Bulletin

Vol. 80, No. 8

August 2017

RESERVE
BANK
OF NEW ZEALAND
TE PŪTEA MATUA

Reserve Bank of New Zealand *Bulletin*

Subscribe online: http://www.rbnz.govt.nz/email-updates

For back issues visit: http://www.rbnz.govt.nz/research-and-publications/reserve-bank-*Bulletin*

ISSN 1177-8644

An international comparison of inflation-targeting frameworks

Amber Wadsworth, Reserve Bank of New Zealand[1]

This article compares the inflation-targeting frameworks of 10 advanced-economy central banks. In particular, it assesses how New Zealand's Policy Targets Agreement compares to other advanced economy inflation-targeting frameworks and how the specifications in each framework compare to the actual practice of each central bank. The comparison focuses on five components of an inflation-targeting framework: the inflation target definition, communication of monetary policy, secondary considerations, assessment of inflation-targeting performance, and framework reviews and revisions. It finds that while the formal inflation-targeting frameworks differ between each central bank, in practice each bank operates in a similar manner.

1 I would to thank my colleagues in the Reserve Bank of New Zealand and also in the Bank of England, Norges Bank, the Bank of Canada, the Reserve Bank of Australia, Sveriges Riksbank, the European Central Bank, the Swiss National Bank and the United States Federal Reserve for their insights and feedback on this article. The views in this article are not necessarily the views of the central banks represented in the article.

1 Introduction

The Reserve Bank of New Zealand ('RBNZ') began targeting inflation as a mechanism to ensure price stability in 1988. The RBNZ's inflation target framework was then formalised with the Reserve Bank of New Zealand Act (1989) and when the first Policy Targets Agreement ('PTA') was set in 1990. The Bank of Canada was the second central bank to target inflation, in order to achieve price stability, in 1991. Since then inflation targeting has become internationally regarded as a conventional monetary policy framework.[2] Inflation-targeting frameworks have continued to evolve based on individual country experiences; consequently it is useful to periodically compare the formal and informal inflation-targeting frameworks across advanced economies and understand the key similarities and differences. A previous article by Wood and Reddell (2014) compared the goals for monetary policy across inflation-targeting countries by focusing on primary legislation. This article expands on that analysis by comparing the inflation-targeting frameworks, including informal frameworks, with actual practices.

2 Roger (2009).

This article compares the frameworks and practices of 10 advanced economies that employ either full or partial inflation targeting.[3] This includes six 'fully fledged' inflation-targeting central banks: Reserve Bank of New Zealand, the Bank of England ('BoE'), Norges Bank, the Bank of Canada ('BoC'), the Reserve Bank of Australia ('RBA'), and Sveriges Riksbank ('Riksbank'). These banks explicitly target inflation over a specified time frame in order to achieve price stability, have monetary policy independence, regularly announce monetary policy decisions, and are accountable for policy decisions.[4] Several large central banks also use elements of inflation targeting without either explicitly announcing an inflation target, or they have other objectives alongside low and stable inflation. These are the European Central Bank ('ECB'), the Swiss National Bank ('SNB'), the United States Federal Reserve ('Fed'), and the Bank of Japan ('BoJ'). Given their importance to international monetary policy, we also assess their frameworks and practices.

The comparison covers five components of an inflation-targeting framework: inflation target definition, communication of monetary policy, secondary considerations[5], assessment of the inflation-targeting performance, and framework reviews and revisions. The comparison reveals four key findings.

1. Despite large differences across inflation-targeting frameworks, the central banks operate and communicate monetary policy similarly.

2. The central banks pursue forward-looking inflation targets and produce reports that support ex ante and ex post performance assessments. However, there is less consistency in the formal definitions and reporting requirements facilitating these assessments.

3. The central banks take account of secondary considerations when setting monetary policy, but not all inflation-targeting frameworks detail how central banks should make these secondary considerations, particularly with regard to financial stability.

4. Several countries have published reviews of and made revisions to their inflation-targeting frameworks. However, the revisions to the frameworks are not always based on recommendations from published reviews.

The remainder of this article is as follows. Section 2 describes the documentation of the inflation-targeting frameworks across the 10 countries. Sections 3 to 6 then discuss the similarities and differences in the formal frameworks and actual practices of the central banks in this study in the following order. Section 3 discusses the areas of most similarity: inflation targets and the communication of monetary policy. Sections 4 to 6 focus on areas of greater differences: the assessment of inflation-targeting performance, the secondary considerations bank's make when setting monetary policy, and formal framework reviews and revisions. Section 7 concludes.

3 The central banks in this study will be referred to as the 'central banks' or 'banks'.

4 The conditions for fully fledged inflation targeting are set out in Hammond (2012), Kamber, Karagedikli and Smith (2015).

5 Secondary considerations refer to central bank's considerations of how economic volatility and financial stability will be affected by a monetary policy decision. These are labelled 'secondary considerations' for banks which do not include them in their primary objectives for monetary policy.

2 Documenting inflation-targeting frameworks

All the banks in this comparison have monetary policy objectives set by primary legislation as documented in Wood and Reddell (2014). However, the specific inflation targeting objectives are formalised and documented differently across the banks. This article categorises these inflation-targeting frameworks ('frameworks') into formal frameworks and informal frameworks as depicted in table 1. Formal frameworks are those that are set by secondary legislation or by a voluntary agreement with the government. The informal frameworks are those that are set by the central bank.[6]

According to this definition, half of the inflation-targeting frameworks compared in this article are set formally and the other half are set informally.[7] Table 1 depicts the degree of central bank autonomy in the inflation-target frameworks from least (government directive) to most (central bank set).

6 See the appendix for a list of all primary legislation and documents outlining the various inflation-targeting frameworks

7 The BoJ inflation-targeting framework is set by the bank's Policy Board and detailed in The 'price stability target' under the framework for the Conduct of Monetary Policy (2013). An additional document, 'Joint Statement of the Government and the Bank of Japan on Overcoming Deflation and Achieving Sustainable Economic Growth' (2013), indicates how the government and central bank will coordinate their policies in the pursuit of price stability.

3 Inflation-targeting frameworks similarities: targets and communications

In practice, the central banks have similar inflation targets and produce similar monetary policy reports, despite the differences in their frameworks.

Inflation target definition

Table 2 shows how inflation targets are defined across the frameworks.[8] The targets are all tied to a measure of headline inflation and are generally centred around 2 percent. However, there are differences in whether the frameworks allow ex ante flexibility by defining the target as a range or whether they allow ex post flexibility by including a tolerance band. A target range is a forward looking range of inflation values that a central bank can target when setting monetary policy. A tolerance band is a range of outcomes that are tolerated given the uncertainty of inflation-targeting but do not constitute as a target.

The RBA's *Statement on the Conduct of Monetary Policy (2016)* specifies both a target range and a performance benchmark: 'an appropriate goal is to keep consumer price inflation between 2 and 3 percent…The 2-3

8 For the purposes of this comparison a target point is defined as any target that is defined as a single number, while a target range is any target that includes any range of numerical options. This is to distinguish between the degrees of precision that exist within inflation target definitions.

