepsilon_{i,t}.$$

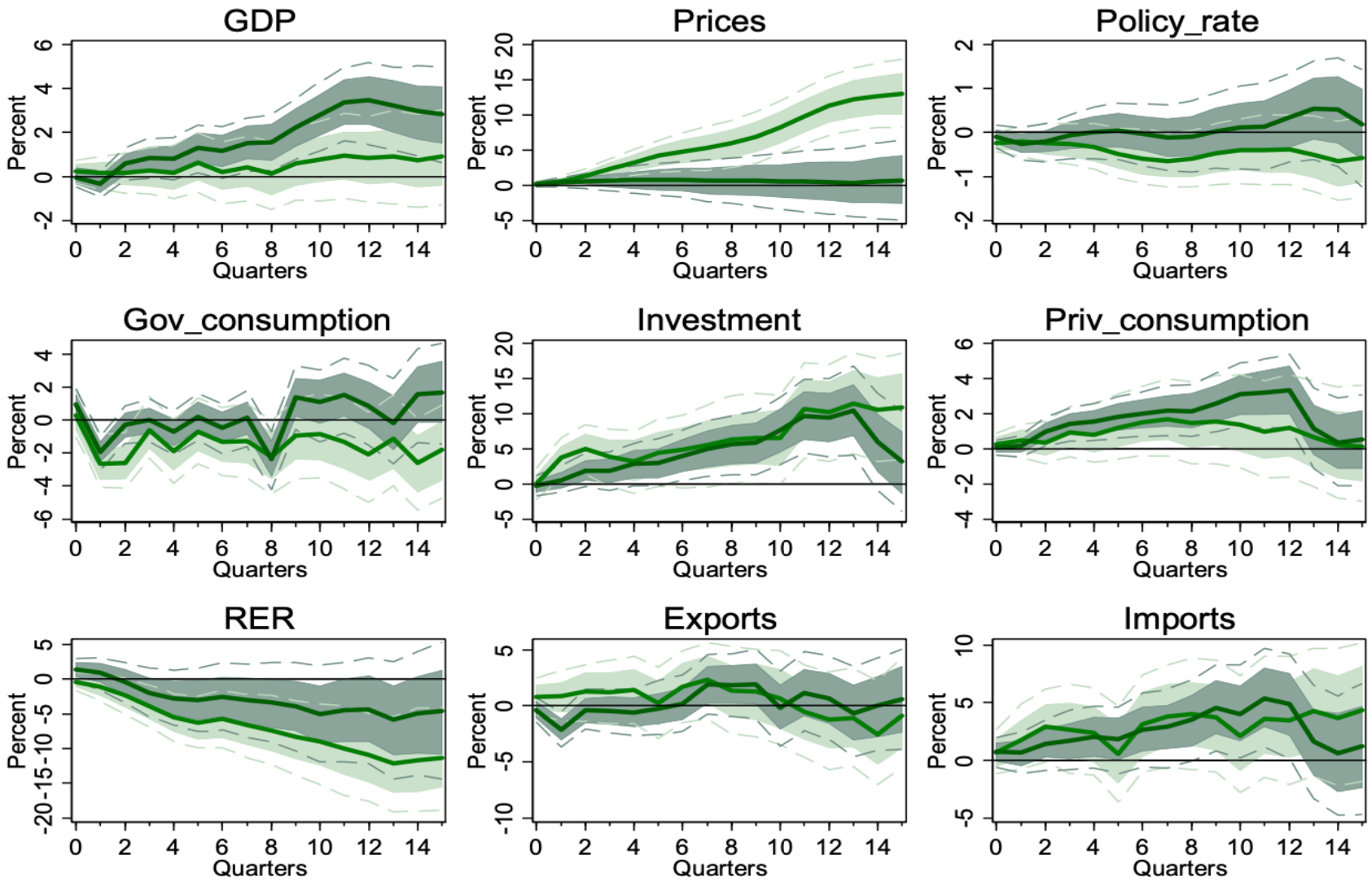
- The main endogenous variables: changes in GDP and consumer prices.
- time-invariant country characteristics, such as the geographic exposure to large natural disasters through country fixed effects ν_i.
- we let year fixed-effects ν_Y correct for common unobservable time-varying factors, such as global growth and inflation trends as well as climate change.
- To remove possible autocorrelationin the error term, we include lags of the dependent variable.
- $X_{i,t-1}$: urbanization, population density, as well as measures for the level of democracy, capital account openness, and the FX regime..

