Strict and Flexible Inflation Forecast Targets: An Empirical Investigation

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Bank of Canada Inflation Target

The target range established by the Bank of Canada and the federal government within which the Bank aims to contain annual inflation as measured by the rate of change in the total CPI. The target range currently extends from 1 to 3 per cent. To keep inflation within this range, monetary policy needs to aim at the 2 per cent target midpoint over the six to eight quarters that are required for monetary policy to have most of its effect.

Reserve Bank of Australia Inflation Target

Since 1993, these objectives have found practical expression in a target for consumer price inflation, of 2-3 per cent per annum. Monetary policy aims to achieve this over the medium term and, subject to that, to encourage strong and sustainable growth in the economy.

- Broad objective: to examine the near term balance between inflation and output variation pursued by central banks.
- Framework: the inflation forecast targeting framework of Svensson (1997, 2003); Woodford (2007).
- Motivation #1:
  - How have inflation targeting central banks (Australia, Canada) implicitly traded-off inflation and output? And has the United States behaved as an (implicit) inflation forecast targeter?

  To address these questions, we need a theoretical structure to interpret the data.
- Motivation #2:
  - Does the inflation forecast targeting framework provide a useful *description* of monetary policy?

  This is an assessment of the forecast targeting framework. This addresses the arguments put forward by Svensson (2003) and Woodford (2007) — forecast targeting rules should form the basis of monetary policy practice.

- Svensson (2003) defines targeting rules as
  - *General targeting rules* ... specify operational objectives for monetary policy (e.g. inflation, output, loss function weights)
  - *Specific targeting rules* ... specify operational Euler conditions for monetary policy.
- Our focus are the specific targeting rules, which we describe as follows:
  - Strict inflation forecast targeting
  $$E_t f(\pi_{t+h}) = 0$$
  - Flexible inflation forecast targeting
  $$E_t f(\pi_{t+h}, y_{t+h}) = 0$$
  where y_t is a (vector) of other variables in the central bank loss function.
- Our narrower focus: inflation and cyclical variation in output.

Inflation Forecast targeting — Related Empirical Literature

- Full structural models of general inflation targeting for US, — Favero and Rovelli (2003); Dennis (2004, 2006).

  How we differ: a less structural (limited information) approach. Advantage: less restrictions imposed; can be easily applied across different countries.

- Estimates of inflation targets: Rowe and Yetman (2002) for Canada. Kuttner (2004) for UK, Sweden, NZ, and US.

  How we differ: estimates of flexible targets (including output variation).

Strict Inflation Targeting Model

$$E_t(\pi_{t+h} - \pi^*) = 0, \quad h \geq H$$

Flexible Inflation Targeting Models

- Without commitment:

$$E_t(\pi_{t+h} + \phi x_{t+h} - \pi^*) = 0, \quad h \geq H$$

- With commitment:

$$E_t(\pi_{t+h} + \phi \Delta x_{t+h} - \pi^*) = 0, \quad h \geq H$$

- Output growth:

$$E_t(\pi_{t+h} + \phi \Delta y_{t+h} - \pi^*) = 0, \quad h \geq H$$

H is determined by the lag effects of monetary policy. We assume $H = 2$ quarters. Policy horizon is $h = 2, 4, 6, 8$ quarters.

Maintained hypothesis (for a given model): the central bank has controlled the economy (inflation and output) such that the targets are satisfied.

- The ϕ coefficient is related to the weight of the output gap in the social welfare function λ and the slope of the aggregate supply curve, α:

$$\phi = \frac{\lambda}{\alpha}$$

- Coefficients ϕ and π^* should be stable across different horizons h.
- Deviations from target should not be predictable.
- Single equation GMM estimates:

$$E\left(z_t'(\pi_{t+h} + \phi \Delta x_{t+h} - \pi^*)\right) = 0$$

  for $h = 2, 4, 6,$ and 8 and z_t' a $k \times 1$ vector of instruments; total of k moments.

- System GMM estimates:

$$E\left(z_t'(\pi_{t+2} + \phi \Delta x_{t+2} - \pi^*)\right) = 0$$
$$E\left(z_t'(\pi_{t+4} + \phi \Delta x_{t+4} - \pi^*)\right) = 0$$

  And again z_t' a $k \times 1$ vector of instruments; total of $2k$ moments.

Data

- Sample periods:
  - Australia: 1993:Q1–2007:Q4; *de facto* period of inflation targeting of 2–3 percent
  - Canada: 1994:Q1–2007:Q4; inflation targeting of 1–3 percent
  - United States: 1990:Q1–2007:Q4; arbitrary
- Inflation: headline CPI, quarterly, year-on-year; consistent with announced targets
- Output gap: HP filter. Two measures used:
  - For instruments: need a measure using only time t information.
    - For each country, we have GDP, y_t, over the sample 1981:1–2007:4, denoted $t = 1...T$.
    - Let $x^R_{t,S}$ be the output gap constructed using the HP filter over the sample $1...S$.
    - Instruments are:

$$x^R_t = x^R_{t,t}$$
$$\Delta x^R_t = x^R_{t,t} - x^R_{t-1,t}$$

  - For objective function: the full sample: $x_t = x^R_{t,T}$ and $\Delta x_t = x^R_{t,T} - x^R_{t-1,T}$
- Instrument set:

$$z_t = (1, \pi^{cx}_t, \pi^{cx}_{t-1}, \pi^{cx}_{t-2}, \pi_{t-1}, \pi_{t-2}, x^R_{t-1}, \Delta x^R_{t-1}, \Delta y_{t-1}, \Delta i_t)$$

Strict Inflation Targeting — Table 1

- Single equation estimates, $h = 2, 4, 6, 8$; system estimates, $h = 2, 4$.

Main results

- Inflation target estimates, all horizons, annual %:
  - Australia: $2.5 \leq \pi^* \leq 3.1$. High end of target range
  - Canada: $1.7 \leq \pi^* \leq 2.1$. A little below target mid-point
  - United States: $2.5 \leq \pi^* \leq 3.0$.
- All countries, all specifications: no rejections based on Hansen's (1982) J-statistic.
- Mixed results for parameter constancy:

Australia	$\pi_2^* = 2.8$	$\pi_4^* = 3.1$	Reject $\pi_2^* = \pi_4^*$,	$p = 0.000$
Canada	$\pi_2^* = 1.8$	$\pi_4^* = 1.8$	Accept $\pi_2^* = \pi_4^*$,	$p = 0.816$
US	$\pi_2^* = 2.8$	$\pi_4^* = 2.7$	Reject $\pi_2^* = \pi_4^*$,	$p = 0.068$

- Qualified support for strict inflation targeting.

