Bank of Israel

Inflation Targeting Revisited

August 2007

Contents

1. SUMMARY OF RECOMMENDATIONS AND MAIN POINTS

Israel's inflation environment has changed drastically in the last twenty years, falling from a level of about 20 percent to price stability, the norm in the advanced economies. This occurred together with a switch from a monetary policy based on the exchange rate as a nominal anchor to an inflation targeting regime in a floating exchange rate environment. Inflation targeting regimes are gaining popularity world wide. The number of countries operating their monetary policy in the framework of an inflation targeting policy has been rising in the last fifteen years, and has now reached twenty-four, and international organizations such as the IMF advise other countries to adopt this regime too. With the realization that high inflation harms economic growth, and that price stability is a necessary condition for continuous growth and low unemployment, there is a growing consensus that an inflation targeting regime is the right and most practical way of achieving those objectives. A credible inflation target provides an anchor for medium- and long-term inflation expectations, thereby making it easier for the business sector to function properly, boosting its growth, and allowing for more effective management of monetary policy.

At present, after several years of price stability under an inflation targeting regime, the time has come to re-examine the rules defining the regime in Israel. This paper incorporates a short review of inflation and inflation targeting in Israel, a description of other countries' experience of inflation targeting regimes, and a discussion of and recommendations regarding the desired operative system for the inflation target.

Experience of inflation targeting in Israel and abroad:
- The first time an inflation target was set in Israel was in 1992. In the years since then, there has been less than complete success in achieving the target. Since 2003, inflation—in terms of change in the consumer price index (CPI) over the previous twelve months—has deviated from the target 75 percent of the time, and 75 percent of the deviations consisted of inflation undershooting the target. This is higher than the norm in other countries, and can be attributed in part to the high volatility of the exchange rate of the shekel and its rapid pass-through to prices.
- Many countries set an inflation target in order to achieve or maintain price stability, but their definitions of the target vary with regard to its level, the width of its range, and the aggregate used as the measure. Nevertheless, in most the target is defined in the area of 2 percent or 3 percent, with a range of ±1 percentage point, and it is measured over the previous twelve months.
- In most countries the target is defined in terms of the general (i.e., all-items) consumer price index. Some countries have moved from a target based on a partial index to an overall index; most countries incorporate the housing index in their consumer price indices.

The conclusions may be summarized as follows:
- The inflation target should continue to be defined in terms of the CPI. This index is published monthly with a half-month lag by the Central Bureau of Statistics, and is not adjusted retroactively. This index has the advantage that the public is

familiar with it, and it is accepted world wide. We recommend that the inflation target should continue to be set in terms of the general price index, and not a core index. Reducing volatility of the index by switching to a partial price index ought to improve the ability of monetary policy to achieve the inflation target with lower volatility of the interest rate. However, we found that the use of partial indices, i.e., indices that exclude the volatile components such as fruit and vegetables, does not reduce volatility and generally creates a bias relative to the general index. It is preferable not to use various statistical devices, such as filters, because they are complex, involve discretion, and are difficult to explain to the public, and therefore less credible. Over and above these considerations, since the inflation target in Israel has already been defined in terms of the CPI, which is widely used in contracts and agreements, changing the definition would incur a cost, and could harm its credibility.

- The midpoint of the target range should be kept at 2 percent. Most countries with an inflation target adopted a low, positive target of 2 percent to 3 percent, in part to avoid the problematic nature of zero inflation. As Israel's current target is consistent with the above, there is no need to change it.

- The width of the range should remain two percentage points, similar to that in many other countries, i.e., the target range should stay at 1 percent to 3 percent inflation a year. Choosing a range rather than a single-point target emphasizes the fact that it is not possible to achieve an exact rate of inflation. The wider the target range, the easier it is to achieve an inflation rate within it, and this affords greater flexibility in conducting monetary policy, and in particular allows more attention to be paid to the secondary targets. On the other hand, a wide range impairs the credibility of the target as defining stability. As the Bank's inflation targeting policy enjoys credibility, narrowing the range would reduce its flexibility without significantly improving the credibility. Despite the fact that the volatility of price changes in Israel is relatively high, so that deviations from the target are almost inevitable, widening the inflation target range could be interpreted as lessening the commitment to price stability.

- The target should be set as price stability at any point in time, as it is defined at present. The test of performance vis-à-vis the target should be a continuous one, i.e., performed on a monthly basis, with inflation measured over the previous twelve months.

- The Bank of Israel should be permitted to exercise flexibility with regard to the rate of convergence to the target, i.e., when shocks lead to a deviation of inflation from the target, the return to the range should be gradual, without the need to invoke a stringent monetary policy to achieve a speedy result.[1] It is known that the transmission mechanism from monetary policy to the rate of inflation does not operate immediately, but spreads over a period that can be up to two years, or even longer. Shocks affecting the rate of inflation in the short term do sometimes occur, but reacting with sharp changes in the interest rate may undermine stability in the financial markets and harm economic growth; hence, the horizon for the

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[1] In a few of the countries that adopted inflation targeting, the practice is to measure performance against the target over the medium term, i.e., two to three years, to avoid sharp fluctuations in the interest rate in reaction to short-term shocks.

return of inflation to the target after such a shock should be one or two years, or even longer if necessary.