4.1. The effects of inflation targeting on macroeconomic dynamics

Table 1
Regression results for differential impact of inflation targeting.

Column	(1)		(2)		(3)		(4)	
Dependent variable	ΔGDP		ΔConsumer prices		ΔPolicy rate		ΔGovernment consumption	
Explanatory variables	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
IT*Shock in t	−0.33	(−0.99)	−0.10	(−0.49)	0.14	(0.82)	0.61	(0.81)
IT*Shock in t-1	−0.22	(−0.66)	0.09	(0.44)	−0.21	(−1.24)	0.20	(0.27)
IT*Shock in t-2	0.94***	(2.86)	−0.54***	(−2.58)	0.10	(0.60)	1.69**	(2.27)
IT*Shock in t-3	0.22	(0.67)	−0.33	(−1.57)	0.19	(1.15)	−0.75	(−1.05)
IT*Shock in t-4	0.01	(0.04)	0.02	(0.09)	0.11	(0.68)	0.08	(0.11)
IT*Shock in t-5	0.02	(0.08)	−0.18	(−0.88)	0.22	(1.34)	−0.12	(−0.18)
IT*Shock in t-6	0.34	(1.09)	0.03	(0.15)	0.02	(0.14)	−0.11	(−0.15)
IT*Shock in t-7	0.24	(0.72)	−0.21	(−0.95)	−0.01	(−0.08)	0.43	(0.60)
IT*Shock in t-8	0.32	(0.96)	−0.16	(−0.73)	0.00	(0.02)	−1.26*	(−1.74)
IT*Shock in t-9	0.22	(0.62)	−0.51**	(−2.14)	0.01	(0.07)	1.76**	(2.28)
IT*Shock in t-10	0.43	(1.20)	−0.64***	(−2.69)	0.03	(0.14)	0.57	(0.74)
IT*Shock in t-11	0.44	(1.17)	−0.30	(−1.18)	0.03	(0.15)	1.02	(1.24)
IT*Shock in t-12	0.28	(0.71)	−0.30	(−1.13)	0.19	(0.91)	0.48	(0.59)
IT*Shock in t-13	−0.26	(−0.58)	0.30	(0.94)	0.30	(1.18)	−1.51	(−1.59)
IT*Shock in t-14	−0.12	(−0.27)	0.17	(0.51)	0.12	(0.48)	2.32**	(2.45)
IT*Shock in t-15	−0.31	(−0.68)	−0.29	(−0.89)	−0.41	(−1.63)	0.53	(0.56)
Dependent in t-1	−0.02	(−1.19)	1.08***	(67.60)	0.09***	(5.62)	−0.50***	(−29.81)
Dependent in t-2	0.02	(1.51)	−0.25***	(−10.73)	−0.05***	(−3.59)	−0.22***	(−11.84)
Dependent in t-3	0.02	(1.42)	−0.06***	(−2.70)	−0.05***	(−3.17)	−0.10***	(−5.14)
Dependent in t-4	−0.14***	(−9.07)	−0.03*	(−1.81)	−0.04***	(−3.11)	−0.09***	(−5.19)
Democracy in t-1	0.22	(0.46)	0.17	(0.57)	0.04	(0.15)	−0.48	(−0.34)
Urban in t-1	−0.01	(−0.70)	0.00	(0.01)	0.01	(0.81)	−0.03	(−0.99)
Density in t-1	−0.00	(−0.90)	0.00	(1.59)	0.00	(0.28)	−0.00	(−0.91)
Cap. acc. Open. in t-1	−0.05	(−1.36)	−0.15***	(−5.64)	−0.02	(−0.87)	−0.15**	(−2.08)
FX Regime in t-1	−0.04	(−0.22)	0.33**	(2.34)	0.00	(0.03)	0.15	(0.40)
Further controls (see Table notes)	yes		yes		yes		yes	
Observations	3926		4343		4286		3782	
Degrees of freedom	163		174		174		159	
R2 within	0.132		0.857		0.096		0.241	
Countries	58		69		69		54	
Av. obs./country	67.69		62.94		62.12		70.04	
P-value joint significance interactions IT*Shock	0.38		0.04		0.79		0.03	