Flexible Inflation Targeting — Tables 2–4

- Single equation estimates, $h = 2, 4, 6, 8$; system estimates, $h = 2, 4$.

Main results (system estimates)

- Three output measures: x_t, Δx_t, and Δy_t. Of these, Δx_t provides "best" results.
  - See Tables 2 and 3.
  - Results for Δx_t are essentially identical to those for Δy_t in Table 4.

Empirical Results — Flexible Inflation Targeting (Table 2)

Model: $E_t(\pi_{t+h} + \phi_h x_{t+h} - \pi_h^*),\ h = 2, 4$

	ϕ_2	ϕ_4	π_2^*	π_4^*	J	$\phi_2 = \phi_4$	$\pi_2^* = \pi_4^*$
Australia							
Unrestricted	0.1503*	-0.0641	2.6355*	2.6377*	8.6445	19.5145	0.0007
	(0.0271)	(0.0511)	(0.0766)	(0.0833)	[0.9273]	[0.0000]	[0.9796]
Restricted	0.1124*		2.8909*		10.6699		
	(0.0291)		(0.0545)		[0.9078]		
Canada							
Unrestricted	-0.0359*	-0.0488*	1.8755*	1.9042*	9.4706	0.5296	0.2123
	(0.0144)	(0.0260)	(0.0546)	(0.0481)	[0.8928]	[0.4668]	[0.6450]
Restricted	-0.0332*		1.8735*		9.5200		
	(0.0133)		(0.0429)		[0.9465]		
United States							
Unrestricted	-0.0678*	0.1128*	2.9300*	2.6869*	8.4032	28.5170	6.1142
	(0.0222)	(0.0215)	(0.0786)	(0.0830)	[0.9359]	[0.0000]	[0.0134]
Restricted	-0.0421*		2.9751*		11.2359		
	(0.0159)		(0.0690)		[0.8841]		

Standard errors in ( ); p-values in [ ]. A * indicates significance at the 10 percent level using a two-sided t-test.

Empirical Results — Flexible Inflation Targeting (Table 3)

Model: $E_t(\pi_{t+h} + \phi_h \Delta x_{t+h} - \pi_h^*),\ h = 2, 4$

	ϕ_2	ϕ_4	π_2^*	π_4^*	J	$\phi_2 = \phi_4$	$\pi_2^* = \pi_4^*$
Australia							
Unrestricted	0.1021*	0.1642*	2.7557*	2.8010*	6.8504	0.4896	0.3070
	(0.0445)	(0.0484)	(0.0891)	(0.0933)	[0.9760]	[0.4841]	[0.5795]
Restricted	0.1275*		2.7617*		7.4509		
	(0.0145)		(0.0781)		[0.9857]		
Canada							
Unrestricted	0.1999*	0.1589*	1.8827*	1.5985*	8.9696	0.7231	15.6699
	(0.0250)	(0.0498)	(0.0484)	(0.0604)	[0.9147]	[0.3951]	[0.0001]
Restricted	0.1410*		1.8038*		10.2404		
	(0.0233)		(0.0374)		[0.9238]		
United States							
Unrestricted	0.1569*	0.0670*	2.7142*	2.6603*	9.1183	5.3570	1.1793
	(0.0397)	(0.0393)	(0.0715)	(0.0611)	[0.9085]	[0.0206]	[0.2775]
Restricted	0.0887*		2.6993		10.9035		
	(0.0351)		(0.0665)		[0.8984]		

Standard errors in ( ); p-values in [ ]. A * indicates significance at the 10 percent level using a two-sided t-test.

Main results (system estimates, continued)

- Three output measures: x_t, Δx_t, and Δy_t. Of these, Δx_t provides "best" results.
  - Results for Δx_t are essentially identical to those for Δy_t in Table 4.
- Inflation target estimates (π^*) similar to strict inflation targeting estimates.
- All coefficients (π_h^* and ϕ_h) statistically significant (10% level).
  - Contrasts with Dennis (2004,2006) for the United States ($\lambda = 0 \Rightarrow \phi = 0$).
- All countries, all specifications: no rejections based on J-statistic.
- Parameter constancy: mixed results.

- Qualified support for flexible inflation targeting using Δx or Δy. But...
  - Weak instruments may be a problem (instrument quality measures in Tables A1,A2).
  - Specification tests may not be very powerful.

- The inflation targeting models specify for any Z_t:

$$E(\pi_{t+h} - \pi^* | Z_t) = 0 \quad \text{or} \quad E(\pi_{t+h} + \phi \Delta x_{t+h} - \pi^* | Z_t) = 0$$

- Tables 5–7: tests of whether the SIT and FIT residuals — deviations from target — are predictable.
- Australia:
  - SIT or FIT: lagged inflation consistently predicts deviations from target at 2-quarter horizon.
  - SIT or FIT: lagged changes in policy interest rate predicts deviations form target at 2, 4-quarter horizon.
  - Weak preference for FIT but predictability a problem.
- Canada
  - Very little predictability for either SIT or FIT.
  - Either model fares well in the directions we are looking.
- United States:
  - SIT or FIT: lagged inflation consistently predicts deviations from target at 2-quarter horizon.
  - SIT: changes in policy interest rates predict deviations from 4-quarter horizon.
  - Weak preference for FIT but predictability a problem.
- General Result: the deviations from target (residuals) are dominated by inflation (Figure 4).