Table 1
Method for establishing details of an inflation-targeting framework

		Secondary legislation		Voluntary agreement	Central bank set
		Government directive	Statutory required agreement		
Formal frameworks	Reserve Bank of New Zealand		✓		
	Bank of England	✓			
	Norges Bank	✓			
	Bank of Canada			✓	
	Reserve Bank of Australia			✓	
Informal frameworks	Riksbank				✓
	European Central Bank				✓
	Swiss National Bank				✓
	US Federal Reserve				✓
	Bank of Japan				✓

Table 2
Inflation target measures adopted in formal and informal inflation-targeting frameworks
CPI = consumer price index, HICP = harmonised index of consumer prices, PCE = personal consumption expenditures, pp = percentage point.*

		Target range (%)		Tolerance band	Target definition		Time to target
		Point	Range		12 monthly	CPI	
Formal frameowrks	Reserve Bank of New Zealand	2	1-3			CPI	'medium term'
	Bank of England	2		1 pp	✓	CPI	'should set out..the horizon'
	Norges Bank	2.5			✓	CPI	'over time'
	Bank of Canada	2		1-3%	✓	CPI	'over time/medium term'
	Reserve Bank of Australia		2-3			CPI	'over time/medium term'
Informal frameworks	Riksbank	2			✓	CPI	'two-years'
	European Central Bank		<2		✓	HICP	'medium term'
	Swiss National Bank		<2		✓	CPI	'medium term'
	US Federal Reserve	2			✓	PCE	'medium term'
	Bank of Japan	2			✓	CPI	'medium to long-term' and 'earliest time possible'

* The measurement of CPI inflation is country specific.

percent medium-term goal provides a clearly identifiable performance benchmark over time.'

Table 2 also shows differences in the definition of 'time to target'. When shocks move inflation away from target, several frameworks define the time to return to target as the 'medium term', while the RBA, Norges Bank and BoC frameworks define the time to target loosely as 'over time'. The RBA and BoC frameworks then provide additional wording to clarify the inflation target as a medium term goal. Meanwhile, the BoE and the Riksbank frameworks give specific directives for the time to target. The BoE's *Remit for the Monetary Policy Committee (2017)* ('*Remit*') requires the bank to specify the time horizon it believes inflation should return to the target: '...it [the Monetary Policy Committee] should set out in its communications: …the horizon over which the Committee judges it is appropriate to return inflation to the target.' The Riksbank's ambition has generally been to return headline inflation to target in two years and notes this timeframe may be adjusted *(Monetary policy report, April 2016).*

Table 3 shows that in practice the specifications of the inflation targets are similar across the central banks. 'In practice' is defined as actions that a central bank publically undertakes including and beyond required actions. In practice, all banks measure 12-monthly headline inflation for their target, as well as reporting measures of core or underlying inflation.[9] In addition, there appears to be a consensus that the 'medium term' is loosely centred around three years. For example, banks which have observed a shock that has moved inflation from target tend to publish inflation projections of three years ahead and show inflation returning to target relative to this three-year time horizon.

Further, in practice it also appears that banks with target ranges are not acting differently from banks with inflation target points. Communications by central banks with target ranges indicate they tend to aim for either a point or narrow range of points within a target range rather than targeting the edges of their target range. For example, the RBNZ aims for the 2 percent target midpoint and the RBA has characterised its target as a 'thick point'.[10] A simulation by Hargreaves (2002) suggests that if central banks were targeting the edges of their target range rather than the mid-point, then these banks would see more frequent and persistent deviations of inflation from their target range. This is because these banks would only react to inflation only when it is outside the target range, and return it to only within the target range edge. There is some evidence for this hypothesis. Little and Romano (2009) found that the RBA and ECB had a greater frequency and longer duration of inflation deviations from target than the BoC and BoE (who have point targets and tolerance bands) from the point of adoption until 2008.

Communication of monetary policy

Monetary policy actions are reported in a similar manner across the central banks and in greater depth and frequency than formally required. Table 4 shows the requirements are set by primary legislation or the formal inflation-targeting frameworks. Due to the wording of these reporting requirements it is natural to separate them into requirements to report on planned or previous monetary policy actions, or 'unspecified' monetary policy reporting requirements as shown in columns three to five of table 4. The frequency specifications for these reporting requirements are set out in table 5.

9 Fay and Kristina (2016).

10 Debell and Stevens (1995), Debell (2009).

Table 3
Inflation targets in practice

		Target definition			Current forecasts of return to target (June 2017)
		12 monthly	Measure of target headline inflation	Emphasised measure of underlying inflation	
Formal frameworks	Reserve Bank of New Zealand	✓	CPI	Model-based (sectoral factor model), trimmed mean, weighted median	2-3 years
	Bank of England	✓	CPI	Exclusion-based	3+ years
	Norges Bank	✓	CPI	Exclusion-based, trimmed mean, weighted median	3+ years
	Bank of Canada	✓	CPI	Exclusion-based trimmed mean, volatility-weighted, weighted mean, factor model	1 year
	Reserve Bank of Australia	✓	CPI	Trimmed mean, exclusion-based, weighted median	2 years
Informal frameworks	Riksbank	✓	CPI	Exclusion-based, trimmed mean, volatility-weighted.	2 years
	European Central Bank	✓	HICP	Exclusion-based	3+ years
	Swiss National Bank	✓	CPI	Exclusion-based, trimmed mean	3+ years
	US Federal Reserve	✓	PCE	Exclusion-based, trimmed mean, weighted median, factor model	2 years
	Bank of Japan	✓	CPI	Exclusion-based, trimmed mean	2 years

Table 4
Reporting requirements in primary legislation or formal framework

		Reporting requirements		General reporting requirements			Reporting required if inflation deviates from target or tolerance band	Audience	
		Set by central bank primary legislation	Set by formal framework	On planned monetary policy actions	On previous monetary policy actions	Unspecified monetary policy reporting requirements		Public statements	Parliamentary hearing
Formal frameworks	Reserve Bank of New Zealand	✓	✓	✓	✓		✓	✓	✓
	Bank of England	✓	✓	✓	✓		✓	✓	
	Norges Bank	✓	✓		✓			✓	
	Bank of Canada	✓	✓			✓			
	Reserve Bank of Australia	✓	✓		✓			✓	✓
Informal frameworks	Riksbank	✓				✓			
	European Central Bank	✓				✓		✓	✓
	Swiss National Bank	✓		✓	✓	✓		✓	✓
	US Federal Reserve	✓		✓	✓				✓
	Bank of Japan	✓			✓			✓	✓

Note: the SNB requirement to report on planned monetary policy actions is unique as it applies only 'before decisions of major importance for economic and monetary policy', National Bank Act (2003).

Table 5
Required frequency of reports counted in '*General reporting requirements*' from table 4 (columns three to five) Regularly = more frequently than quarterly.

		Frequency of required *general* reports				
		Annual	Semi-annual	Quarterly	After decisions	Regularly
Formal frameworks	Reserve Bank of New Zealand	✓	✓			
	Bank of England	✓				
	Norges Bank					✓
	Bank of Canada					✓
	Reserve Bank of Australia	✓	✓		✓	✓
Informal frameworks	Riksbank		✓			
	European Central Bank	✓		✓		
	Swiss National Bank	✓		✓		✓
	US Federal Reserve		✓			
	Bank of Japan		✓		✓	

Table 6
Monetary policy reporting in practice Regularly = more frequent than quarterly

		Monetary policy report	Minutes	Central bank report	Parliamentary hearings	Transparency index
Formal frameworks	Reserve Bank of New Zealand	Quarterly		Annually	Quarterly	14
	Bank of England	Quarterly	Regularly	Annually	Regularly	12
	Norges Bank	Quarterly		Annually	Annually	11.5
	Bank of Canada	Quarterly		Quarterly	Regularly	11
	Reserve Bank of Australia	Quarterly	Regularly	Annually	Semi-annually	11
Informal frameworks	Riksbank	Regularly	Regularly	Annually	Regularly	15
	European Central Bank	Regularly	Regularly	Annually	Regularly	11
	Swiss National Bank	Quarterly		Annually	Annually (at least)	10.5
	US Federal Reserve	Semi-annually	Regularly	Annually	Regularly	12
	Bank of Japan	Regularly	Regularly	Semi-annually	Semi-annually	11.5

Note: Central bank reports are those that give an account on the banks' range of statutory functions.