- To enable the performance vis-à-vis the target to be monitored on a continuous basis, we recommend that the Bank publish a quarterly inflation report, in which it will report on how well it has achieved the target and on deviations from it. If actual inflation deviates from the target in six consecutive months, the report should include an analysis of the reasons for the deviations, a description of the policy adopted and the expected time needed to bring inflation back to within the target range.[2] Three times a year, in April, July and October, the report will be concise and will describe the developments in inflation, the achievement of the target and the expected path of inflation. Soon after the end of the year, in January, the report will be more extensive, and will include an analysis of inflation, monetary policy, the background conditions, and in particular the macroeconomic environment.

2. THE BACKGROUND

a. Inflation and inflation targets in Israel

The rate of inflation in Israel fell from about 20 percent after the Economic Stabilization Plan of 1985 to price stability in the last few years. The slowing of the rate of inflation started in 1992 with the introduction of falling inflation targets, the gradual abandonment of the exchange rate as a nominal policy anchor, and the switch to a policy based entirely on inflation targeting and the interest rate as a monetary instrument in a floating exchange rate regime.

Up to the early 1990s the rate of exchange had served as the major nominal anchor of monetary policy in influencing the inflation environment. When it was necessary to determine the slope of the crawling exchange rate band for 1992, it was estimated that inflation in that year would be no more than 14 percent to 15 percent. That was in fact how the first inflation target was set. In the first half of the 1990s the weight of the exchange rate as an anchor of monetary policy declined, until mid-1997, when the exchange rate band was widened significantly and the exchange rate regime in effect became a floating rate one. Since 1997 monetary policy has been conducted in an inflation targeting regime in a floating exchange rate environment, and the main policy instrument is the interest rate set by the Bank of Israel.

In August 2000 the government decided on a downward path for inflation targets, at the end of which, from 2003, the target for inflation would be defined as continuous price stability, with a 1–3 percent rate of inflation at any time, as opposed to the calendar year target used till then. In June 2005 the exchange rate band was abolished, and the shekel floated freely.

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[2] In a few countries (including the UK and Iceland) the report on a deviation from the target takes the form of an open letter from the governor to the government. In some countries (Canada, Sweden, New Zealand) the report is included in the regular reports, and in others (including Australia, the Czech Republic and Norway) there are no rules concerning reports on deviations from the target.

Table 1
Inflation Targets and Actual Inflation, 1992–2006

	Target	Actual inflation	Deviation (from nearest limit)
1992	14–15	9.4	-4.6
1993	10	11.2	+1.2
1994	8	14.5	+6.5
1995	8–11	8.1	√
1996	8–10	10.6	+0.6
1997	7–10	7.0	√
1998	7–10	8.6	√
1999	4	1.3	-2.7
2000	3-4	0.0	-3.0
2001	2.5–3.5	1.4	-1.1
2002	2–3	6.5	+3.5
From 2003	1–3	1.0*	-0.9**

* Average inflation over the previous twelve months, starting from January 2003.
** Average deviation of inflation in the previous twelve months from the nearest limit, in the months when there was a deviation. The largest deviation from the upper limit was 2.5 percent, in January 2003. The largest deviation from the lower limit was 3.7 percent, in March 2004.

Table 1 shows the inflation targets since 1992. The definition of the target, which started as a by-product of the setting of the slope of the exchange rate band, was changed in the course of time. In some years the target was a point target, and in others it was a range with a width of between one and two percentage points. Setting gradually declining inflation targets was part of the disinflation process, and was based in part on an opportunistic approach. In other words, the decline in actual inflation, rather than the target set for any particular year, was used for a further reduction of the target the following year. This happened at the beginning of the process when the target for 1993 was set, and in setting the target for 1999.[3] The table shows that if we look at the end of the calendar years, in line with the way the target was set from 1992 to 2002, the inflation target was achieved in only three of those eleven years. In four years actual inflation undershot the target, and in four years it overshot it. Since 2003 the target has been defined in terms of inflation "at any time," so that actual inflation should be viewed against the target on a continuous basis. On average, actual inflation has been close to the lower limit of the target, and the average deviation has been 0.9 percentage points below it. In eight of the forty-seven months in this period (January 2003 to November 2006) inflation was above the upper limit of the target, and below the lower limit twenty-six times.

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[3] The rate of inflation in most of 1998 was around 5 percent, and it was only at the end of the year, following a sharp rise in the exchange rate, that it surged to about 8 percent.