Table 5: Prediction Regressions for Australia

	Strict				Flexible			
Dep.	$\pi_{t+2} - \hat{\pi}_2^*$		$\pi_{t+4} - \hat{\pi}_4^*$		$\pi_{t+2} + \hat{\phi}_2 \Delta x_{t+2} - \hat{\pi}_2^*$		$\pi_{t+4} + \hat{\phi}_4 \Delta x_{t+4} - \hat{\pi}_4^*$	
Cons.	**-1.2335**	(0.4308)	-0.1169	(0.6617)	**-1.2046**	(0.4198)	-0.2967	(0.6561)
π_{t-1}	**1.2270**	(0.3624)	0.6546	(0.4394)	**1.1827**	(0.3639)	0.4956	(0.4119)
π_{t-2}	**-0.8623**	(0.3774)	-0.6934	(0.4965)	**-0.8334**	(0.3823)	-0.5296	(0.4762)
$\bar{R}^2$	0.338		0.064		0.312		0.018	
Cons.	-0.3189	(0.2450)	-0.1548	(0.2249)	-0.3220	(0.2374)	-0.3357	(0.2218)
x_{t-1}^R	-0.0228	(0.0393)	0.0544	(0.0878)	-0.0304	(0.0379)	0.0728	(0.0864)
x_{t-2}^R	0.0261	(0.0960)	-0.0850	(0.0806)	0.0271	(0.1008)	-0.1011	(0.0909)
$\bar{R}^2$	-0.037		-0.017		-0.035		-0.008	
Cons.	-0.3176	(0.2883)	-0.1888	(0.2807)	-0.3216	(0.2832)	-0.3702	(0.2776)
Δx_{t-1}^R	-0.0023	(0.0365)	0.0559	(0.0780)	-0.0297	(0.0374)	0.0737	(0.0786)
Δx_{t-2}^R	0.0095	(0.0572)	0.0485	(0.0803)	-0.0212	(0.0557)	0.0642	(0.0894)
$\bar{R}^2$	-0.036		-0.013		-0.033		0.004	
Cons.	0.0232	(0.3647)	-0.2404	(0.3939)	0.1962	(0.3466)	-0.5603	(0.4476)
Δy_{t-1}	-0.0637	(0.0502)	0.0132	(0.0700)	-0.0768	(0.0495)	0.0341	(0.0698)
Δy_{t-2}	-0.0308	(0.0550)	0.0050	(0.0710)	-0.0679	(0.0528)	0.0236	(0.0793)
$\bar{R}^2$	-0.019		-0.038		0.004		-0.032	
Cons.	**-0.3435**	(0.2025)	-0.2009	(0.2451)	**-0.3512**	(0.2061)	-0.3761	(0.2437)
Δi_t^p	**1.2759**	(0.4839)	**1.5372**	(0.6251)	**1.1786**	(0.5352)	**1.4625**	(0.6657)
Δi_{t-1}^p	**0.5596**	(0.3266)	-0.0374	(0.3741)	0.4999	(0.3518)	-0.0879	(0.3679)
Δi_{t-2}^p	**0.9478**	(0.4127)	0.1630	(0.3514)	**0.9601**	(0.4310)	0.3253	(0.3717)
$\bar{R}^2$	0.438		0.188		0.387		0.165	
Cons.	-0.3227	(0.2910)	-0.1899	(0.2838)	-0.3439	(0.2849)	-0.3622	(0.2800)
Δs_t	-0.0042	(0.0093)	-0.0078	(0.0079)	-0.0085	(0.0092)	-0.0041	(0.0077)
Δs_{t-1}	-0.0082	(0.0065)	-0.0028	(0.0073)	-0.0062	(0.0066)	-0.0050	(0.0076)
Δs_{t-2}	-0.0065	(0.0082)	-0.0091	(0.0086)	-0.0046	(0.0082)	-0.0056	(0.0094)
$\bar{R}^2$	-0.021		-0.018		-0.020		-0.038	

Notes: Standard errors are Newey-West with lag truncation parameter 3. The covariance matrix is constructed using the small sample adjustment suggested in Davidson and Mackinnon (1994). Standard errors are in brackets to the right of point estimates. Coefficients in boldface indicates significance at 10% using a two-sided t-statistic. Estimated values for constructed residuals are as follows:

Strict $\hat{\pi}_2^* = 2.7389$; $\hat{\pi}_4^* = 2.6261$
Flexible $\hat{\phi}_2 = 0.1021$; $\hat{\pi}_2^* = 2.7557$; $\hat{\phi}_4 = 0.1642$; $\hat{\pi}_4^* = 2.8010$

Table 6: Prediction Regressions for Canada

Dep.	Strict				Flexible			
	$\pi_{t+2} - \hat{\pi}_2^*$		$\pi_{t+4} - \hat{\pi}_4^*$		$\pi_{t+2} + \hat{\phi}_2 \Delta x_{t+2} - \hat{\pi}_2^*$		$\pi_{t+4} + \hat{\phi}_4 \Delta x_{t+4} - \hat{\pi}_4^*$	
Cons.	0.2889	(0.3605)	0.0687	(0.2559)	0.3390	(0.3493)	0.2206	(0.3067)
π_{t-1}	0.1984	(0.1530)	-0.2361	(0.2095)	0.0606	(0.1389)	-0.1917	(0.1940)
π_{t-2}	**-0.2896**	(0.0951)	0.2946	(0.2241)	-0.1712	(0.1275)	0.3024	(0.2295)
$\bar{R}^2$	0.018		0.022		-0.014		0.029	
Cons.	0.1553	(0.1669)	0.2235	(0.1710)	0.1940	(0.1447)	**0.4835**	(0.1555)
x_{t-1}^R	0.0677	(0.0485)	-0.0188	(0.0539)	0.0842	(0.0513)	-0.0503	(0.0523)
x_{t-2}^R	-0.1033	(0.0674)	-0.0194	(0.0508)	**-0.1448**	(0.0606)	0.0091	(0.0519)
$\bar{R}^2$	0.010		0.010		0.082		0.049	
Cons.	0.1114	(0.1641)	0.1942	(0.1629)	0.1286	(0.1514)	**0.4500**	(0.1500)
Δx_{t-1}^R	0.0376	(0.0579)	0.0311	(0.0525)	0.0758	(0.0582)	-0.0049	(0.0528)
Δx_{t-2}^R	0.0178	(0.0520)	-0.1099	(0.0851)	-0.0366	(0.0517)	-0.1054	(0.0782)
$\bar{R}^2$	-0.023		0.026		-0.014		0.054	
Cons.	**-0.3300**	(0.1376)	0.2464	(0.3455)	-0.2545	(0.1781)	**0.6152**	(0.3185)
Δy_{t-1}	0.0797	(0.0509)	0.0604	(0.0601)	**0.1165**	(0.0570)	0.0271	(0.0616)
Δy_{t-2}	0.0574	(0.0585)	-0.0803	(0.0927)	0.0020	(0.0556)	-0.0776	(0.0877)
$\bar{R}^2$	0.054		-0.012		0.050		-0.011	
Cons.	0.1319	(0.1720)	0.1702	(0.1669)	0.1369	(0.1605)	**0.4211**	(0.1554)
Δi_t^p	0.3165	(0.1950)	-0.1124	(0.1951)	0.1837	(0.2207)	-0.1505	(0.1806)
Δi_{t-1}^p	-0.0704	(0.1191)	-0.1398	(0.1989)	-0.0660	(0.1113)	-0.2282	(0.1756)
Δi_{t-2}^p	-0.0828	(0.2117)	-0.1446	(0.1769)	-0.1855	(0.1929)	-0.0594	(0.1720)
$\bar{R}^2$	-0.003		-0.012		-0.017		0.013	
Cons.	0.1061	(0.1852)	0.1612	(0.1872)	0.1041	(0.1651)	**0.4123**	(0.1791)
Δs_t	-0.0052	(0.0127)	-0.0027	(0.0090)	-0.0096	(0.0110)	-0.0028	(0.0094)
Δs_{t-1}	-0.0038	(0.0115)	0.0032	(0.0074)	-0.0051	(0.0114)	-0.0009	(0.0085)
Δs_{t-2}	0.0000	(0.0094)	-0.0104	(0.0072)	-0.0026	(0.0104)	-0.0068	(0.0070)
$\bar{R}^2$	-0.056		-0.047		-0.039		-0.055	