4.1. The effects of inflation targeting on macroeconomic dynamics



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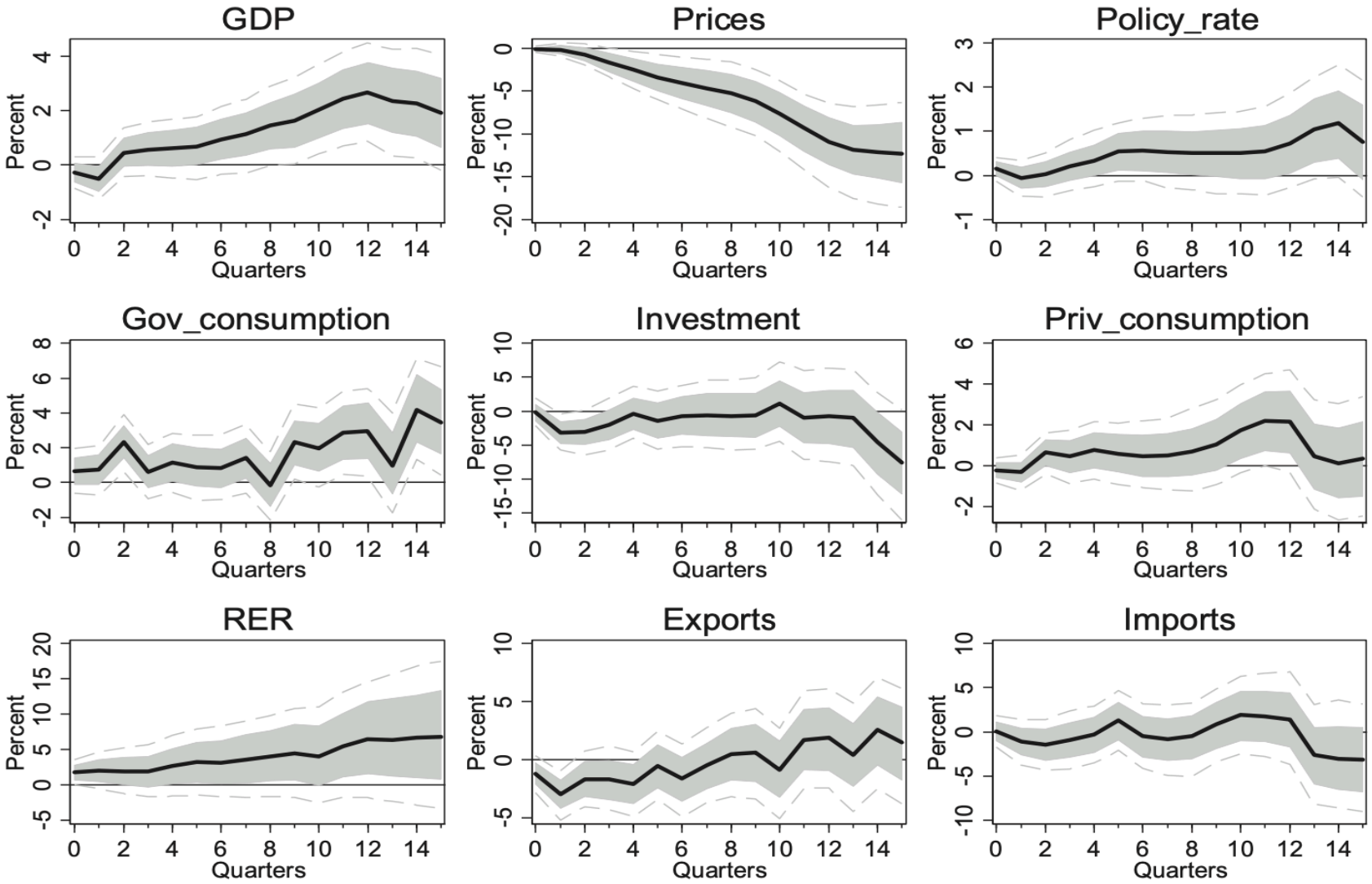