Figure 1
Inflation Targets and Inflation over the Previous 12 Months, 1988–2006
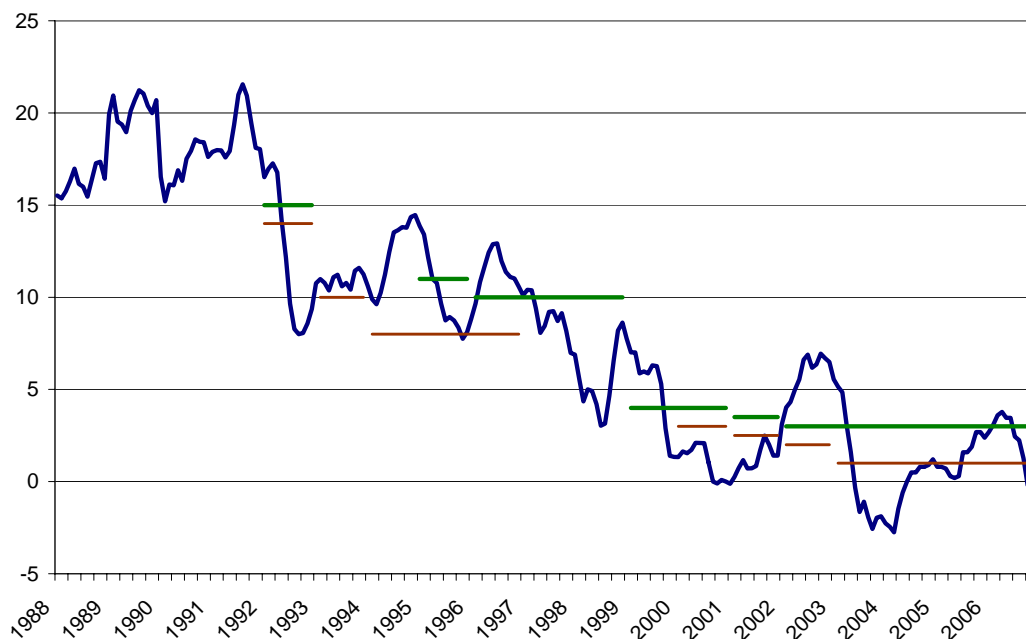**(percent)**

Figure 1 shows inflation since 1988. The stepped reduction of inflation can be seen, and in particular the high volatility in the rate of price increases throughout the period, despite the significant slowdown in inflation.

b. Inflation targeting throughout the world, and an international comparison
In the course of the last ten years many countries adopted and implemented an inflation targeting framework. In rethinking Israel's inflation targeting framework it is important therefore to review other countries' experience in this area. This section presents an international comparison of inflation targeting regimes. Our sample consisted of a total of twenty-two advanced[4] and emerging[5] economies; some of the statistics are taken from Roger and Stone (2005) and Heenan et al. (2006).[6]

Parameters of the inflation target
A numerical target: Most countries, among them the UK, the Czech Republic, and Sweden, set a point inflation target, but they also define a symmetrical range around the target (generally ±1 percentage point) within which inflation may deviate from the point target without obliging the central bank to take explanatory steps. Other countries (among them Israel, New Zealand, South Africa, and Thailand), define the

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[4] Australia, Canada, Finland, Iceland, Israel, Korea, New Zealand, Norway, Spain, Switzerland, and the UK.
[5] Brazil, Chile, Colombia, the Czech Republic, Hungary, Mexico, Peru, the Philippines, Poland, South Africa and Thailand.
[6] Scott Roger and Mark Stone. 2005. "On Target? The International Experience with Achieving Inflation Targets," WP/05/163, IMF Working Paper Series. Geoffrey Heenan, Marcel Peter, and Scott Roger. 2006. "Implementing Inflation Targeting: Institutional Arrangements, Target Design, and Communications," WP/06/278, IMF Working Paper Series.

target in terms of a range. In any event, despite the fact that most countries adopted a point inflation target, in practice it is a range with regard to deviations from it (see Table 2). The UK's experience with inflation targeting is an interesting case: initially the target was defined by a range, but after several years it was changed into a point target. For a broader discussion, see Appendix 2.

The width of the range: Most countries define a range with a width of two percentage points, and the midpoint (or the point target) is usually between 1 percent and 3 percent (see Figure 2). There seems to be no correlation between the width of the range and the volatility of inflation. Most countries whose inflation has a higher standard deviation than Israel's, have an inflation target range with an average width of two percentage points.[7]

Figure 2
Inflation Targets, Selected Countries
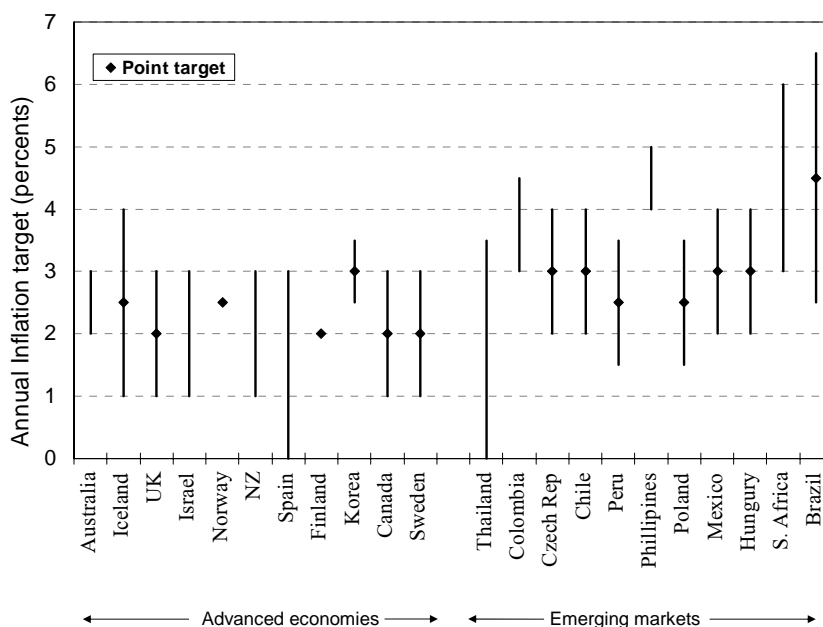
The target index: Most countries define the target in terms of the percentage change in the CPI. Some (Australia, the Czech Republic, Korea, New Zealand and the UK) switched from one index to another while conducting inflation targeting policies. In some instances this was done in the light of a change in the definition of the general price index, particularly the exclusion of the interest component from the general index (the case with Australia and New Zealand). Australia, the Czech Republic, and New Zealand explained that using a partial index confused the public. The Bank of England makes the point that there is a global consensus that the most relevant and precise index for measuring inflation is the general price index. For a fuller discussion see Appendix 3.