Notes: Standard errors are Newey-West with lag truncation parameter 3. The covariance matrix is constructed using the small sample adjustment suggested in Davidson and Mackinnon (1994). Standard errors are in brackets to the right of point estimates. Standard errors are in brackets to the right of point estimates. Coefficients in boldface indicates significance at 10% using a two-sided t-statistic. Estimated values for constructed residuals are as follows:

Strict $\hat{\pi}_2^* = 1.9146$; $\hat{\pi}_4^* = 1.8663$

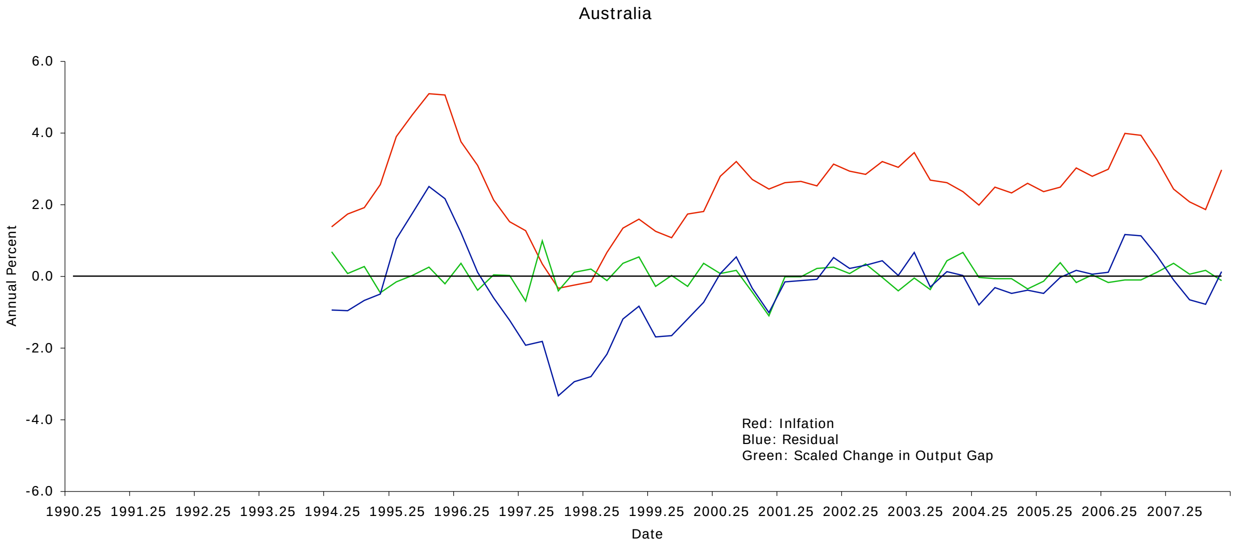
Flexible $\hat{\phi}_2 = 0.1999$; $\hat{\pi}_2^* = 1.8827$; $\hat{\phi}_4 = 0.1589$; $\hat{\pi}_4^* = 1.5985$

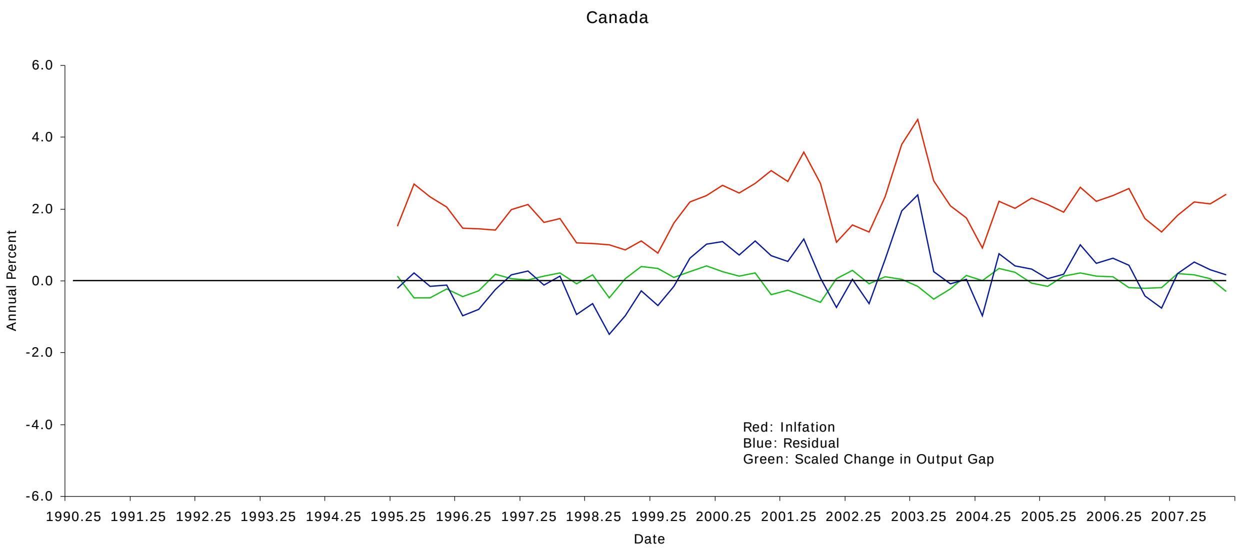
Table 7: Prediction Regressions for the United States