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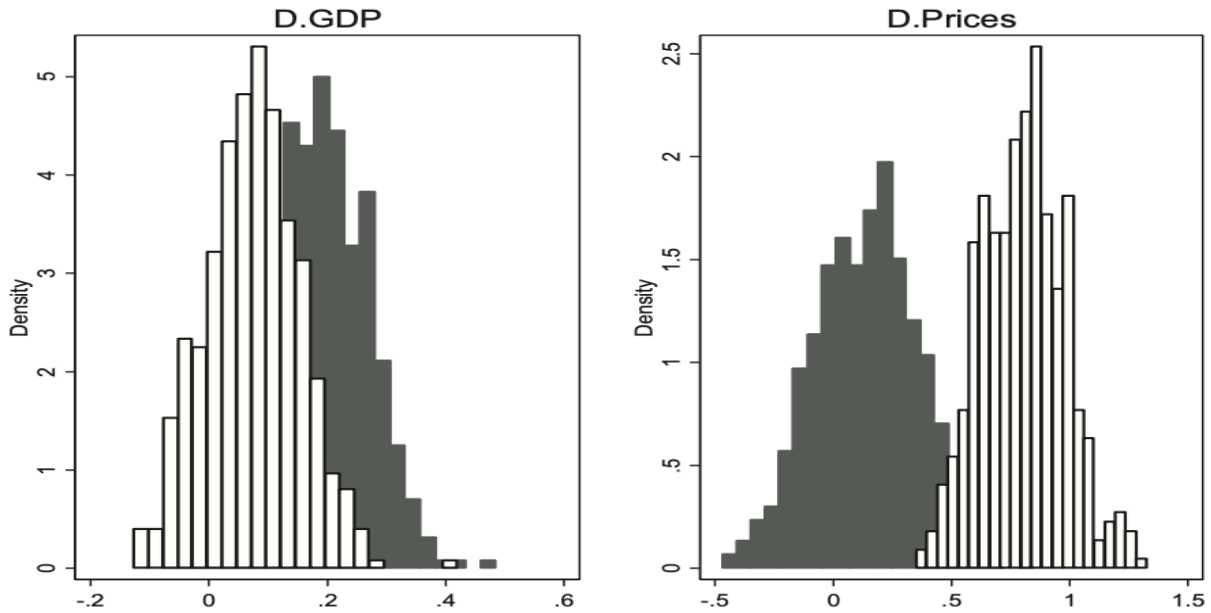


Table 2
Testing for differences in means following natural disasters.

Variable	Mean GDP growth	Mean inflation rate
Targeting economies	0.18	0.14
Non-targeting economies	0.07	0.80
Difference	0.11	−0.67
t-statistic	28.56	−74.77
p-value	0.00	0.00

4.2. Transmission channels

there are two important features of IT that are thought to contribute to i**ts superiority over alternative monetary regimes**

- (i) the attainment of a generally more stable economic environment;
- (ii) better anchoring of inflation expectations

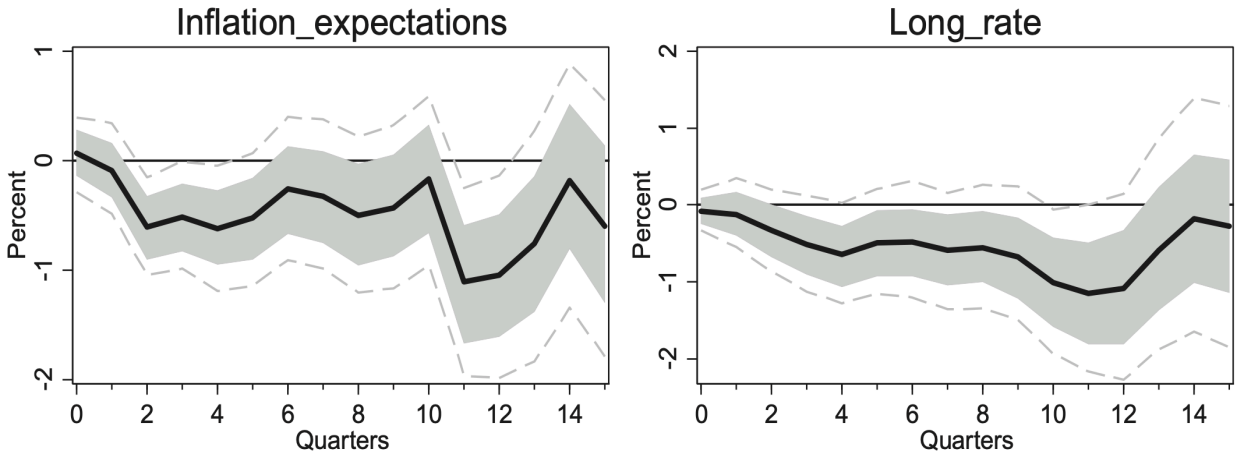
Table 3
Testing for differences in volatility.