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[7] However, most of those countries have a point inflation target or range whose midpoint is slightly higher than Israel's.

Defining the target: Most countries define the inflation target in terms of the rate of change of the target index over the previous twelve months; furthermore, in most countries the target is continuous (as opposed to being measured only at the end of the calendar year).

Figure 3
Standard Deviation of Monthly Inflation, Advanced Economies vis-à-vis Emerging Markets

Iceland ■ Israel ■ Norway □ Sweden ■ United Kingdom □ Canada □ United States

Czech Republic ■ Poland ■ Israel □ Mexico □ South Africa ■ Chile

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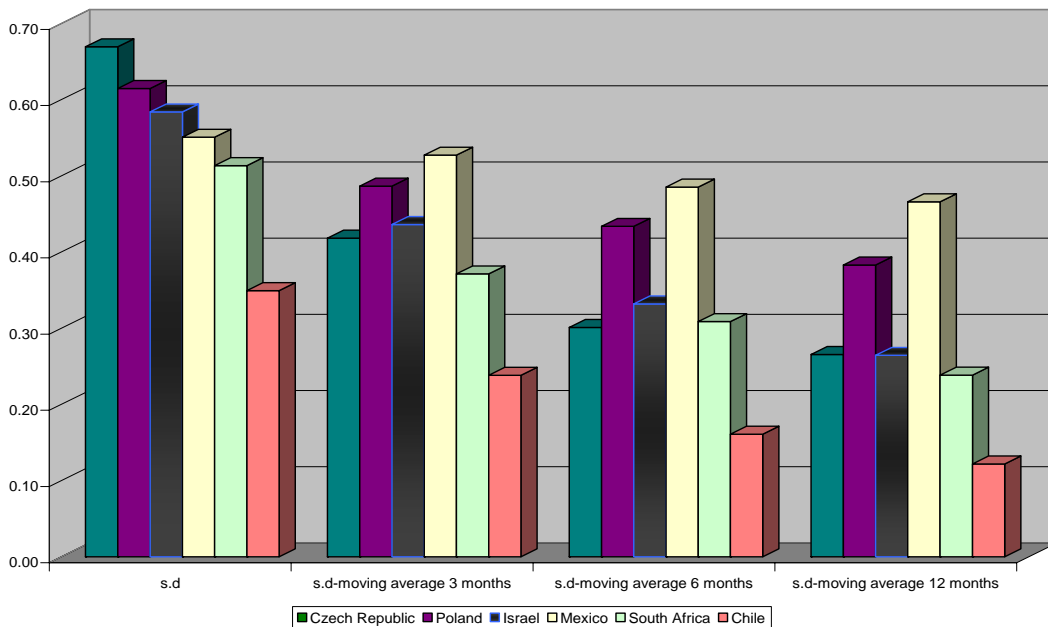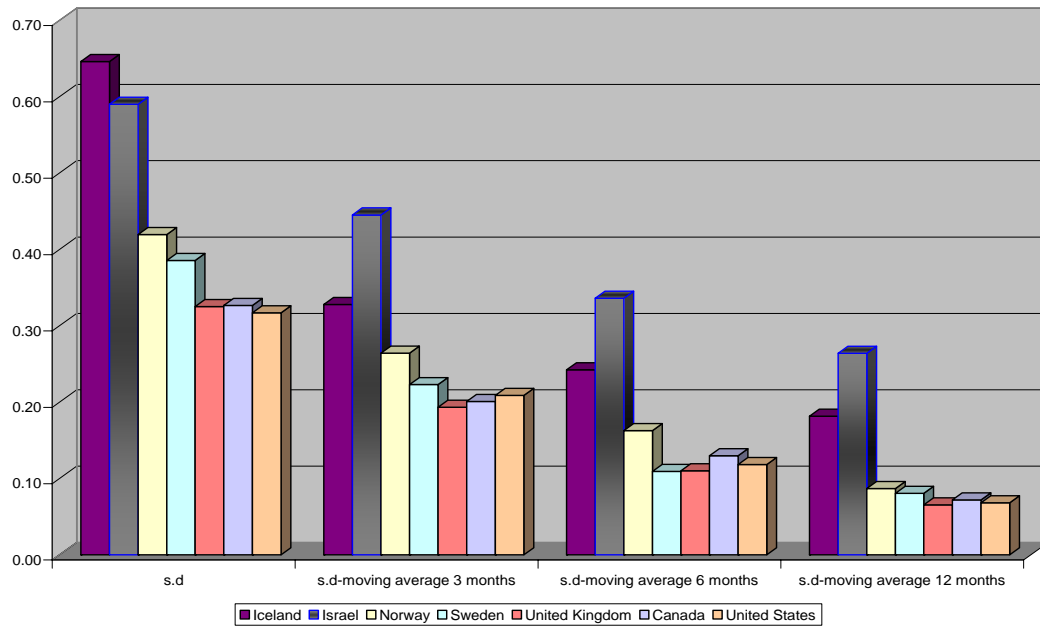
Volatility of inflation: The standard deviation (s.d.) of Israel's monthly inflation since 1997 (0.58) is higher than that of the advanced economies[8] (0.46), and similar to that of the emerging economies (0.54). This result holds also for inflation measured quarterly, half-yearly, and yearly,[9] see Figure 3. Similar results were obtained when the s.d. was calculated for the period from 1992 and 1994. If the s.d. is calculated for each country from the time it adopted a full-fledged inflation targeting framework, Israel's is one of the highest, while only Australia and Iceland have higher ones. This result does not hold if the comparison is made for different frequencies of measurement.