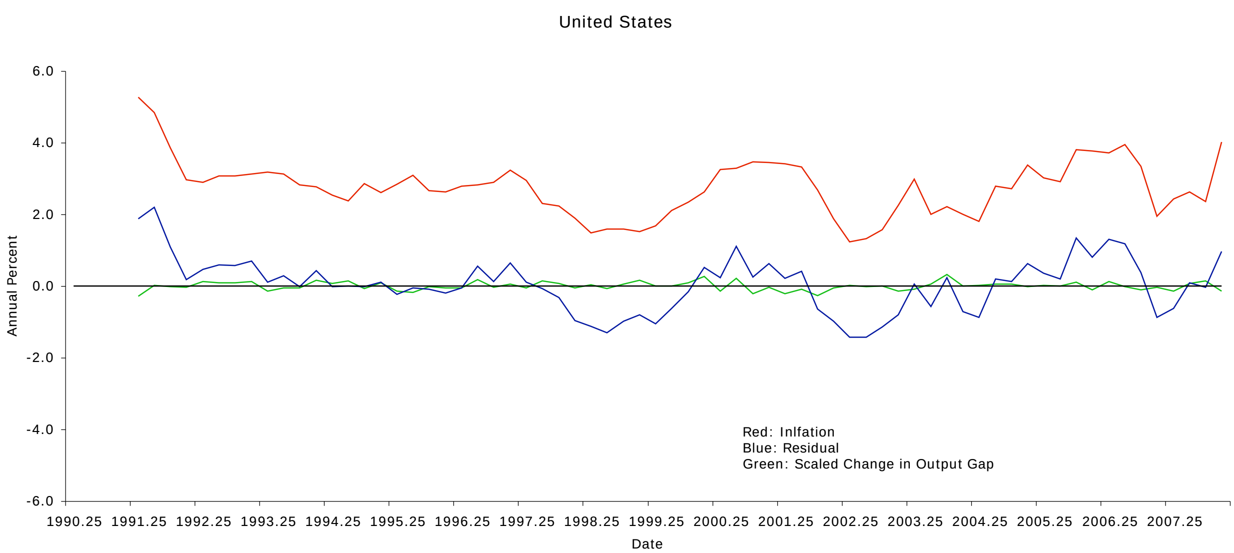
Dep.	Strict				Flexible			
	$\pi_{t+2}-\hat{\pi}_2^*$		$\pi_{t+4}-\hat{\pi}_4^*$		$\pi_{t+2}+\hat{\phi}_2\Delta x_{t+2}-\hat{\pi}_2^*$		$\pi_{t+4}+\hat{\phi}_4\Delta x_{t+4}-\hat{\pi}_4^*$	
Cons.	**-1.0924**	(0.3024)	-0.3200	(0.3243)	**-0.9134**	(0.2777)	-0.2206	(0.3148)
π_{t-1}	**0.7889**	(0.1554)	0.0362	(0.1878)	**0.7465**	(0.1683)	0.0535	(0.1885)
π_{t-2}	**-0.4506**	(0.1780)	0.0549	(0.2054)	**-0.4148**	(0.1746)	0.0337	(0.2087)
$\bar{R}^2$	0.297		-0.014		0.248		-0.016	
Cons.	0.0054	(0.1597)	-0.0558	(0.1433)	0.0334	(0.1539)	0.0304	(0.1411)
x_{t-1}^R	-0.0245	(0.0705)	0.0398	(0.0497)	-0.0191	(0.0683)	0.0372	(0.0513)
x_{t-2}^R	0.0359	(0.0638)	-0.0475	(0.0490)	0.0253	(0.0626)	-0.0476	(0.0495)
$\bar{R}^2$	-0.025		-0.015		-0.028		-0.016	
Cons.	0.0007	(0.1575)	-0.0528	(0.1389)	0.0307	(0.1534)	0.0344	(0.1372)
Δx_{t-1}^R	-0.0390	(0.0696)	0.0342	(0.0455)	-0.0371	(0.0649)	0.0298	(0.0466)
Δx_{t-2}^R	0.0568	(0.0479)	0.0105	(0.0401)	0.0626	(0.0521)	0.0134	(0.0423)
$\bar{R}^2$	-0.006		-0.016		-0.002		-0.017	
Cons.	-0.0016	(0.3648)	-0.0878	(0.2501)	0.0467	(0.3755)	0.0185	(0.2621)
Δy_{t-1}	-0.0471	(0.0717)	0.0190	(0.0469)	-0.0521	(0.0647)	0.0119	(0.0465)
Δy_{t-2}	0.0477	(0.0493)	-0.0074	(0.0405)	0.0461	(0.0524)	-0.0070	(0.0415)
$\bar{R}^2$	-0.008		-0.029		-0.005		-0.030	
Cons.	0.0260	(0.1524)	-0.0420	(0.1331)	0.0511	(0.1483)	0.0427	(0.1323)
Δi_t^p	0.0422	(0.3202)	**0.5595**	(0.2983)	0.1282	(0.3574)	0.4913	(0.3114)
Δi_{t-1}^p	0.4145	(0.2549)	-0.1142	(0.1887)	0.2603	(0.2680)	-0.0441	(0.1803)
Δi_{t-2}^p	0.0487	(0.1792)	-0.1199	(0.2456)	0.0220	(0.2295)	-0.1716	(0.2467)
$\bar{R}^2$	0.041		0.050		0.001		0.037	

Notes: Standard errors are Newey-West with lag truncation parameter 3. The covariance matrix is constructed using the small sample adjustment suggested in Davidson and Mackinnon (1994). Standard errors are in brackets to the right of point estimates. Standard errors are in brackets to the right of point estimates. Coefficients in boldface indicates significance at 10% using a two-sided t-statistic. Estimated values for constructed residuals are as follows:

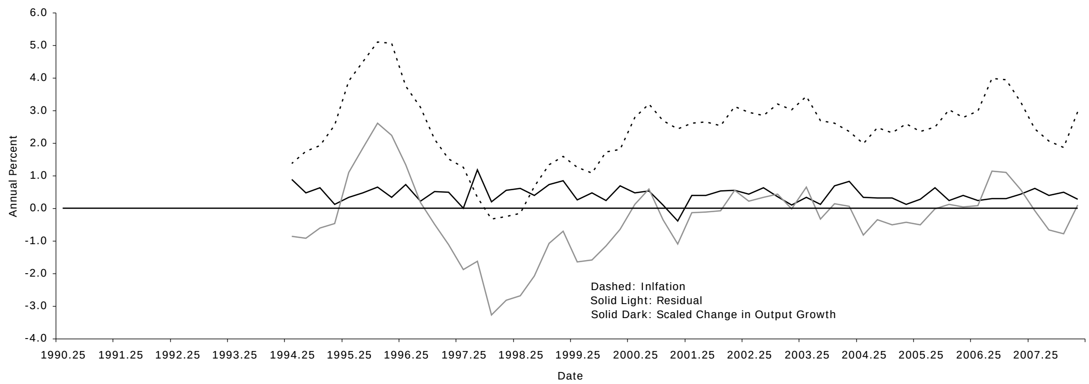
Strict $\hat{\pi}_2^* = 2.7417$; $\hat{\pi}_4^* = 2.7430$
Flexible $\hat{\phi}_2 = 0.1569; \hat{\pi}_2^* = 2.7142$; $\hat{\phi}_4 = 0.0670; \hat{\pi}_4^* = 2.6603$


Australia
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
Annual Percent
Red: Inlfation
Blue: Residual
Green: Scaled Change in Output Gap
1990.25
1991.25
1992.25
1993.25
1994.25
1995.25
1996.25
1997.25
1998.25
1999.25
2000.25
2001.25
2002.25
2003.25
2004.25
2005.25
2006.25
2007.25
Date