Variable	GDP	Prices	Pol. rate	Gov. cons.	Priv. cons.	Investm.	RER	Exports	Imports
IT	0.50	0.34	0.19	1.51	0.35	1.01	1.33	1.30	0.89
non-IT	0.37	0.49	0.15	1.63	0.42	1.81	0.99	1.21	1.55
Difference	0.13	−0.15	0.04	−0.12	−0.07	−0.80	0.34	0.09	−0.66
t-statistic	30.87	−26.66	14.62	−6.75	−12.62	−38.71	19.56	4.96	−37.47

Notes: The table shows the estimated average standard deviation of the (log) change of main macroeconomic variables over 4 years following a large real shock in inflation targeting and non-inflation targeting economies as well as the differences between the mean standard deviations and the *t*-statistics based on 500 Monte Carlo draws.

4.2. Transmission channels

- we next test whether IT leads to more stable inflation expectations.
- We use data from the ifo World Economic Survey (WES) for the variable "**expected inflation rate by the end of the next 6 months.**"



- the nominal long-term rate is the sum of the path of the **current and future expected nominal short-term rates and the term premium.**
- Since the initial monetary policy response over the horizon is not significantly different across the two country groups, the difference in the evolution of the long rate is most likely due to a **different dynamics of term premia.**
- **better anchored inflation expectations and lower risk premia, rather than the monetary policy response directly.**

5. Economic mechanisms

we further investigate which economic mechanisms account for the superior performance of IT countries.

- we look at the interactions of monetary and fiscal policies.
- we analyze whether IT functions differently in developing versus advanced economies, before we ask whether soft or hard targeting makes a difference.

5.1. Fiscal rules and monetary-fiscal coordination

$$\begin{aligned}\Delta y_{i,t} = \sum_{j=0}^{15} \Big[& \beta_i S_{i,t-j} + \gamma_j \delta_j IT\_only_{i,t-j} + \delta_j FR\_only_{i,t-j} \\ & + \rho_j IT\_and\_FR_{i,t-j} + \lambda_{i,t-j} IT\_only_{i,t-j} S_{i,t-j} \\ & + \tau_j Fr\_only_{i,t-j} S_{i,t-j} + \xi_{i,t-j} IT\_and\_FR_{i,t-j} S_{i,t-j} \Big] \\ & + \sum_{l=1}^{4} \mu_l \Delta y_{i,t-l} + \phi X_{i,t-1} + c + \nu_Y + \varepsilon_{i,t}. \end{aligned} \tag{8}$$