Deviations from the target: Israel deviates from the inflation target more frequently than do other countries: since 1997 it has deviated about 80 percent of the time. However, deviations from the target are not unusual from the international perspective—most countries tend to deviate (more or less frequently) from their inflation targets. Emerging markets miss the target, on average, 52 percent of the time, and advanced economies 35 percent of the time. The period of time until they revert to the target is also important. Roger and Stone (2005) found that deviations last, on average, 8.2 months in the advanced economies and for emerging markets the average was very close, 8.3 months; Israel's case is not different.[10] Regarding deviations when inflation exceeded the upper limit of the target, the average length of deviations in Israel, 6.6 months, is below the average of the advanced economies (7.3 months), but close to the average of the emerging markets (6.8 months). This means that the length of deviations when Israel's inflation was below the lower limit of the target range, 9.14 months, is higher than that of the advanced economies (8.8 months) and slightly lower than the average of the emerging markets (9.7 months).

Reporting cases of deviation: If inflation deviates from the target range or is outside the symmetrical margins around the point target, most central banks must explain to the government and the public what caused the deviation, the steps taken to bring inflation back to the target range, and an estimate of the time required to achieve this. The rules regarding the report vary: in some cases (e.g., the UK and Iceland) the central bank must report immediately after the publication of the index, and in others (such as Canada and Sweden) the report is incorporated in the periodic inflation reports submitted by the central bank. In most countries the report relates to past deviations, but in New Zealand the inflation report also includes reference to a future expected deviation from the target, if any. It appears that there are no clear rules regarding follow-up reports in cases where the deviation persists (see Appendix 4, Table 1). We found that only the UK has a clear definition covering a follow-up

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[8] Only in Australia and Iceland is the standard deviation higher than that in Israel.

[9] It is important to note that some of the countries were in the midst of a disinflation process for at least part of the period reviewed, a process generally accompanied by a relatively high standard deviation.

[10] It is important to note that since 1997 Israel has had several different inflation targets, and each time the target changed, the deviation from it, even if it was a continuation of the deviation from the previous target, was counted as a new deviation. If we ignore that aspect, Israel's deviations from the target lasted on average 11 months. Furthermore, if we relate to the deviations in 2004 and 2005 as one deviation (in this period there was one month when inflation was 1.2 percent), then the average length of Israel's deviations is 12.2 months.

report (in the form of an open letter to the Chancellor of the Exchequer), to be sent three months later. A considerable number of countries have no clearly defined formal reporting rules (in the form of regulations or directives dealing with inflation targets) covering instances of deviations (see Appendix 4, Table 3).

It appears that in all countries deviation from the inflation target are reported in the periodic inflation reports, which in most countries are published quarterly. In Israel the Inflation Report is published biannually. The practice followed in Canada and Hungary is interesting: a full inflation report is published biannually, with briefer quarterly updates published in the intervening quarters (see Appendix 4).

The composition of the CPI: The composition of the CPI follows a similar pattern in most countries. Particularly, we checked whether owner-occupied housing is included in the CPI index. In Israel this component is weighted at 16 percent of the general price index, and is calculated by the equivalent rent prices. Brazil and the UK seem to be among the very few countries that do not incorporate this component in the CPI. In Australia and New Zealand prices of owner-occupied housing are calculated using the purchase price of new apartments, while in Iceland and Norway, for example, this component is calculated using the equivalent rent prices.

Table 2
Parameters of Inflation Targets—A Summary
(see below for definitions)

Country	Date inflation targeting adopted,[a] (annual inflation rate at that time)	Price index used for target	Point inflation target (%)	Inflation target range (%)	Standard deviation since adoption of target (and since 1997)
Australia	April 1993 (3)	From end–1998, CPI; till then–underlying inflation	N/a	2-3	0.60 (0.65)
Brazil	June 1999 (3.3)	CPIA (broad)	4.5 (2006); target set for calendar year	1999-2002, ±2; 2003-05, ±2.5 ; 2006, ±2	0.50 (0.49)
Canada	Feb 1991 (6.2)	CPI	2	1–3	0.29 (0.33)
Chile	Sep 1999 (2.9)	CPI	3	2–4	0.36 (0.35)
Colombia	Sep 1999 (9.3)	CPI	2006, 4.5; long term, 3	4–5 (2006) 3–4.5 (2007)	0.46 (0.68)
Czech Republic	Jan 1998 (13.11)[d]	From 2001–CPI; till then–net inflation	3	From 2000, ±1 till then, ±0.5	0.48 (0.67)
Finland	Feb 1993–Dec 1998 (2.7)	CPI	Close to 2 in 1995	N/a	0.22 (0.32)