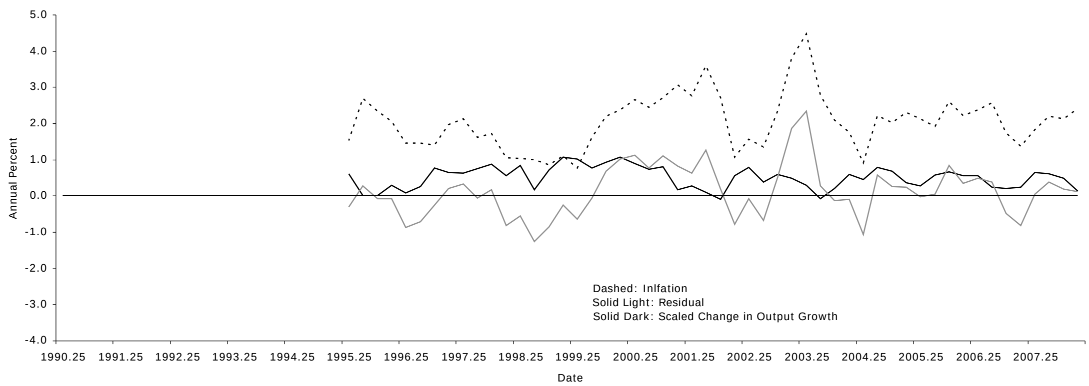

Canada
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
Annual Percent
Red: Inlfation
Blue: Residual
Green: Scaled Change in Output Gap
1990.25
1991.25
1992.25
1993.25
1994.25
1995.25
1996.25
1997.25
1998.25
1999.25
2000.25
2001.25
2002.25
2003.25
2004.25
2005.25
2006.25
2007.25
Date


United States
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
Annual Percent
Red: Inlfation
Blue: Residual
Green: Scaled Change in Output Gap
1990.25
1991.25
1992.25
1993.25
1994.25
1995.25
1996.25
1997.25
1998.25
1999.25
2000.25
2001.25
2002.25
2003.25
2004.25
2005.25
2006.25
2007.25
Date