Table 4 shows that the central banks with formal frameworks have relatively more detailed inflation-targeting reporting requirements, while the banks with informal frameworks are more likely to be required to present a verbal report at a parliamentary hearing. It also shows that only two banks are formally required to make a special report on monetary policy if inflation outcomes are away from either the target or tolerance band. These are the RBNZ and the BoE. Section 4 of the RBNZ's *PTA* (2012) states 'On occasions when the annual rate of inflation is outside the medium-term target range, or when such occasions are projected, the Bank shall explain in *Policy Statements* made under section 15 of the Act why such outcomes have occurred, or are projected to occur, and what measures it has taken, or proposes to take, to ensure that inflation outcomes remain consistent with the medium-term target'. Meanwhile, the BoE must report to its government when inflation is outside the tolerance band. Norges Bank made a voluntary commitment to report to its government when inflation was away from its target by 1 percentage point when it was implementing its inflation-targeting framework.

Table 5 expands on the general reporting requirements given in primary legislation or formal frameworks by depicting the required frequency of reporting. Together, tables 4 and 5 demonstrate that the content and frequency specifications of the required reporting varies significantly across the central banks and tend not to be obtrusive.

Table 6 indicates that the type and frequency of reports the central banks publish in practice are relatively similar and published more frequently than is required. Further, the Dincer and Eichengreen transparency index (2014) assesses central bank transparency based on monetary policy communication and assigns these banks similar scores. The small differences in the scores reflect some remaining differences in the communication between the banks. For example, the Fed places more importance on decentralised reporting such as speeches and branch reports. It is worth noting the Riksbank has the highest transparency ranking despite having relatively low *required* reporting compared to the other central banks (table 4).[11]

4 Assessment of inflation-targeting performance with forward looking targets

In practice, all of the central banks have forward looking inflation targets and produce reports that enable performance assessments on an ex ante and ex post basis. However, not all inflation-targeting frameworks provide a guide on what tolerance should be given regarding inflation outcomes that are away from target. In addition, not all reporting requirements on the central banks are consistent with supporting both ex ante and ex post performance assessments.

11 The 2014 transparency index can be found at http://eml.berkeley.edu/~eichengr/Dincer-Eichengreen_figures&tables_2014_9-4-15.pdf. The authors base the index on public reports and communications by each central bank and compare transparency across five areas: political (definition of objectives), economic (data, model, forecasts), procedural (minutes, votes), policy (announcement and explanation of policy decisions) and operational (disturbances, control errors). The central banks in this comparison all have scores between 10.5 and 15, from a range of 0 to 15. These values are similar in the context of Dincer and Eichengreen's full sample. This measure does not take account of subsequent actions by Central Banks since 2014.

Inflation-targeting frameworks influence performance assessments

The definition of each central bank's inflation target and its reporting requirements, as well as whether there is a defined tolerance band, impacts the way each central bank's performance is assessed.

As shown in table 2, inflation targets can be broadly characterised as a point or a range. The attributes of a point or range target influence the public assessment of a central bank's inflation targeting performance. A target range gives a sense of the uncertainty of inflation outcomes and allows the central bank more flexibility in choosing monetary policy. However, as mentioned in section 1, a drawback of a target range is that the area within the range can become, or be perceived as, a 'zone of inaction', or biases may form around either end of the range.[12] In this respect, a target point gives a more specific signal to market pricing and inflation expectations. A point target conveys the forward-looking and medium-term nature of inflation targeting as it cannot be achieved in the very short term. Meanwhile, a target range with a mid-point conveys the central bank's preference to target the middle of the range, as well as the uncertainty of actual inflation outcomes.

An ex ante inflation-targeting assessment is made before the inflation outcome is realised and can be made by comparing forecasts of inflation against the future inflation target. It typically would focus on whether the bank's forecast for inflation will settle at the target point or within the target range, whether the forecast for inflation is credible and reasonable, and whether the policy path is consistent with delivering the inflation forecast.

12 Bernanke, Laubach, Miskin and Posen (1999), Hargreaves (2002), Orphanides & Wieland (1999), Castelnuovo, Nicoletti-Altimari, and Rodriguez-Palenzuela (2003), Hammond (2012).

An ex post assessment is made once inflation outcomes are known and all the impacts of monetary policy decisions have been realised. It would assess how well past inflation has settled relative to the target. A defined tolerance band facilitates an assessment of how well past inflation has settled to the inflation target given the uncertainties of inflation targeting, by providing a suitable range of inflation outcomes. Inflation deviations outside of a tolerance band may reveal that improvements to the forecast can be made. Inflation outcomes can also be assessed against an inflation target, but as the wording of a target is forward looking, there is less clarity regarding the extent to which observed inflation deviations should be tolerated. An ex post assessment of a central bank's performance would also focus on how the bank responded to new information, how it communicated new developments and whether credibility was maintained after decisions had been made.[13]

Target definition and reporting requirements in the frameworks

Table 7 compares the central banks' target definitions with their reporting requirements in primary legislation or formal frameworks. This enables a comparison of how the inflation-targeting frameworks facilitate ex ante and ex post assessments of the central banks' inflation targeting performances.

The BoE has particularly clear definitions and requirements for performance assessments. It has a formally defined ex ante target, ex post tolerance band, and reporting requirements for both *previous* and *planned* monetary policy actions. The BoE's *Remit (2017)* defines its ex ante target by stating: 'The inflation target of 2 percent applies at all times.' It then defines an ex post tolerance band of one percentage point

13 Ford, Kendall and Richardson (2015).

Table 7
Inflation target and monetary policy reporting requirements

		Target point	Target range	Tolerance Band	General reporting requirements on *planned* monetary policy actions	General reporting requirements on *previous* monetary policy actions
Formal frameworks	Reserve Bank of New Zealand	✓	✓		✓	✓
	Bank of England	✓		✓	✓	✓
	Norges Bank	✓				✓
	Bank of Canada	✓		✓		
	Reserve Bank of Australia		✓			✓
Informal frameworks	Riksbank	Informal				
	European Central Bank		Informal			
	Swiss National Bank		Informal			✓
	US Federal Reserve	Informal			✓	✓
	Bank of Japan	Informal				✓

Note: 'Informal' refers to the actual practice of the bank rather than a formal requirement.

and makes it clear that this is not a target range: 'If inflation moves away from the target by more than 1 percentage point in either direction, I shall expect you to send an open letter to me… The thresholds do not define a target range.' This statement also articulates a clear ex post reporting requirement. The *Remit (2017)* then clarifies that the Committee is required to report on why inflation has moved away from target. Ex ante, the *Remit (2017)* requires the BoE to report on the outlook for inflation, why inflation may be expected to move away from target, the policy action the Committee is taking in response, the horizon over which the Committee judges it is appropriate to return inflation to target, the trade-off that has been made, and how the approach meets the government's objectives.