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Country	Date inflation targeting adopted,[a] (annual inflation rate at that time)	Price index used for target	Point inflation target (%)	Inflation target range (%)	Standard deviation since adoption of target (and since 1997)
Hungary	Jun 2001 (10.5)	CPI	3 (2007)	±1	0.51 (0.70)
Iceland	March 2001 (3.9)	CPI	2.5	From 2003, ±1.5	0.81 (0.66)
Israel	Jun 1997[c] (8.4)	CPI	N/a	1–3	0.58
Korea[e]	Apr 1998 (8.8)	From 2000– core CPI; till then, and since 2007– CPI	From 2007, 3	From 2004, 2.5–3.5; from 2007, ±0.5	0.44 (0.53)
Mexico	Jan 2001 (8.1)	CPI	3	±1	0.30 (0.55)
New Zealand	Mar 1990 (7.9)	From 1999– CPI; till then– CPIX	N/a	From 2002, 1–3; till then, 0–3	0.43 (0.46)
Norway	Mar 2001 (3.7)	CPI	2.5	N/a	0.48 (0.42)
Peru	Jan 2002 (-0.8)	CPI	2.5	±1	0.36 (0.38)
The Philippines	Jan 2003 (3.7)	Average annual CPI	N/a	4–5	0.35 (0.58)
Poland	Oct 1998 (9.9)	CPI	2.5	±1 (from 2002)	0.47 (0.61)
Spain	Jan 1995–Dec 1998 (4.36)	CPI	N/a	0–3 (for 1997)	0.23 (0.40)
South Africa	Feb 2000 (7.2)	CPIX	N/a	3–6	0.50 (0.51)
Sweden	Jan 1993 (4.8)	CPI	2	±1	0.42 (0.39)
Thailand	May 2000 (0.2)	Core CPI; target set according to quarterly average	N/a	0–3.5	0.41 (0.45)
UK[b]	October 1992 (3.84)	From 2004– CPI; till then– RPIX	2, since 2004	±1	0.36 (0.33)

[a] Date when country adopted full-fledged inflation targeting.

[b] Till 1996, a range of 1–4 percent, not a point target.

[c] Israel started declaring inflation targets in 1992, but due to the combination with a narrow exchange rate band, used to manage the exchange rate, was not considered (e.g., by the IMF) as conducting an inflation targeting regime until mid-1997, when the exchange rate band was widened and the Bank of Israel adopted a policy of non-intervention in the foreign currency market.

[d] Calculated from the general price index, as net inflation data are not available.

[e] As recorded in the central bank's website, and E.M. Truman, 2003, *Inflation Targeting in the World Economy*, Institute for International Economics, Washington, DC.

Definitions of terms in the table

CPI	–	Consumer price index
Underlying inflation	–	CPI excluding seasonal components (e.g., fruit and vegetables) and items whose prices are determined outside the domestic economy (such as tobacco products), and excluding changes in the interest rate.
RPIX	–	Retail price index excluding interest on mortgages.
CPIA	–	CPI excluding food items and items under government price control.
CPIX	–	In South Africa: CPI excluding interest on mortgages.
CPIX	–	In New Zealand: CPI excluding credit services.
Net inflation	–	CPI excluding items under government price control (e.g., energy prices and apartment rents).
Core CPI	–	In Korea: CPI excluding oil products and agricultural produce (except for grain).
Core CPI	–	In Thailand: excluding energy and raw foodstuff.

3. THE OPERATIVE FRAMEWORK OF THE INFLATION TARGET: DISCUSSION AND RECOMMENDATIONS

a. Setting the index aggregate to be used as target[11]

In order to implement an inflation targeting regime, the index on which the target will be measured must be chosen. It is desirable that the aggregate chosen to be used for the target inflation yields maximum benefit from the inflation target regime for the purposes of maintaining nominal stability. It is also desirable that the index chosen best reflects the aggregate that is important to the economy and that it is relevant in terms of social welfare. However, as it serves as an instrument of monetary policy, one must also examine the level of influence that the policy instrument has on the chosen index in order to assess the central bank's ability to achieve it, and hence, the credibility that it will enjoy. The level of credibility, transparency and availability of the chosen index is also important, that refers to the ability to simply explain its importance and therefore be known and understood by the public. As inflation targeting is practiced in a large number of countries (see the international review in Chapter 2, section 2), it is also important that the choice of target is acceptable and known in the international arena. Furthermore, as the inflation target in Israel is currently defined in terms of the Consumer Price Index, one must also consider any costs associated with a change in the target definition.

The connection with economic activity: Theoretically, one should aim for a price index that reflects the changes in the levels of prices that are the most informative for the process of making decisions in the economic units of the economy. In the framework of a broader discussion, one could claim that the consumer price index best reflects the changes in consumers' purchasing power but from the point of view of manufacturers, the index of industrial output prices is more relevant, while for an overview of the entire economy, the price indices of the National Accounts better reflect prices of the different sources and uses. Although we could discuss the pros and cons of each of these indices, as the inflation target accepted all over the world is

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[11] Partly based on the article by Rami Amir and Sigal Ribon (1999) "Choice and Formulation of an Inflation Target in Israel: Points Consideration", from *Inflation and Disinflation by Steps in Israel*, edited by Leo Leiderman, Bank of Israel, Research Department.

defined relative to the consumer price index or part of it, we will not widen the discussion on alternative indices here and will instead focus on the choice of the appropriate aggregate from the consumer price index. We will note though that despite the theoretical advantage of the National Account prices, as they are measured quarterly, published after a relatively long delay and often updated retroactively, it is difficult to rely on them as a target for managing an ongoing policy. In contrast, the consumer (and producer) price indices are measured directly every month, are published with a delay of half a month and are not retroactively updated. Furthermore, the consumer price index serves in the Israeli economy as the base of indexation for financial assets and in the labor market. It is widely known and recognized by the public, accepted worldwide for its economic definition, and therefore has the advantage.