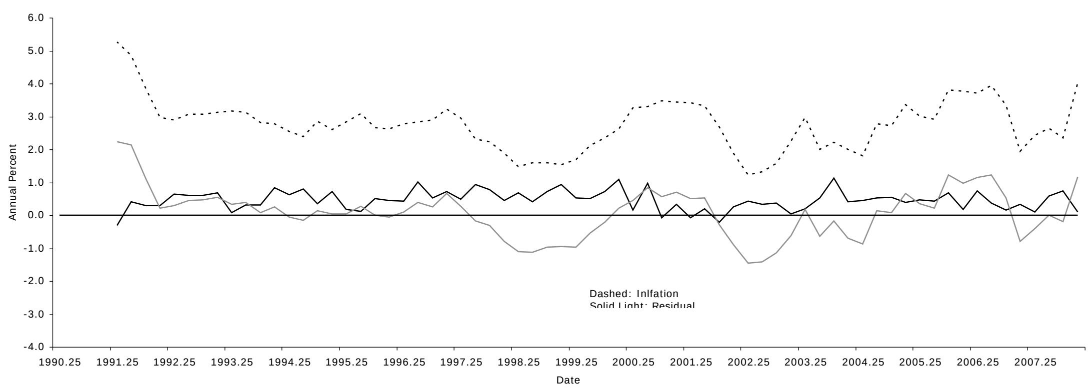
Australia



Canada

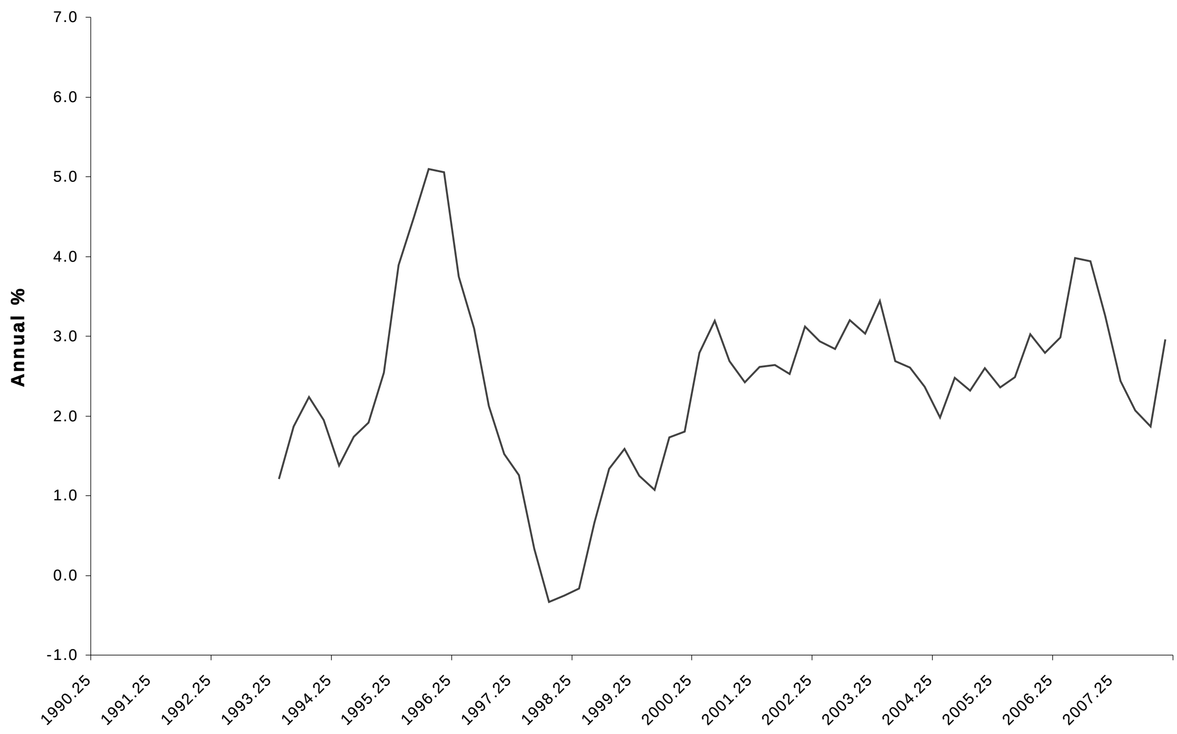


United States

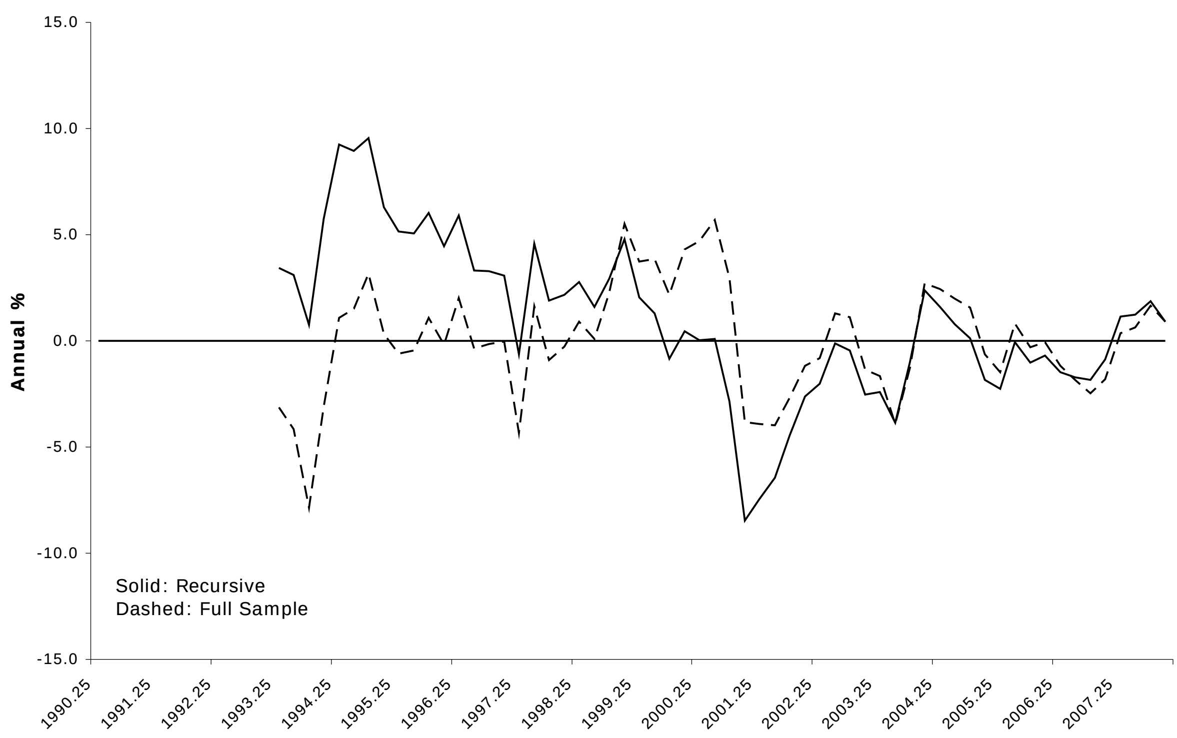


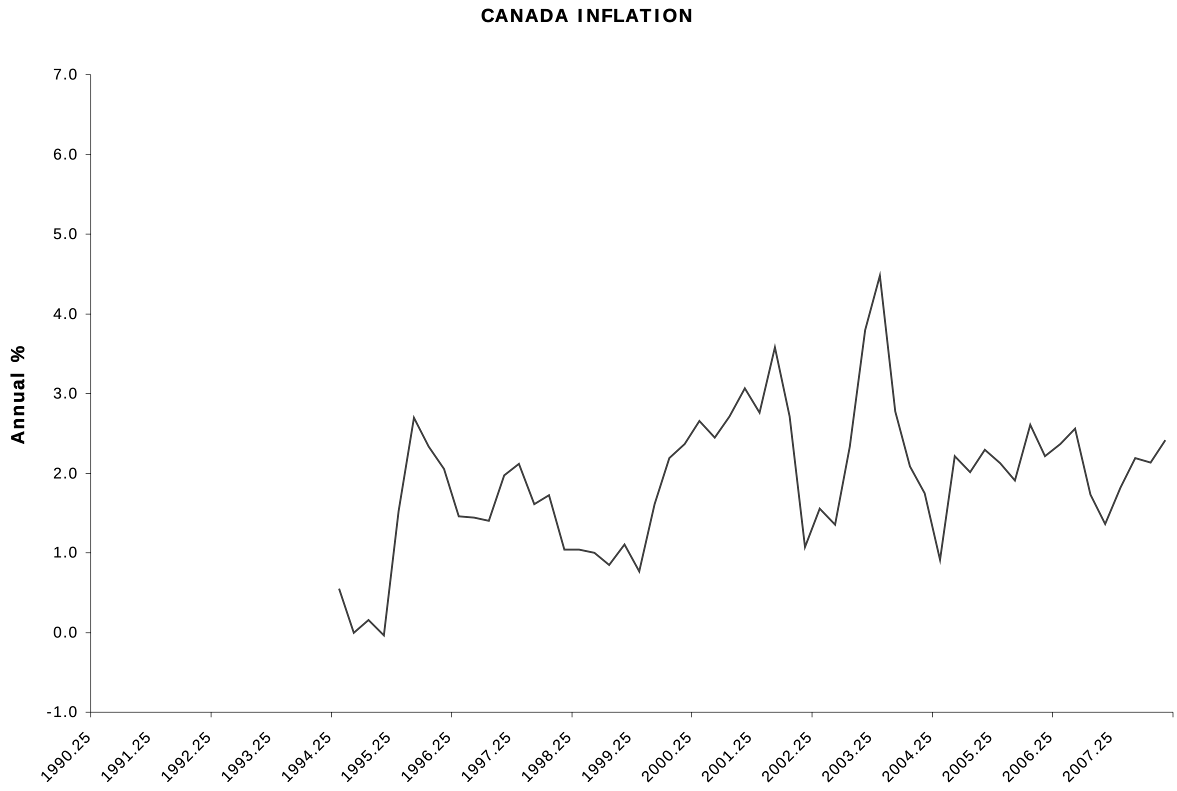
- For all three countries, we obtain plausible models of flexible inflation forecast targeting that provide an empirical measure of the short-run balance between inflation and cyclical variation in output.
  - ⇒ Provides support for these types of models as *positive* descriptions of monetary policy; an alternative to Taylor rules.
  - ⇒ Central banks could present flexible inflation forecast targets as part of their policy statements since their past behaviour has been consistent with such targets, though with some qualifications. (In fact, could use Δy instead of Δx.)
- Qualifications:
  - Canada: stability of π^* coefficient.
  - United States: stability of ϕ.
  - Australia and the US: predictability of targets. Policy has not been consistent with simple model's objectives.
    - ⇒ May need more general models (e.g. interest rate smoothing).
- Our flexible inflation forecast targets are dominated by the behaviour of inflation.
  - ⇒ the difference between strict and flexible inflation targeting even at short horizons is going to be difficult to distinguish.