5.1. Fiscal rules and monetary-fiscal coordination

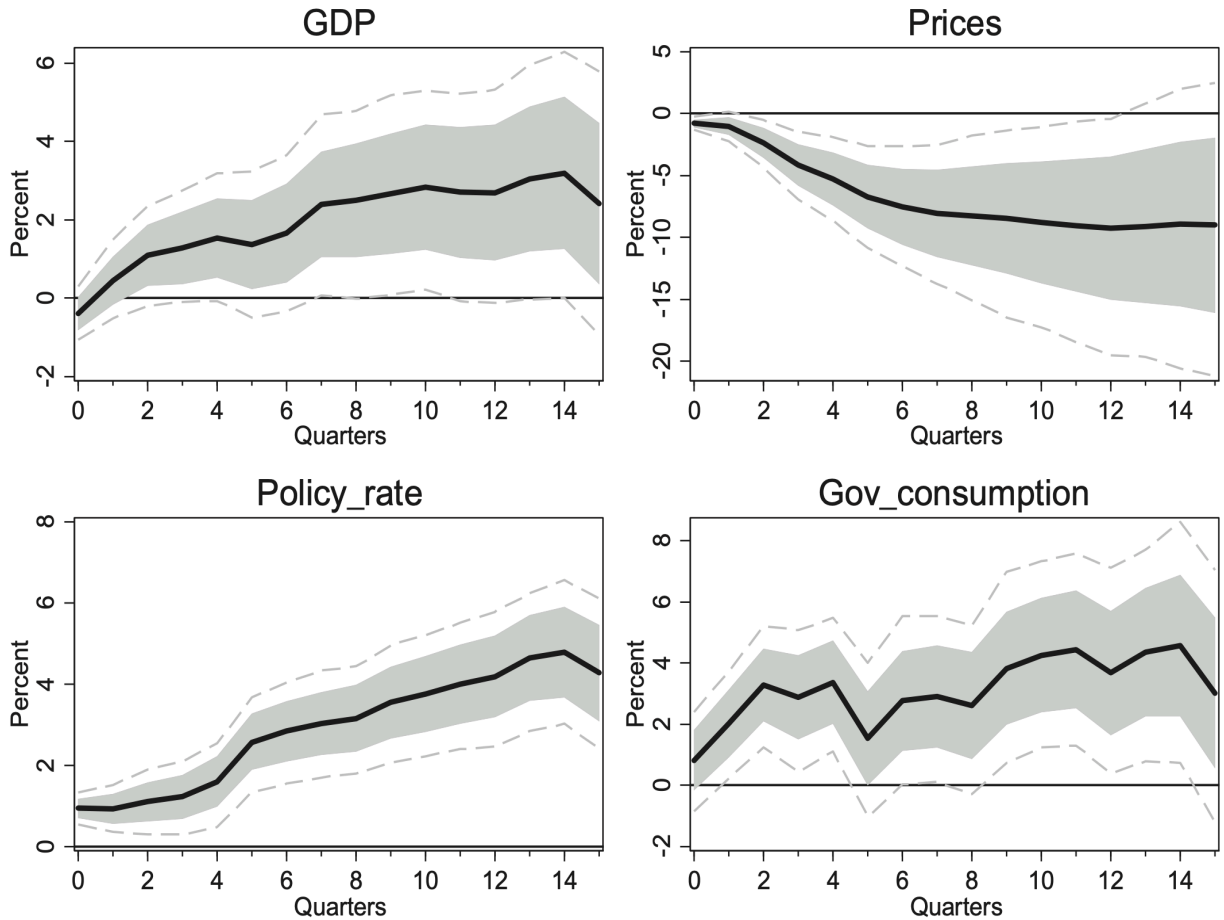
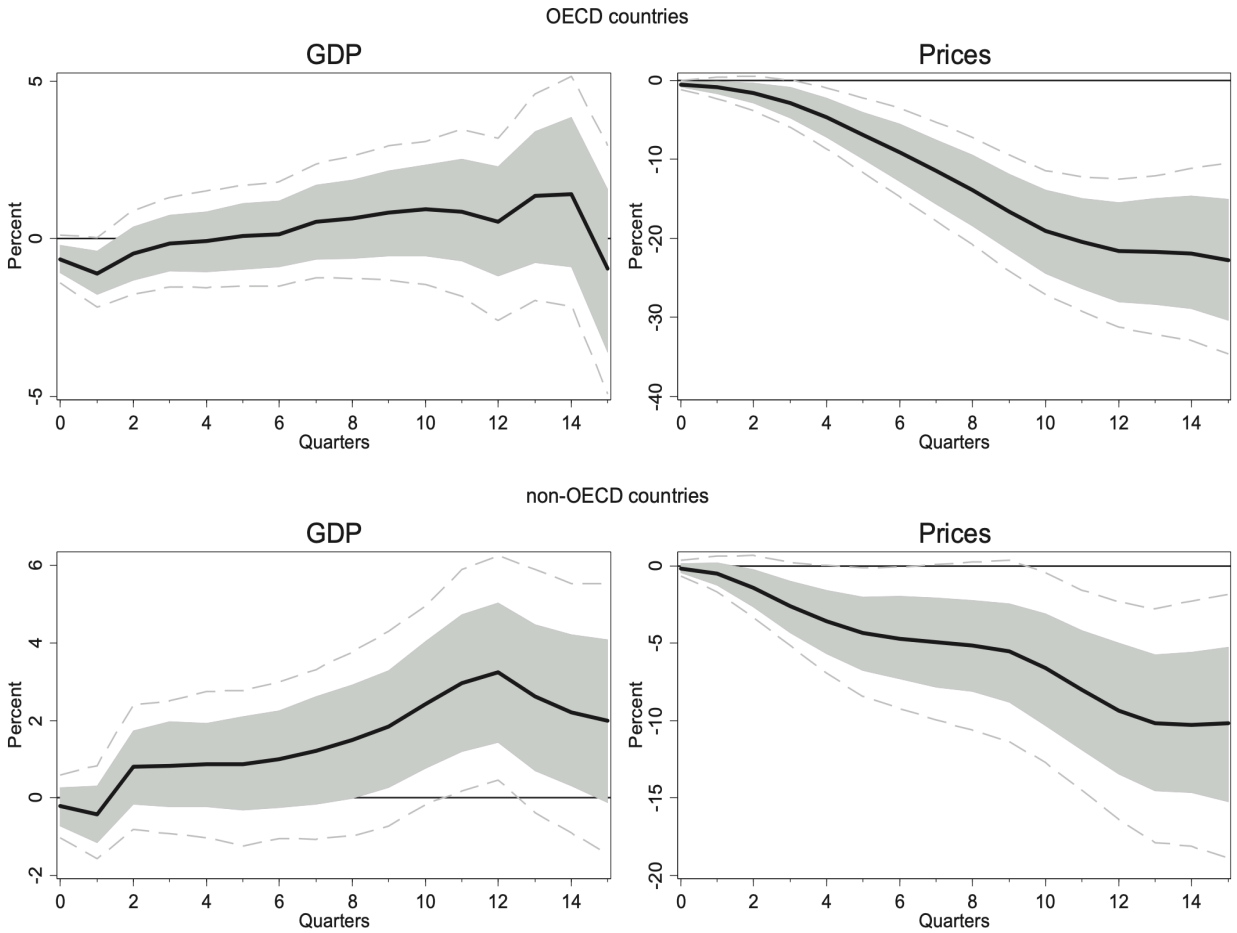