Monetary policy's ability to influence: Starting from the viewpoint that achieving the inflation target is the responsibility of the central bank, it is desirable to choose an index that is most sensitive to the instruments at the Bank's disposal. The index chosen as the target must allow the Bank to minimize the loss in its objective function, that is, to minimize any deviations of inflation from the target, and of deviations in activity, in appropriate weights. The inclusion of prices on which monetary policy has negligible influence, and changes which reflect mainly changes in relative prices and not the rate of inflation, forces the Bank, in cases of exceptional developments in these prices, to take extreme action in monetary policy despite the fact that most of the effect will actually be on other items in the index. As a result, certain sectors and activities could be harmed with no significant effect on the problematic prices. In contrast, the inclusion of items in the target index that are less sensitive to the interest rate, will obligate the policy makers (and in particular the government) to take appropriate steps (structural changes, for example) in order to overcome the deviations in the rate of price increases of this item and to meet the set target. An outstanding example of such an item, although its weight in the general price index is relatively small, is the fruit and vegetables item. The source of wide fluctuations in the prices of this item is, as mentioned, the short-term shocks in supply and therefore the ability of monetary policy to influence its behavior is small. One could also consider removing energy prices from the target index as they are mostly set by markets abroad and are independent of monetary policy, though policy could influence the exchange rate which is included in the local price of energy. Furthermore, these goods, apart from their being part of the consumer basket, serve as a factor of production, and therefore the rise in their prices will tend to reduce supply and act to raise prices. A tight monetary policy in response to a rise in energy prices will further increase the effect of the external shock on output instead of acting to moderate it.

We attempted to check whether, ex post, it is possible to distinguish different relationships between the Bank of Israel interest rate and the general price index or various partial indices. Using a simple equation of quarterly changes in prices which was originally specified for the general price index[12] we checked the effect of the

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[12] The equation is part of the Research Department's 'small' quarterly model (used for monthly monetary planning) and which includes the change in the exchange rate in the current period and at a lag of a quarter, the change in prices of imports in dollars, a moving average of the Bank of Israel

Bank of Israel's real interest rate on various indices. The results are summarized in the following table:

Table 3: The effect of the interest rate on various indexes

	Interest rate coefficient	R^2
General price index	-0.138	0.899
CPI excl. fruit and vegetables	-0.181	0.937
CPI excl. housing	-0.169	0.786
CPI excl. fruit and vegetables, clothing and footwear	-0.147	0.911
CPI excl. fruit and vegetables, housing, clothing and footwear, and government controlled prices	-0.274	0.823
CPI excl. energy	-0.104	0.901

In an *ex post* test, affected also by the fact that in practice policy targets the general price index, one can see that the interest rate and other explanatory variables in the equation have a higher explanatory power when the fruits and vegetables and clothing and footwear components are excluded from the index.[13] This is because these items are affected to a great extent by factors exogenous to policy. Despite the energy item being independent of policy, removing it from the CPI does not increase the equation's explanatory ability. Excluding housing from the price aggregate greatly reduces the explanatory ability principally due to the strong relationship between the housing item and the exchange rate. The conclusion from this examination is that in consideration of monetary policy's ability to influence, it would apparently have been desirable to exclude the fruit and vegetable item.

In some cases, components that respond anomalously to monetary policy are omitted from the target index. For example in the past the item of mortgage interest rate payments were omitted from the target index in the UK. (See Chapter 2, section 2). This was because when a tight monetary policy was pursued by raising interest rates, these payments actually rose and contributed to a rise in the index serving as the target. In Israel, housing services are measured through a sample of rental contracts according to certain rules. These prices are influenced to a great extent by changes in the exchange rate due to the practice of setting rental prices in dollars. As the housing item constitutes more than 20 percent of the general price index, changes in the exchange rate have therefore a faster and greater effect on the consumer price index. (See discussion in Appendix 1). Despite this, the pass-through mechanism has no component that is either unreasonable or counter to the expected effect,[14] and therefore due to such considerations the housing index should not be omitted from the target index.

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interest rate discounted for expected inflation in the past three quarters, the unemployment rate at a lag of two quarters and periodic dummy variables. The equation was estimated from the last quarter of 1996 until the last quarter of 2005 (38 quarterly observations).

[13] The interest rate coefficient in the equation describes the direct effect of the interest rate on prices. The interest rate though also affects the exchange rate and activity, which also appear in the equation.

[14] Raising the interest rate is expected to contribute toward an appreciation of the nominal exchange rate and in the short term to act to lower housing prices and to moderate the rise of the general price index.

Transparency, credibility and availability: The index used as the target must be recognized and known to the public and its meaning must be understood by all the players in the market. The consumer price index, as published by the Central Bureau of Statistics, is of this stature. As it is measured and published on a regular monthly basis by the Central Bureau of Statistics, its credibility is in no doubt. As it is an all-item index, no discussion will arise regarding the inclusion or exclusion of any particular item. Furthermore, the general price index serves as a base of indexation for many contracts both in the labor market and in the asset market and therefore is relevant to consumers and producers. The publication of the consumer price index on a fixed date each month allows a continual reference to price developments and the management of a monetary policy based on up-to-date information.