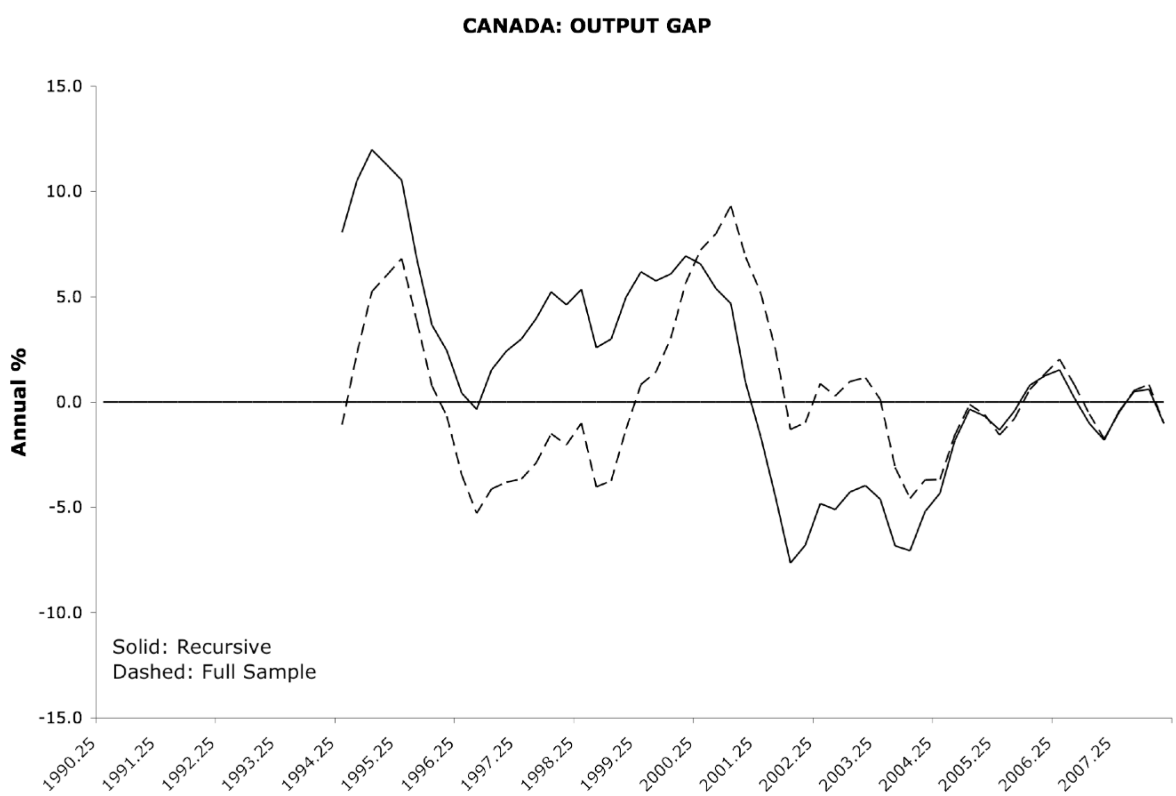
AUSTRALIA: INFLATION



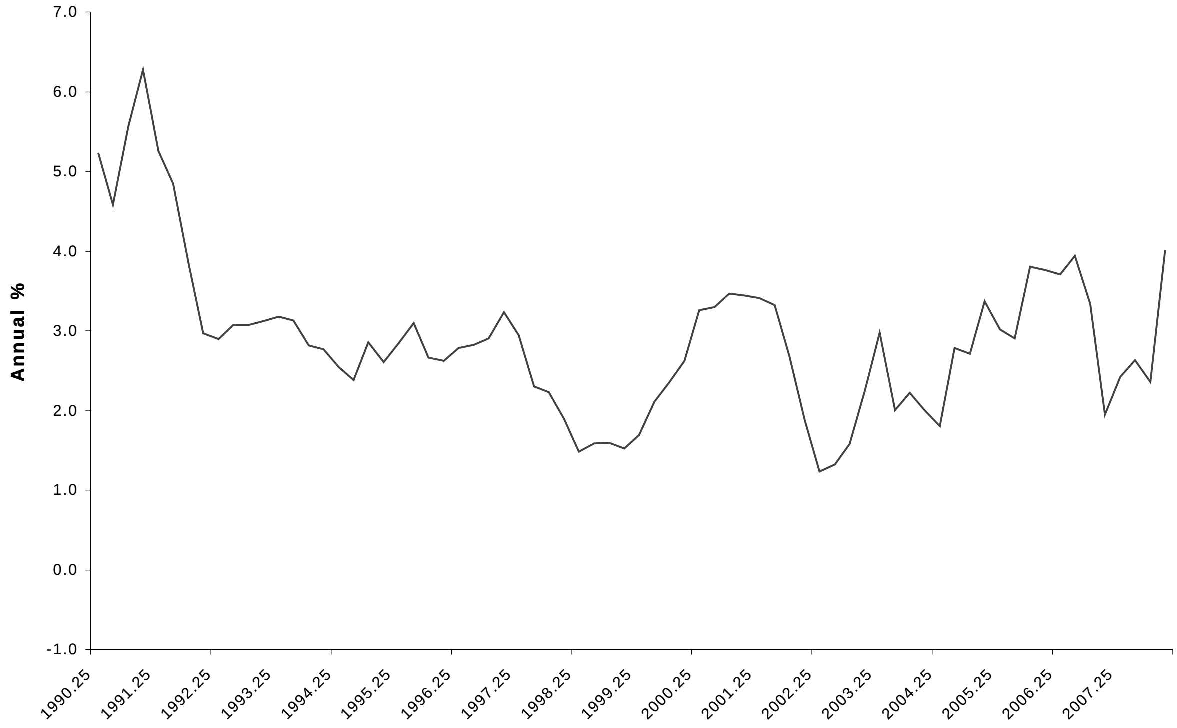
AUSTRALIA: OUTPUT GAP




CANADA INFLATION
Annual %
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
1990.25
1991.25
1992.25
1993.25
1994.25
1995.25
1996.25
1997.25
1998.25
1999.25
2000.25
2001.25
2002.25
2003.25
2004.25
2005.25
2006.25
2007.25


CANADA: OUTPUT GAP
Annual %
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
Solid: Recursive
Dashed: Full Sample
1990.25
1991.25
1992.25
1993.25
1994.25
1995.25
1996.25
1997.25
1998.25
1999.25
2000.25
2001.25
2002.25
2003.25
2004.25
2005.25
2006.25
2007.25

US INFLATION



UNITED STATES: OUTPUT GAP