The remaining central banks have a range of formal performance assessment arrangements. The RBNZ and the Fed have ex ante targets and are required to report on *planned* and *previous* monetary policy actions. For example, the RBNZ has a defined ex ante target range and mid-point. Ex post the *Reserve Bank of New Zealand Act (1989)* ('*RBNZ Act'*) requires policy statements to 'contain a review and assessment of the implementation by the Bank of monetary policy during the period to which the preceding policy statement relates'. The *PTA (2012)* references the target range as if it was also a tolerance band by requiring the bank to report on why the annual rate of inflation is outside the target range, while at the same time specifying the target range as 'future CPI inflation outcomes'.[14]

Norges Bank, the RBA, the SNB and the BoJ have ex ante targets and are required to report on *previous* monetary policy actions. Meanwhile, the BoC, Riksbank and the ECB have ex ante targets which are subject to *unspecified* reporting requirements and have ex ante targets, while the BoC also has an ex post tolerance band. The BoC's *Renewal of the Inflation-Control Target – Background Information – October 2016* refers to its tolerance band as a control range: 'the Bank will continue to conduct monetary policy aimed at keeping inflation, as measured by the total consumer price index (CPI), at 2 percent, with a control range of 1 to 3 percent around this target.'

Inflation target assessments in practice

In practice the central banks in this study pursue forward-looking inflation targets and support ex ante and ex post performance assessments. Table 8 outlines and compares the information the central banks produce with regards to whether it supports an ex ante assessment, an ex post assessment or both. It indicates the information in regular reporting

14 The RBNZ reporting requirements say: 'The Bank shall deliver to the Minister and publish… policy statements for the period of 6 months from and after the date of publication…. The policy statement shall … specify the policies and means by which the Bank intends to achieve the policy targets... state the reasons for adopting those policies and means... contain a statement of how the Bank proposes monetary policy might be formulated and implemented during the next five years, contain a review and assessment of the implementation by the Bank of monetary policy during the period to which the preceding policy statement relates.' Section 15, the Reserve Bank of New Zealand Act (1989).

'On occasions when the annual rate of inflation is outside the medium-term target range, or when such occasions are projected, the Bank shall explain in Policy Statements made under section 15 of the Act why such outcomes have occurred, or are projected to occur, and what measures it has taken, or proposes to take, to ensure that inflation outcomes remain consistent with the medium-term target.' *Policy targets agreement (2012)..*

Table 8
Information provided by central banks supporting ex ante or ex post assessment

		Ex ante				Both	Ex-post				
		Forecast of headline inflation	The policy path on which the forecast is conditioned	Explanation of current economic conditions for inflation forecast	Current risks to inflation reaching target	Measures of inflation expectations	Core inflation measure	Uncontrollable/ unforeseeable developments that occurred since previous monetary policy decisions	Direct comparison of headline inflation to tolerance band	Direct comparison of key policy judgements in previous MP decisions to outcomes	Forecast error study (at least one)
Formal frameworks	Reserve Bank of New Zealand	MPR	Endogenous policy	MPR	MPR	MPR	MPR	MPR			✓
	Bank of England	MPR	Market implied policy	MPR	MPR	MPR	MPR	MPR	MPR	MPR	✓
	Norges Bank	MPR	Endogenous policy	MPR	MPR	MPR	MPR	MPR		MPR	✓
	Bank of Canada	MPR		MPR	MPR	MPR	MPR	MPR	MPR		✓
	Reserve Bank of Australia	MPR	Unchanged policy rate	MPR	MPR	MPR	MPR	MPR			✓
Informal frameworks	Riksbank	MPR	Endogenous policy	MPR	MPR	MPR	MPR	MPR		MPR	✓
	European Central Bank	MPR	Market implied policy	MPR		MPR	MPR				
	Swiss National Bank	MPR	Unchanged policy rate	MPR		MPR	MPR				✓
	US Federal Reserve	MPR	Endogenous policy	MPR	Minutes	MPR	MPR	MPR			✓
	Bank of Japan	MPR		MPR	MPR	MPR	MPR				

Notes: 1) The information in table 8 is predominantly drawn from each bank's monetary policy reports as at June 2016, but also draws from some previous monetary policy reports. It is possible this range of information may be provided through other country-unique channels; 2) Column two is based on table 4 in the Stockton's 'Review of the Monetary Policy Committee's forecasting capability' (2012), Bank of England; 3) Column 10 (last) draws from ad hoc reports; 4) MPR = monetary policy report.

produced by the banks is weighted towards supporting an ex ante assessment.

Table 8 shows that all of the central banks in this study provide forecasts of inflation and most banks publish the policy track this forecast is conditioned on. This information enables an assessment of whether the bank will reach its target, and whether the bank's policy path is consistent with delivering the inflation forecast. In addition, each bank describes the current domestic and international economic conditions and gives a measure of inflation expectations, and the majority of banks discuss the risks to inflation reaching the target. These elements are useful for assessing whether the forecast for inflation is credible and reasonable. This information, when read retrospectively, can also inform an ex post assessment of whether the bank maintained credibility and responded to new information effectively.

In analysing inflation outcomes, the majority of banks explain uncontrollable or unforeseeable events which occurred following the previous monetary policy decision and all banks provide measures of 'core' inflation. This information enables an assessment of inflation outcomes by acknowledging the impacts of sharp isolated price movements that previous monetary policy decisions could not address. Two of the central banks in this study include a direct comparison of headline inflation outcomes to a tolerance band. In addition, only three banks directly and explicitly compare key policy judgements to outcomes, as most banks appear to prefer to update key judgements and maintain a forward-looking focus. Searching across the central banks' published reports indicated that most banks discuss their forecast errors on an ad hoc basis and not in direct relation to specific monetary policy decisions, suggesting this is not a regular element of a bank's public performance assessment.

Lastly, each central bank issues a report, usually annually, that gives an account on its range of statutory functions. Across the central banks in this study, this type of report generally includes a summary of how monetary policy responded to developments over the period of the report but does not appear to contain any additional information than what is in the monetary policy reports.

5 Secondary considerations and flexibility in inflation targeting

All of the central banks in this study target price stability to support growth in economic output and employment in the long-run.[15] For most central banks' price stability is defined as the primary objective of monetary policy. However, the Fed and RBA are also directed to consider economic output and employment in their primary objectives of monetary policy.

