Testing the Transparency Benefits of Inflation Targeting

Evidence from Private Sector Forecasts

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Motivation

- Inflation Targeting (IT)
  - Central Bank (CB) directly targets (forecast) inflation rather than intermediate target (e.g. monetary aggregate, exchange rate, nominal GDP)
  - An increasingly popular method of carrying out monetary policy globally
- *"The most important distinguishing characteristic of inflation target regimes is the emphasis they place on transparency and accountability"* (Mervyn King, 1997)
  - Is this view reflected in the data?
  - Test using private sector inflation forecasts.

Model

- A simple signal extraction model: forecasters have private signal and public signal (from CB)
  - Increased CB transparency modeled as reduced variance of CB signal
  - **Prediction: IT leads to lower forecast errors, most pronounced for worst forecasters**
  - Extension: Morris and Shin model: IT adoption could hurt the best forecasters

Identification Strategy

- Identify eleven IT-adoption *episodes* (24-month window around adoption date)
  - Match 166 forecasters with counterparts in countries where IT not adopted (same time period) using propensity score
  - Estimate difference in differences
  - Focus on interaction effect:

$$\Delta \text{Forecast Error} = \text{IT} \in \{0, 1\} \times \text{Initial Forecast Error}$$

  - Use IV to control for additional endogeneity concern

Results

- Evidence supports main prediction
  - IT adoption associated with decline in forecast errors, particularly for worst forecasters.
- ‘Placebo’ regressions indicate not country effect.
  - No effect when IT adoption window is shifted backwards or forwards 12 months.

Remainder of Presentation

- Literature
  - Is CB Transparency desirable?
  - Is IT transparent?
- Model
  - Baseline Signal Extraction Model
  - Morris and Shin (2002)
- Empirics
  - Strategy
  - Results
- Conclusions

Is Transparency Beneficial?

- Early literature stressed role of 'surprises' in offsetting shocks (e.g. Cukierman and Meltzer, 1986)
- Later literature: general consensus on credibility benefits of transparency (Geraats, 2002; 2006).
    - Chortareas, Stasavage and Sterne (2002; 2003): Transparency reduces inflation or costs of disinflation
    - Crowe and Meade (forthcoming): increase in CB transparency index associated with greater use of public information by private sector
- Morris and Shin (2002) question this consensus:
    - When forecasting has strategic component (Keynes's 'beauty contest'), better public signals can worsen performance for best forecasters
    - Public forecasts act as focal point for higher order beliefs

Is IT Transparent?

- Consensus is yes (Bernanke et al., 1999; Faust and Henderson, 2004; Mishkin and Schmidt-Hebbel, 2001; Svensson, 1999).
- Anecdotal evidence: less focus on 'personalities' of Governor and MPC members.
- Empirical evidence less conclusive:
  - Crowe and Meade (2007); Eijffinger and Geraats (2006); Roger and Stone (2005) find that IT regimes most transparent;
  - However, transparency indices could be biased towards finding this result (tautological reasoning).
- Corbo et al. (2001); Johnson (2002): conflicting results on effects on forecasters' errors.

Private Sector Forecasters

- Agents i generate forecast (f_i) of inflation, π
- Observe two signals:
  - public signal π_C, precision α
  - private signal π_i, precision β
  - Optimal forecast (minimises mean square forecast error, weight according to relative precision):

$$f_i = \frac{\alpha \pi_C + \beta \pi_i}{\alpha + \beta}$$

  - Mean square forecast error given by:

$$\widetilde{V} \equiv E\left[(f_i - \pi)^2 \right] = \frac{1}{(\alpha + \beta)}$$

Identifying Assumptions

- Private signal accuracy β^i (forecaster i) constant over time (within 24 month window);
- Public signal accuracy α^j (country j) constant over time (within 24 month window) except for switch to IT
- Private forecasts are non-strategic (see e.g. Ottaviani and Sørensen, 2006).

Effect of IT adoption

- Hence:

$$\left(\widetilde{V}^{ij} \mid IT = 0\right) \equiv \widetilde{V}_0^{ij} = \frac{1}{\left(\alpha^j(0) + \beta^i\right)}$$

$$\frac{\partial}{\partial \alpha^j}\widetilde{V}^{ij} = -\frac{1}{\left(\alpha^j(0) + \beta\right)^2} = -\left(\widetilde{V}_0^{ij}\right)^2 < 0$$

$$\frac{\partial^2 \widetilde{V}^{ij}}{\partial \alpha^j \partial \widetilde{V}_0^{ij}} = -2\widetilde{V}_0^{ij} < 0$$