Fig.: Cross-effects between inflation targeting and fiscal rules. Note: The figure shows the cumulative effects of inflation targeting and fiscal rules jointly, captured by the $\xi_{i,t-j}$ in model (8), on macroeconomic variables following natural disaster shocks.

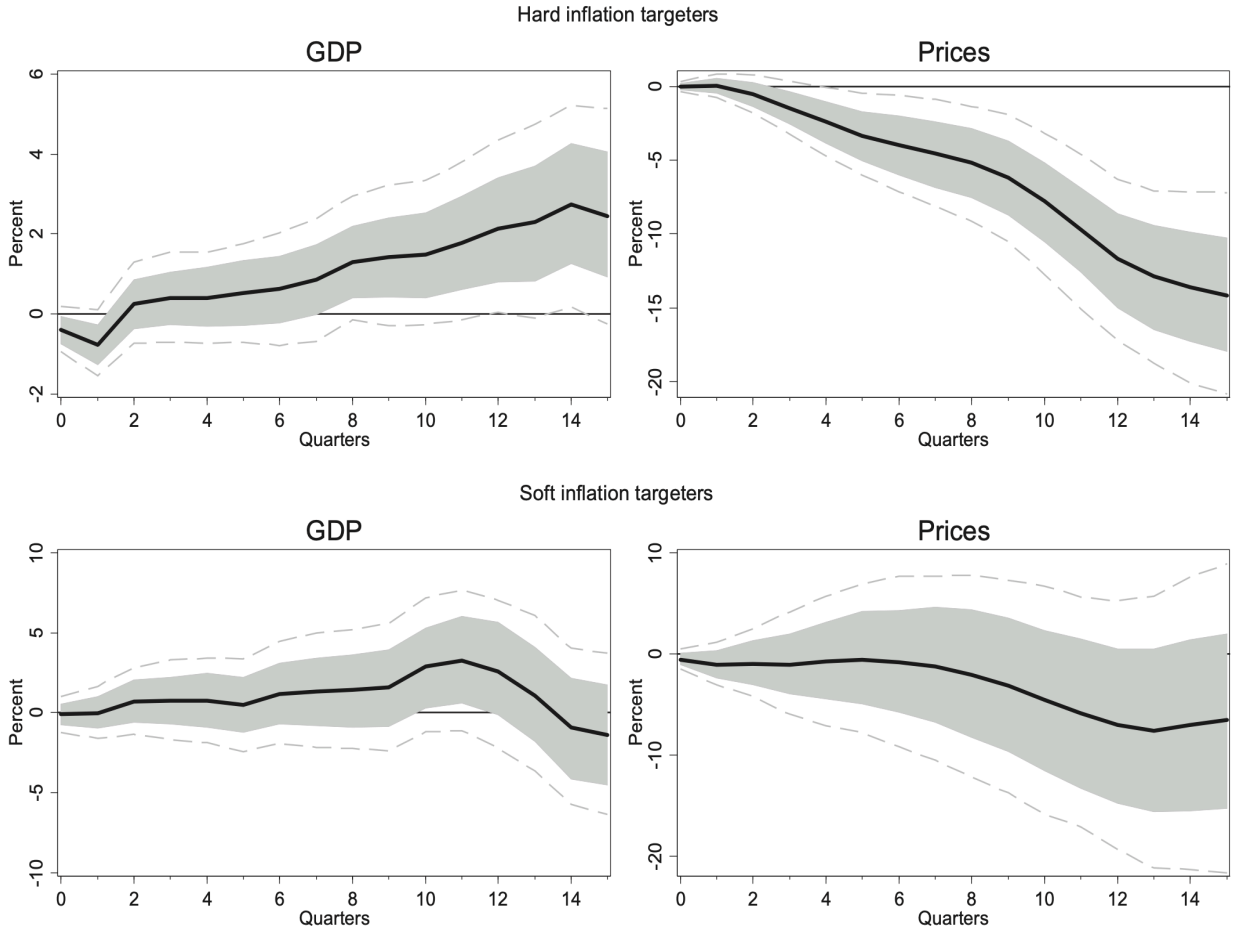
5.2. IT in advanced and developing economies



5.3. Does hard or soft targeting make a difference?

- We split the IT group into a **hard targeting** group that **ex post complies more strictly with the inflation target** versus a **soft targeting group** that **ex post complies less with the inflation target**.
- This leads to a threshold value of 11.4 percent.
- Thus, the countries with a maximal one-sided deviation from target of more than 11.4 percent of the total number of quarters under IT are declared as soft IT counties.

5.3. Does hard or soft targeting make a difference?



6. Sensitivity analysis

Table 5
Sensitivity to controlling for alternative shock absorbers.

Controlling for alternative shock absorbers	Mean GDP growth		Mean inflation	
	Difference IT vs. non-IT	*t*-stat	Difference IT vs. non-IT	*t*-stat
Level of economic development proxied by				
G7 dummy	0.12	29.05	−0.75	−72.28
OECD dummy	0.13	33.42	−0.77	−68.70
Advanced economy dummy	0.15	37.19	−0.75	−72.74
Level of democracy	0.14	35.69	−0.76	−70.99
Geographic and other country characteristics				
Exchange rate regime	0.14	30.57	−0.79	−76.93
Central bank independence	0.09	20.76	−0.77	−62.74
Unconditional frequency of shocks	0.10	26.11	−0.75	−74.82
Island dummy	0.15	36.25	−0.66	−64.15

Notes: The table shows the estimated average difference between mean GDP growth and mean inflation over 4 years following a natural disaster between inflation targeting and non-inflation targeting economies, together with their *t*-statistics based on 500 Monte Carlo draws.

7. Conclusions

inflation targeting leads to better economic outcomes.

- predominantly **hard targeting stabilizes the economy**, while soft targeting has only limited effects.
- inflation expectations are **better anchored in IT** countries following natural disaster shocks.
- IT reduces macroeconomic volatility following the shocks, **thus lowering term premia.**
- IT with its focus on price stability, seems to be coupled with a stronger orientation of **fiscal policy** toward output stabilization.
- The better shock adjustment suggests that **IT was more of a savior during the global financial crisis** than previously thought.