Considering economic volatility when setting monetary policy

In the medium-term, central banks may be required to trade off achieving or maintaining inflation at a certain level with avoiding volatility in economic output and employment. Table 9 shows that most frameworks explicitly direct the bank to avoid economic volatility in the short-term when making monetary policy decisions. However, the Norges Bank and SNB frameworks state this more indirectly. The Norges Bank framework states: 'monetary policy shall underpin fiscal policy by contributing to

15 Wood and Reddell (2014).

Table 9
Consideration of economic output when pursing monetary policy

		Framework		In practice
		Dual mandate - inflation, output/ employment.	Single mandate with secondary objective to avoid short term volatility in output	Avoids short term volatility in output
Formal frameworks	Reserve Bank of New Zealand		Explicitly	✓
	Bank of England		Explicitly	✓
	Norges Bank		Implicitly	✓
	Bank of Canada		Explicitly	✓
	Reserve Bank of Australia	✓		✓
Informal frameworks	Riksbank			✓
	European Central Bank		Explicitly	✓
	Swiss National Bank		Implicitly	✓
	US Federal Reserve	✓		✓
	Bank of Japan		Explicitly	✓

stable developments in output and employment' (*Regulation on Monetary Policy, 2001)* and the SNB framework states: 'In so doing, it shall take due account of the development of the economy' *(National Bank Act, 2003)*. In practice, all banks employ flexible inflation targeting to make such trade-offs.[16]

Considering financial stability when setting monetary policy

Flexible inflation targeting has increasingly come to include financial stability considerations. Most of the banks consider financial stability in some form when setting monetary policy based on information in their policy reports. However, the inflation-targeting frameworks differ in how they define the manner and extent to which the central bank must have regard to financial stability.[17] This ambiguity reflects the global ongoing discussion amongst policy makers on whether or how monetary policy should interact with financial stability concerns.[18]

The central banks can be grouped into three categories:

1. Central banks with directive financial stability wording in their inflation-targeting frameworks.

2. Central banks with flexible financial stability wording in their inflation-targeting frameworks.

3. Central banks without financial stability wording in their inflation-targeting frameworks.

1. Central banks with directive financial stability wording in their inflation-targeting frameworks

The BoE and the BoC frameworks give the most direction about how the central bank should consider financial stability when setting monetary policy, by specifying the banks should have regard for financial stability by setting a longer time to target if appropriate.

The BoE's *Remit (2017)* states: 'Circumstances may also arise in which attempts to keep inflation at the inflation target could exacerbate the development of imbalances that the Financial Policy Committee may judge to represent a potential risk to financial stability...in these circumstances the Monetary Policy Committee may wish to allow inflation to deviate from the target temporarily...' The BoE *Remit (2017)* also acknowledges that its Financial Policy Committee's macroprudential tools are the first line of defence against financial stability risks. In practice, the BoE Monetary Policy Committee minutes show financial stability is regularly considered when deliberating on monetary policy. Further, in 2013 BoE proposed a 'knockout' condition in *Monetary policy trade-offs and forward guidance (2013)* for its monetary policy forward guidance if: 'the Financial Policy Committee (FPC) judges that the stance of monetary policy poses a significant threat to financial stability that cannot be contained by the substantial range of mitigating policy actions available to the FPC, the Financial Conduct Authority and the Prudential Regulation Authority in a way consistent with their objectives.'[19]

16 Flexible inflation targeting refers to a central bank that minimises a quadratic loss function consisting of inflation's deviation from its target as well as output's deviation from its potential level. Svensson (1999).

17 This section focuses only on the extent to which financial stability concerns impact monetary policy decisions. It excludes actions and decisions made to achieve specific and separate financial stability mandates.

18 For a summary of the discussion see Schnabel (2016) and Carauana (2016)

19 The bank gave forward guidance it would not raise the Bank Rate from 0.5% at least until the Labour Force Survey headline measure of unemployment rate had fallen to a 'threshold' of 7%, unless one of three 'knockout' conditions was met.

In 2011 the BoC's *Renewal of the inflation control target* stated: 'The unfolding consequences of a shock could be sufficiently large and persistent that a longer horizon might be warranted in order to provide greater stability to the economy and financial markets…. Through a longer targeting horizon, monetary policy can also promote adjustments to financial excesses or credit crunches.' This was updated in the recent *Renewal of the Inflation-Control Target – Background Information – October 2016* which states that 'monetary policy should be adjusted only in exceptional circumstances to address financial vulnerabilities' and that 'episodes of tension between a monetary policy objective of low and stable inflation and risks to financial stability will be less common than assessed previously… such episodes are likely to be limited to situations where policy interest rates are held very low for an extended period.' This framework clarification echoed the practice of the BoC, as the bank had previously stated that it would only rarely employ a longer targeting horizon to take account of financial stability.[20]

2. Central banks with flexible financial stability wording in their inflation-targeting frameworks

The RBNZ, BoJ and RBA frameworks have high-level statements directing these banks to consider financial stability, but these statements give more flexibility regarding the manner and extent to which the central banks should have regard for financial stability.

For example, the RBNZ Act (1989) directs the bank to 'have regard to the efficiency and soundness of the financial system'. The BoJ's statement on inflation targeting, *The 'price stability target' under the framework for the Conduct of Monetary Policy (2013),* states: 'The conduct of monetary policy has to be flexible by examining various risk factors, including those related to financial imbalances…'. Lastly the *RBA's Statement on the Conduct of Monetary Policy (2016)* states that: 'the medium-term focus provides the flexibility for the Reserve Bank to set its policy so as best to achieve its broad objectives, including financial stability'.

In practice, the RBNZ's policy reports indicate the bank has regard for financial stability. The June 2016 *Monetary Policy Statement* states: 'House price inflation in Auckland and other regions is adding to financial stability concerns. Auckland house prices in particular are at very high levels, and additional housing supply is needed.' In a similar vein the RBA has regularly cited the health of household balance sheets, financial imbalances and their potential macroeconomic impact as considerations in their monetary policy decisions. Recently the RBA governor stated that the RBA 'considered that a very quick return of inflation to the 2 to 3 percent range at the cost of a material deterioration in the health of private sector balance sheets was unlikely to be in the public interest'.[21] In comparison, the BoJ policy reports have been more direct in revealing that it ruled out implementing a negative interest rate in January 2016 as the bank found that at the time: 'The introduction of a negative interest rate will have larger side effects on the functioning of financial markets and the financial system than positive effects on the real economy.' *Summary of opinions at the Monetary Policy meeting January 2016.*

3. Central banks without financial stability wording in their frameworks

Norges Bank and the Riksbank do not have documented financial stability considerations in their inflation-targeting frameworks but have both made trade-offs between price stability and financial stability.

Norges Bank has been actively trading off price stability with financial stability in each monetary policy decision since 2012. Norges Bank

20 Lane (2016).

21 Lowe (2016).

formally defined three criteria for how it makes monetary policy decisions in the March 2012 *Monetary Policy Report*. The financial stability criterion states: 'The interest rate should be set so that monetary policy mitigates the risk of a build-up of financial imbalances, and so that acceptable developments in inflation and output are also the likely outcome under alternative assumptions about the functioning of the economy.' It then changed the name of its monetary policy report to include 'with financial stability assessment'. Norges Bank then updated this to a robustness criterion in the March 2017 *Monetary Policy Report with financial stability assessment,* stating: 'The interest rate path should take account of conditions that imply a risk of particularly adverse economic outcomes and of uncertainty surrounding the functioning of the economy. A build-up of financial imbalances may increase the risk of sudden shifts in demand further out. A robust monetary policy should therefore seek to mitigate the risk of a build-up of financial imbalances. Uncertainty surrounding the effects of monetary policy normally suggests a cautious approach to interest rate setting. This may reduce the risk that monetary policy will have unintended consequences. In situations where the risk of particularly adverse outcomes is substantial, or where confidence in the nominal anchor is in jeopardy, it may be appropriate in some cases to pursue a more active monetary policy than normal.'