- Linearizing the interaction effect around V_0^{ij} gives the following approximation for the effect of IT on forecast errors:

$$\Delta \widetilde{V}^{ij} \equiv \widetilde{V}_1^{ij} - \widetilde{V}_0^{ij} \simeq b_{0T} - b_{1T}\widetilde{V}_0^{ij}$$

$$-b_{1T} < 0$$

Morris and Shin Model

- Forecasters now have two objectives:
  - Minimize forecast errors (weight $1 - r$)
  - Minimize deviation from average forecast ("beauty contest" element, weight r)
- Public Signal has additional property now: signal of "beliefs about beliefs"
- Hence public signal is overweighted:

$$f_i = \frac{\alpha \pi_C + \beta (1 - r) \pi_i}{\alpha + \beta (1 - r)}$$

Effect of Increased Transparency

- More accurate public signal π_C can exacerbate this overweighting:

$$\frac{\partial \widetilde{V}}{\partial \alpha} = -\frac{\alpha - (2r-1)(1-r)\beta}{(\alpha + \beta(1-r))^3}$$
$$\lesseqgtr 0 \text{ as } \frac{\alpha}{\beta} \gtreqless (2r-1)(1-r).$$

- Necessary conditions for more transparency reducing forecasters' accuracy: $\frac{\partial \widetilde{V}}{\partial \alpha} > 0$
  - Beauty contest is important: $r > 0.5$
  - Private sector's own forecast is very accurate: $\beta > \frac{\alpha}{(2r-1)(1-r)}$.
- An estimated positive intercept $(b_{0T} > 0)$ would provide evidence for empirical relevance of Morris-Shin model.

Data and Methodology

- Forecast data from *Consensus Economics* dataset:
  - "next year" forecasts of inflation (also GDP growth and a number of other macro variables)
  - Monthly or bi-monthly frequency
  - Range of advanced and emerging market economies
- Identify eleven IT adoption episodes with 166 forecaster/country observations
  - Identify 24-month "window" around IT adoption month
  - Two 12-month periods: 0 (before IT adoption); 1 (after IT adoption)
  - Match with forecasters in non-IT adoption countries for same time periods
- Analyze change in mean absolute forecast error ΔV in IT adoption group and non-IT adoption group

Identification Issues

- Endogeneity is a concern: systematic differences in forecasting behavior between IT and non-IT adoption countries.
  - e.g. economic volatility leads to bad forecasts and also to IT adoption
  - Attempt to control by matching on observable forecaster characteristics
- Additional concern: forecasts will generally be subject to mean reversion:
  - Idiosyncratic shocks to forecasts: hence $Cov(V_0, \Delta V) < 0$.
  - No reason to expect mean reversion to be systematically higher in IT countries (unrelated to IT adoption itself)
  - However, as additional robustness check, estimate 2SLS with V_0 instrumented using *forecast error for GDP growth* and *level of inflation forecast*.

Matching

- Match forecasters using propensity score (PS):
  - Estimate probit for IT adoption with eight forecaster characteristics (pre-adoption) on RHS
  - Use estimated probability as PS
- Three matching methodologies:
  - Nearest neighbor with replacement
  - Nearest neighbor without replacement
  - Two stage: nearest neighbor (with replacement) from *single (best) country*
- For robustness, run regressions using all three control groups

- **IT adoption countries**
  - Australia (April 1993)
  - Brazil (June 1999)
  - Canada (Feb. 1991)
  - Chile (Sep. 1999)
  - Colombia (Sep. 1999)
  - Korea (January 2001)
  - Mexico (January 2001)
  - Norway (March 2001)
  - Peru (January 2002)
  - Thailand (May 2000)
  - UK (October 1992)

- **Controls**
  - Argentina
  - France
  - Germany
  - Hong Kong SAR
  - India
  - Indonesia
  - Japan
  - Malaysia
  - Netherlands
  - Singapore
  - Spain
  - Switzerland
  - USA
  - Venezuela

Specification

- IT adoption dummy:

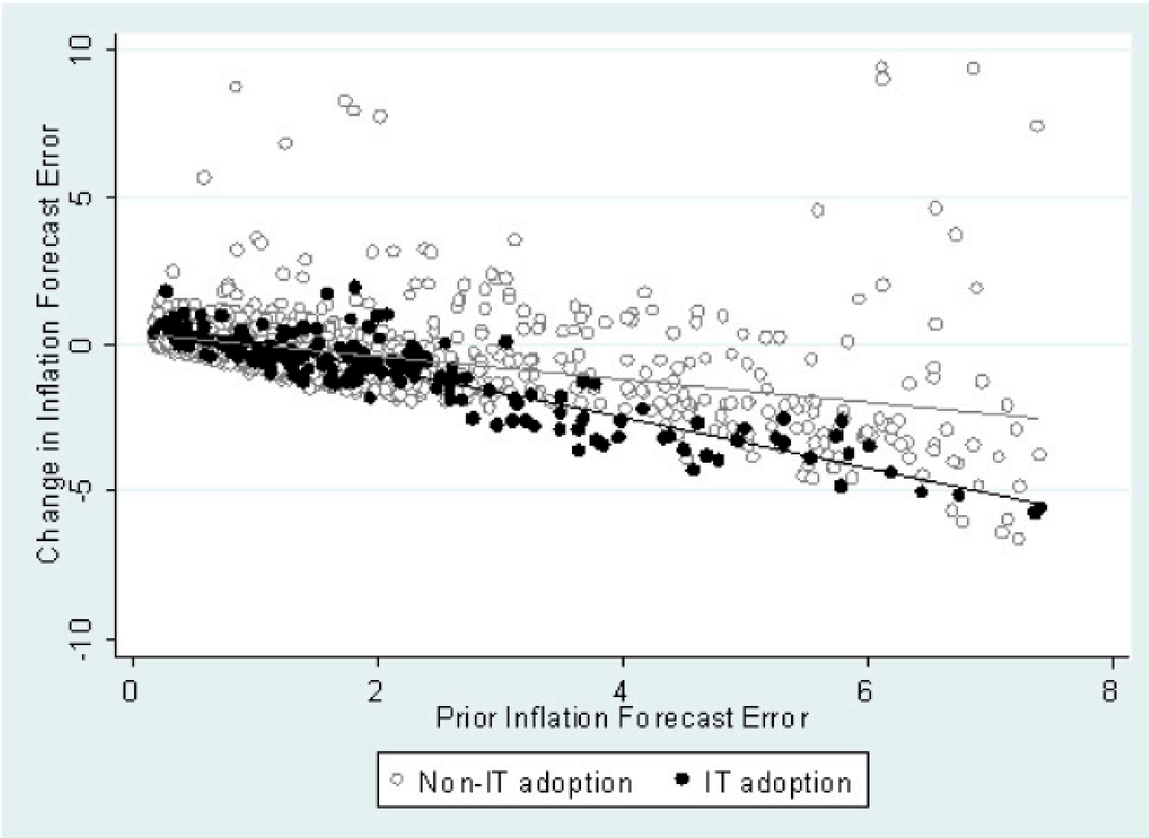
$$D_T^{ij} = \begin{cases} 1 | \text{IT adopted in country } j \text{ (treated group)} \\ 0 | \text{IT not adopted in country } j \text{ (control group)} \end{cases}$$

- Estimation equation:

$$\Delta V^{ij} = b_0 + b_{0T} D_T^{ij} - V_0^{ij} \left(b_1 + b_{1T} D_T^{ij} \right) + D_{Adv} + u^{ij}$$

- Note mean reversion: $-b_1 < 0$
- Hence b_{1T} picks up additional effect of IT adoption.
- Model predicts $-b_{1T} < 0$ if IT adoption increases CB transparency.
- Main results use SEs clustered at country/episode level.

Figure 2. Change in Inflation Forecast Error



Regression Results Overview

- Results presented for the baseline control group
  - Results for other control groups very similar
- Significance level in Table denoted by:
  - $^{*}10\%;^{**}5\%;^{***}1\%;^{\dagger\dagger\dagger}0.1\%$
- IV Results: pass over-id, identification and weak instrument tests

Table: Nearest Neighbor (with replacement)

	Levels	Interaction (OLS)	Interaction (2SLS)
IT	-1.16^{*}	$.200$	$.831^{**}$
	$(.666)$	$(.423)$	$(.421)$
V_0^{ij}		$-.153$	$.0382$
		$(.124)$	$(.231)$
$IT \times V_0^{ij}$		$-.752^{\dagger\dagger\dagger}$	$-.944^{\dagger\dagger\dagger}$
		$(.154)$	$(.238)$
$Adv.$	$.0742$	$-.803$	$-.306$
	$(.690)$	$(.528)$	$(.419)$
$Const.$	$.193$	1.16^{*}	$.308$
	$(.864)$	$(.648)$	$(.611)$
$F-stat$	2.47^{*}	$44.4^{\dagger\dagger\dagger}$	$22.8^{\dagger\dagger\dagger}$
R^2	$.0545$	$.216$	$.193$

Robustness

- Robustness Check 1: Placebo Regressions (Table 4 in paper)
  - Replicate with window shifted 12 months forward or backward
  - Exploit monthly frequency of data to test whether it is IT effect or country effect
  - No effect of "IT" placebo
- Robustness Check 2: Drop Observations (Table 5 in paper)
  - Outliers in countrol groups dropped
  - Some effect on significance level for control group 3 only.

Conclusions

- IT adoption significantly reduces forecast errors, particularly for worst forecasters
  - Supports hypothesis that IT increases transparency, along lines predicted by signal extraction model
  - Therefore supports consensus view in favor of IT.
- Little or no evidence for $b_{0T} > 0$: i.e. does not make best forecasters worse off
  - Does not support Morris and Shin (2002).
- Avenues for future research
  - Test for effect on other macro forecasts
  - Look at channels: e.g. data/model transparency; CB communication strategies?