The Riksbank has given consideration to both economic factors and financial stability as detailed in a speech by Governor Stefan Ingves.[22] Further, an external review of the Riksbank's monetary policy over 2010 to 2015[23] concluded that by 2012, financial stability concerns had led the Riksbank to set its repo rate at a higher level than was justified by strict inflation targeting. This report indicated that it was likely that in practice the Riksbank had traded price stability with financial stability during that period.

6 Reviews of and revisions to inflation-targeting frameworks

Another element of inflation-targeting frameworks is whether banks' inflation-targeting frameworks are formally or independently reviewed and whether outputs of these reviews are published. In a similar vein, an equally important element is whether and how banks make revisions to their frameworks. This section defines a review as a formalised evaluation of the inflation targeting framework, and a revision as a change to the framework. Table 11 shows that most of the central banks have published reviews of their inflation-targeting frameworks and table 12 shows that all of the central banks have made revisions to their inflation-targeting frameworks, except the Norges Bank. These tables indicate that reviews do not always lead to revisions of frameworks, nor are revisions to the frameworks necessarily based on recommendations from a *published* review. Further, we find that central banks that have a formalised obligation to review their frameworks have based their revisions to their frameworks on published review recommendations. The central banks that do not have such an objective may be more likely to base their revisions on internal analysis.

22 Ingves (2011).
23 Goodfriend and King (2016).

Reviews of frameworks

The inflation-targeting frameworks can be categorised as 'time-dependent', 'state-dependent', or neither (table 10). These categories shed light on how and when the frameworks may be reviewed.

Formal objectives for the inflation-targeting framework to be reviewed only exist for the BoE, BoC and Fed. These frameworks have been classified as 'time-dependent' frameworks as their frameworks are formally required to be renewed at regular intervals outside of the term of a governor or governing committee. These regular scheduled reviews of the framework provide an opportunity to implement changes as a result of the review or that are linked to a separate review, as is the case of the BoE.

In the BoE's *Remit (2017)* the Chancellor states: 'The inflation target will be confirmed in each Budget… I will also need to consider the case for a revised target at these times on its merits.' This gives the Chancellor an opportunity to change the specifications for aspects of the *Remit*, which may be based on the outcome of a published review. However, these annual reviews tend to be relatively light. Consequently, the HM Treasury carried out an additional comprehensive review in 2013 and the BoE commissioned a separate component review in 2014.[24]

The BoC is required to conduct a five-yearly review. Its *Joint Statement of the Government of Canada and the Bank of Canada on the Renewal of the Inflation-Control Target (2016)* states: 'The Bank will continue its research into potential improvements in the monetary policy framework. Before the end of 2021, the Government and the Bank will review the experience over the five-year period, as well as any research insights, and determine the appropriate framework for the years ahead.' The Fed's *Statement on longer-run goals and monetary policy strategy (2016)*, documents an undertaking to review the framework each year.

The RBNZ's framework can be defined as a 'state-dependent' framework as each policy target is agreed between each specific governor and the office of the Minister of Finance. This means the PTA must be negotiated and signed when there is a change or re-appointment of Governor, and an incoming Government may seek to negotiate a new PTA. However, there is no formal requirement to formally review the PTA when it is re-executed. Further, the *RBNZ Act* (*1989)* allows (but does not require) revisions to the framework from time to time including during the term of a Governor.

The remaining banks appear to have frameworks that do not depend on a timeframe or a pre-defined state. Within these banks there is variability with regards to how the framework is reviewed. Some of the central banks carry out reviews on a regular basis. For example, Norges Bank is reviewed externally by a committee of independent economists (Norges Bank Watch) , partly funded by its government. This group reviews monetary policy and in most years one or more components of the inflation-targeting framework. Other central banks have scheduled reviews of their frameworks either due to time that has passed since inflation-targeting implementation or due to a change of state.

Table 11 indicates that all banks have undertaken reviews of their inflation-targeting frameworks but there are differences in the frequency, scope and depth of these reviews. The reviews have been categorised

24 HM Treasury (2013), Warsh (2014).

Table 10
State- and time-dependent frameworks

		State-dependent framework	Time-dependent framework	Neither state-nor time dependent frameworks
Formal frameworks	Reserve Bank of New Zealand	✓		
	Bank of England		✓	
	Norges Bank			✓
	Bank of Canada		✓	
	Reserve Bank of Australia			✓
Informal frameworks	Riksbank			✓
	European Central Bank			✓
	Swiss National Bank			✓
	US Federal Reserve		✓	
	Bank of Japan			✓

Table 11
Reviews of inflation-targeting frameworks

		Objective to review framework	Announced or published reviews of framework	
Formal frameworks	Reserve Bank of New Zealand		2 broad-scope reviews	Svensson 2000, Finance Expenditure Committee inquiry 2007.
	Bank of England	Annual	19 annual reviews, 1 component review, 1 broad-scope review.	Warsh review 2014, HM Treasury review 2013.
	Norges Bank		12 component reviews	Norges Bank Watch (2001, 2002, 2004, 2005,2007, 2008, 2010, 2012, 2013, 2014, 2015). Gjedrem review 2017.
	Bank of Canada	Five yearly	6 broad-scope reviews	Inflation-control target reviews 1995, 1998, 2001, 2006, 2011, 2016.
	Reserve Bank of Australia			
Informal frameworks	Riksbank		4 broad-scope reviews	Giavazzi and Mishkin 2007, Goodhart and Rochet 2011, Goodfriend and King review 2016, Svierges Riksbank Economic Review 2017.
	European Central Bank		1 broad-scope review	ECB self-assessment in 2012.
	Swiss National Bank			
	US Federal Reserve	Annual	4 annual reviews	
	Bank of Japan		1 broad-scope review, 1 component review.	2012 review of inflation target, 2016 comprehensive assessment.

into ‘broad-scope’, ‘component review’ and annual reviews.[25] In theory, the presence of an annual review will give a regular opportunity to assess any component of the framework to any particular depth.

Table 11 also shows that the central banks that have an objective to review their framework have undertaken a greater number of public reviews, including deeper broad-scope or component reviews, with the exception of Norges Bank and Riksbank. These reviews may result in recommendations to change the frameworks, but such recommendations or their implementation cannot be assumed. In practice, central banks perform self-assessments but these do not tend to be published.

Revisions to frameworks

All of the banks have continued to express a commitment to inflation targeting and most banks have made improvements or revisions to their frameworks since they were implemented. These revisions refer to either updated or additional wording in formal framework documents, or a documented change to an informal framework.

Table 12 depicts the number of revisions that have been made to each of the five components within the frameworks.[26] We have not included a comparison of revisions to peripheral components of the frameworks or to primary legislations as there do not appear to have been any significant changes to primary legislations.

25 ‘Broad-scope’ refers to reviews that cover a range of elements in an inflation-targeting framework; these tend to be one-off reviews and are published. ‘Component’ refers to a review of one element or more (but not all) of the inflation-targeting framework, these also tend to be one-off reviews and published. An ‘annual’ review is one that occurs regularly but the terms of references or findings are not always published.

26 These changes do not necessarily equal the number of new document versions (for those banks that have written frameworks) as several changes may have been made within each new version. A detailed list of revisions can be found in the appendix.

The revisions made by the BoE, the BoC and BoJ noted in table 12 can be linked to recommendations from a published review. For example, the BoE’s *Remit* was revised in 2015 to reflect transparency recommendations from the Warsh Review[27] and in 2013 to reflect a recommendation from an HM Treasury review that the bank should clarify the trade-offs in setting monetary policy with respect to financial stability. HM Treasury also changed the BoE’s *Remit* in 2003 to allow an inflation target of 2 percent measured by the CPI. This was not linked to a separate review but a detailed explanation was provided with the revision.

Similarly, the BoC’s *Renewal of the Inflation-Control Target Background Information (2011)* clarified the financial stability considerations in the BoC’s framework, and was an output of the 2011 broad-scope review. The update on financial stability considerations in the 2016 framework was also an output of the 2016 broad-scope review. Likewise an earlier change to the definition of the medium term was an outcome of the 2006 broad-scope review. In 1993 the BoC added the tolerance band as part of its transition to fully fledged inflation targeting.

The Bank of Japan announced two reviews of its inflation-targeting framework: a comprehensive review in 2012 and a review focused on policy effects in 2016. Both reviews resulted in a change to the definition of the bank’s inflation target.[28]

The revisions to the remaining inflation-targeting frameworks cannot always be traced to published review recommendations detailed in table 11. These revisions are likely based on internal reviews and analysis. In addition, the presence of these revisions to inflation-targeting frameworks

27 Warsh (2014).

28 Bank of Japan (2016)

Table 12
Revisions to inflation-targeting frameworks

		Revisions to inflation-targeting frameworks				
		Target definition including measurement	Secondary considerations	Communication of monetary policy	Assessment of inflation-targeting performance	Review of inflation-targeting framework
Formal framework	Reserve Bank of New Zealand	7	3	2	4	2
	Bank of England	1	1	2		
	Norges Bank					
	Bank of Canada	1	2		1	
	Reserve Bank of Australia	6	2	4	3	
Informal frameworks	Riksbank	1	1		1	
	European Central Bank	1				
	Swiss National Bank					
	US Federal Reserve	1				
	Bank of Japan	2				

demonstrates the central banks' commitment to improving their inflation-targeting frameworks. For example, the RBNZ has made a number of revisions to its *PTA* upon the appointment of new Governors starting from 1990 through to 2012, and there have been two published broad-scope reviews of the framework: the Svensson 2000 review and FEC 2007 inquiry. The Riksbank is currently conducting a parliamentary review that may implement recommendations from the 2016 Goodfriend and King review.[29] In addition, the RBA has made a number of changes to its frameworks although it has not published a formal framework review. Meanwhile, Norges Bank has not made any changes to its framework (the *Regulation on Monetary Policy, 2001*) despite a number of recommendations from Norges Bank Watch.

7 Conclusion

Comparing the inflation-targeting frameworks across advanced-economy central banks reveals that while the formal frameworks can differ greatly, the operation of inflation targeting is similar across banks. In practice, there is a great deal of consistency among the central banks inflation-target setting, monetary policy communications, and performance assessment. However, there is more variability in the financial stability considerations central banks take into account when setting monetary policy, and how the inflation-targeting frameworks are reviewed and revised.

29 http://www.riksbank.se/en/Press-and-published/Notices/2016/Riksbank-welcomes-Committee-on-Finances-review-of-monetary-policy/

References

Bernanke, B, T Laubach, F Mishkin and A Posen (1999) 'Inflation Targeting – Lessons from the International Experience', *Princeton University Press.*

Bank of Japan (2016) 'Comprehensive assessment: Developments in Economic Activity and Prices as well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE)'.

Caruana, J (2016) 'Monetary policy for financial stability', speech to 52nd SEACEN Governor's conference, Myanmar, 26 November.

Castelnuovo, E, Nicoletti-Altimari S and D Rodriguez-Palenzuela (2003) 'Definition of price stability, range and point inflation targets: the anchoring of long-term inflation expectations', *ECB Working Paper Series*, (No. 273).

Debelle, G (2009) 'The Australian experience with inflation targeting' speech to Banco Central do Brasil XI annual seminar on inflation targeting, Rio de Janeiro, 15 May.

Debelle, G and G Stevens (1995) 'Monetary policy goals for inflation in Australia', *Discussion Paper 9503,* Reserve Bank of Australia

Eichengreen, B and N Dincer (2014) 'Central Bank Transparency and Independence: Updates and New Measures'. *International Journal of Central Banking*, *10*(1), pp 189-259.

Fay, R and H Kristina (2016) ‘Monetary policy frameworks: Recent international developments’. *Bank of Canada Review*, Spring 2016.

Ford, D, E Kendall and A Richardson (2015) ‘Evaluating monetary policy’, Reserve Bank of New Zealand *Bulletin 2015/11*,

Goodfriend, M and M King (2016) ‘Review of the Riksbank’s Monetary Policy 2010 – 2015’.

Hammond, G (2012) ‘State of the art inflation targeting – 2012’, *Centre for Central Banking Studies Handbook – No 29*

Hargreaves, D (2002) ‘The implications of modified inflation targets for the behaviour of inflation’, *The policy targets agreement: Reserve Bank briefing note and related* articles.

HM Treasury (2013) ‘Review of the monetary policy framework’.

Ingves, S (2011) ‘Flexible inflation targeting in theory and practice’, speech to the Swedish Economics Association, Stockholm.

Kamber, G, I Karagedikli and C Smith (2015) ‘Applying an Inflation-Targeting Lens to Macroprudential Policy ‘Institutions’’, *Journal of Central Banking*, 11 (4), pp 395-429.

Lane, T (2016) ‘Monetary policy and financial stability – looking for the right tools’, speech to HEC Montreal.

Little, J and R Romano (2009) ‘Inflation targeting – central bank practice overseas’, *Public policy briefs*, Federal Reserve Bank of Boston.

Lowe, P (2016) ‘Monetary policy framework, recent economic developments and Reserve Bank of Australia’s major projects’, speech to the House of Representatives Standing Committee on Economics, Sydney, 22 September.

Orphanides, A and V Wieland (1999) ‘Inflation zone targeting’, *ECB Working Paper Series*, (No. 8).

Roger, S (2009) ‘Inflation targeting at 20: achievements and challenges’, *IMF Working Paper.*

Schnabel, I (2016) ‘What is the role for central banks in safeguarding financial stability?’ *Sveriges Riksbank Economic Review.*

Svensson, L (1999) ‘Inflation targeting: Some extensions’. *Scandinavian Journal of Economics* 101(3), pp 337–361.

Warsh, K (2014) ‘Transparency and the Bank of England’s Monetary Policy Committee’. December 2014.

Wood, A and M Reddell (2014) ‘Documenting the goals for monetary policy: some cross-country comparisons, *Reserve Bank of New Zealand Bulletin* 2014/10

Appendix

A Primary legislation stating monetary policy powers

Reserve Bank of New Zealand	Reserve Bank of New Zealand Act (1989)
Bank of England	Bank of England Act (1998)
Norges Bank	The Norges Bank Act (1985)
Bank of Canada	Bank of Canada Act (1934)
Reserve Bank of Australia	Reserve Bank Act (1959)
Riksbank	The Sveriges Riksbank Act (1988)
European Central Bank	European Union Treaty (1992)
Swiss National Bank	National Bank Act (2003) Federal Constitution (1999)
US Federal Reserve	Federal Reserve Act (1913)
Bank of Japan	Bank of Japan Act (1882)

B Documents outlining inflation-targeting frameworks

Framework dates refer to the current document edition.

Formal frameworks	**Reserve Bank of New Zealand**	Policy Targets Agreement (2012).
	Bank of England	Remit for the Monetary Policy Committee (2017).
	Norges Bank	Regulation on Monetary Policy (2001).
	Bank of Canada	Joint Statement of the Government of Canada and the Bank of Canada on the Renewal of the Inflation-Control Target (2016). Letter from the Governor to the Minister of Finance regarding the Renewal of the Inflation-Control Target (2016). Renewal of the Inflation-Control Target - Background Information - October 2016.
	Reserve Bank of Australia	Statement on the Conduct of Monetary Policy (2016).
Informal frameworks	**Riksbank**	Monetary Policy in Sweden (2010).
	European Central Bank	The Monetary Policy of the ECB, 2011.
	Swiss National Bank	Statement on the web page ‘Monetary policy strategy’.
	US Federal Reserve	Statement on longer-run goals and monetary policy strategy (2016).
	Bank of Japan	The ‘price stability target’ under the framework for the Conduct of Monetary Policy (2013).

C Detailed list of revisions to inflation-targeting frameworks

Reserve Bank of New Zealand

Target definition including measurement.

1990 December: Defined the target as 0-2 percent, and added in further measurement specifications.

1992: Added that the target measure was 'All Groups CPI', and removed the requirement to calculate HAPI index.

1996: Widened the target band to 0-3 percent.

1997: Specified the target would be measured by CPIX.

1999: Specified the target would be measured as Statistics NZ 'All groups CPI' due to changes in Statistics NZ measurement of CPI.

2002: Changed the target from annual inflation between 0-3 percent to 'future CPI inflation outcomes between 1-3 percent on average over the medium term'.

2012: Added 'a focus on keeping future inflation near the 2 percent target midpoint'.

Secondary considerations.

1990 December: Removed additional consideration for financial system. Recognised a need to look through shocks.

1999: Added the bank shall 'seek to avoid unnecessary instability in output, interest rates, and the exchange rate.'

2012: Explicitly mentioned asset prices to be monitored. Added 'have regard to the efficiency and soundness of the financial system'.

Communication of monetary policy.

1990 December: Added that each Monetary Policy Committee (MPC) should state how the bank will maintain price stability over the succeeding five years.

1992: Removed requirement to publish projected path for inflation.

Assessment of inflation-targeting performance.

1990 December: Removed requirement to notify minister if there is a divergence of 0.5 percentage points between CPI and the bank's measure of CPI. Added that 'bank shall implement monetary policy in a sustainable, consistent and transparent manner'.

1997: New wording regarding implementation and accountability clarifying the bank is responsible for the implementation of monetary policy and accountable for judgements and actions taken.

1999: Removed clause requiring the bank to constantly and diligently strive to meet the policy target.

Review of inflation-targeting framework.

1990 December:
Added general conditions for renegotiation of target.

1997: Removed section on renegotiating of the targets.

Other.

1992: Wording changes to reflect achievement of price stability.

1996: Added explanation of why the bank shall maintain price stability.

1997: Wording changes including adding in the Governor's term expiration.

1999: Added a statement of the Government's economic policy objective.

2008: Updated the statement of Government policies.

Bank of England

Target definition including measurement.

2003: Changed the target from 2.5 percent RPI to 2 percent CPI.

Secondary considerations.

2013: Made wording changes to clarify the trade-offs in setting monetary policy noting the establishment of the Financial Policy Committee (FPC) and the need for the MPC and FPC to have regard for one another.

Communication of monetary policy.

2015 January: Changed the timing in the Statement 'to ensure that if inflation moved from target by more than 1 percentage point the open letter would be published alongside the first routine publication after the meeting of the Committee that follows the release of CPI data.'

2015 February:
The Government announced an intention for new bill to increase the bank's transparency.

Bank of Canada

Target definition including measurement.

The Inflation-control target has been extended six times since 1991, in 1993 (for period 1995-1998), 1998, 2001, 2006, 2011, 2016 to the end of 2021

2006: Medium term defined as 6 to 8 quarters.

Secondary considerations.

2011: Clarified financial stability considerations.

2016: Updated the clarification on financial stability considerations.

Assessment of inflation-targeting performance.

1993: Added a 1 – 3 percent tolerance band.

Reserve Bank of Australia

Target definition including measurement.

2003: Target measure changed from underlying inflation to consumer price inflation.

2006: Defined the cycle as the business cycle.

2007: Removed 'business' from cycle definition.

2016: Added 'stable' to the statement that both the RBA and Government agree on the importance of low and stable inflation. Removed 'over the cycle' replaced with 'over time'. Added in 'effective management of inflation to provide greater certainty and guide expectations'.

Secondary considerations.

2010: Added in financial stability section to clarify the bank's financial stability role.

2016: Added 'the medium-term focus provides the flexibility for the Reserve Bank to set its policy so as best to achieve its broad objectives, including financial stability'.

Communication of monetary policy.

2003: Refined reporting wording from biannual MPS to quarterly and added in public addresses and a monthly statistical bulletin.

2007: Removed 'statistical' from the monthly bulletins. Added that the Bank will release statement explaining each monetary policy decision after the fact, along with minutes. Added that the scope of economic forecasts in the quarterly statements would be increased to enhance public understanding.

Assessment of inflation-targeting performance.

2007: Removed statement that the Government and Bank recognise outcomes and not the arrangements underpinning them to ultimately measure the quality of the conduct of monetary policy.

2013: Added a section stating the Government reserved right to comment on monetary policy from time to time.

2016: Added 'the 2-3 percent medium-term goal provides a clearly identifiable performance benchmark over time.'

Other.

2003: Stated the Governor is the chair of the Board.

2007: Added independence initiatives regarding statutory independence of Governor and Deputy Governor, along with a register of eminent candidates from which the Treasurer makes new appointments to the Board.

2010: Modified the wording on independence [the Government] 'will respect the Reserve Bank's independence as provided by statute.'

2013: Changed independence wording to 'the Government recognises and will continue to respect the Reserve Bank's independence as provided by the Act'. Refined some wording to 'reflect core understanding'. Added in the Governor's commitment to low inflation and the Government's endorsement of low inflation.

Riksbank

Target definition including measurement.

2006: Published repo rate forecasts.

Secondary considerations.

2012: Financial stability regard became a prominent factor.

Assessment of inflation-targeting performance.

2010: Removed 1 percentage point tolerance band.

Note: The Riksbank 2017 parliamentary review may evaluate whether to re-introduce a 1 percentage point tolerance band and change the measure of the inflation target from CPI to CPIF or HCPI.

European Central Bank

Target definition including measurement.

2002: Defined the inflation target as 'below, but close to 2 percent over the medium term.'

US Federal Reserve

Target definition including measurement.

2012: Published the *Statement on Longer-run Goals and Monetary Policy strategy* which explicitly communicated a 2 percent target.

Assessment of inflation-targeting performance.

2015: Announced the target was symmetric: 'Committee would be concerned if inflation were running persistently above or below its 2 percent objective'.

Bank of Japan

Target definition including measurement.

2013: Previously, the 'price stability goal in the medium to long term' was in a positive range of 2 percent or lower in terms of the year-on-year rate of change in the CPI and the BoJ set a goal at 1 percent for the time being. It then replaced a 'goal' with a 'target' and setting it at 2 percent in terms of the year-on-year rate of change in the CPI.

2016: Introduced an 'inflation-overshooting commitment'.