Fluctuations of the target index: Large fluctuations of the target index which reflect a greater probability of missing the target as set could harm credibility. Therefore it could be desirable to omit volatile items in order to reduce the variance of the target index and hence ease the management of monetary policy. There are various methods of discounting the general price index from the background noise that characterize it while maintaining the identical long-term trend of the general price index.

A common, simple and transparent method is that of omitting selected items from the consumer price index and referring instead to a partial index that better reflects the inflationary environment or the core inflation, while reducing volatility.[15] In Israel the focus is primarily on the fruit and vegetables, housing, and clothing and footwear items as well as those goods whose prices are government controlled or regulated. Table 4 shows the average rate of inflation and its standard deviation according to both the consumer price index and its partial indices, split into periods categorized by their different levels of inflation.

The table clearly shows a drop in the inflation environment from rates of about 15-20 percent at the beginning of the 1990s to around 2 percent in recent years. However despite the significant change in the inflation environment, the standard deviation remains at around the same level, that is, the relative volatility has grown considerably. Even when annual inflation is around 2 percent as it has been recently, the annual standard deviation has been more than 2 percent, similar to that of the first period when inflation was almost 20 percent. One can also see from the table that omitting certain items other than housing does not reduce the average volatility of the 12-month consumer price index.[16] The volatility in the fruit and vegetable item and in the clothing and footwear item is largely due to seasonal factors within a year, and therefore these do not appear in the rates of change over 12-month periods.

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[15] Vered Dar of Psagot Ofek recommends moving to an inflation target defined in terms of a core index, without detailing exactly what index she proposes.

[16] In examining also the *monthly* volatility for different partial indices as well as the general price index it was found that the partial indices do not significantly reduce variance (for the period from 7/1999).

Table 4: Average Change in, and Standard Deviation of, the Consumer Price Index and Selected Partial Indices, for different periods (average for past 12 months)

Index (weight, percent)		1/1988 to 6/1992	7/1992 to 11/1997	12/1997 to 6/1999	7/1999 to 11/2006
General price index (100%)	average	0.178	0.105	0.059	0.018
	s.d.	0.020	0.017	0.016	0.024
Excl. fruit and veg. (96.7%)	average	0.183	0.107	0.059	0.019
	s.d.	0.023	0.015	0.015	0.025
Excl. housing (78.4%)	average	0.156	0.091	0.061	0.020
	s.d.	0.019	0.013	0.018	0.019
Excl. fruit and veg., and housing (75.1%)	average	0.159	0.093	0.062	0.021
	s.d.	0.020	0.009	0.016	0.020
Excl. fruit and veg., and clothing and footwear (93.7%)	average	0.193	0.118	0.065	0.021
	s.d.	0.066	0.019	0.016	0.027
Excl. fruit and veg., housing and clothing and footwear (71.9%)	average	0.184	0.104	0.072	0.026
	s.d.	0.024	0.010	0.013	0.022
Excl. fruit and veg., housing, clothing and footwear, and govt. controlled goods (55.6%)	average	0.167	0.099	0.074	0.026
	s.d.	0.022	0.009	0.015	0.023
Excl. energy (91.3%)*	average	0.177	0.105	0.060	0.015
	s.d.	0.021	0.018	0.016	0.023

 * Excluding gasoline from gas stations, heating oil, electricity and gas.

A statistical examination shows that in the period beginning at the end of 1997 there was no significant difference in the average between the general price index (without seasonal adjustment) and the partial indices of the CPI excluding fruit and vegetables, excluding fruit and vegetables and clothing and footwear, excluding housing, excluding fruit and vegetables and housing, or excluding energy. The average of the indices that exclude the three components, fruit and vegetables, clothing and footwear, and housing, is significantly greater than the average for the general price index. The variance of all the partial indices does not differ significantly from the variance of the general price index.[17]

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[17] A test of variance equality between the general price index and the consumer price index excluding housing shows that there is no difference between the variances whether the sample begins in 1999 or 2003. However a test for samples beginning in 2000 or 2002 or for a longer period from 1992 shows that the variance for the partial index is significantly smaller than that of the general price index. This result is reasonable when considering the greater weight of the exchange rate in the housing component, although not conclusive.

Table 5: The Relationship between Changes in the General Price Index and Partial Indices 1997:IV to 2006:III (quarterly data)

	Correlation	Intercept	Slope
Excluding fruit and vegetables	0.983	**0.000**	**1.029**
Excluding housing	0.866	**0.000**	<u>0.853</u>
Excluding fruit and vegetables, and housing	0.875	**0.000**	**0.880**
Excluding fruit and vegetables, housing and clothing and footwear	0.848	0.0009	0.736
Excluding fruit and vegetables, housing, clothing and footwear, and govt. controlled goods	0.824	0.0009	0.766
Excluding energy	0.986	**-0.000**	**0.962**

Values in bold symbolize a non-zero coefficient for the intercept and a coefficient not equal to 1 for the slope at a significance level of 5 percent. An underlined value is significant at the 10 percent level.

Omitting additional items other than fruit and vegetables from the consumer price index that serves as the target, greatly reduces the part of the consumer basket covered by it, and generally causes a distortion of the inflation path as measured by the partial basket relative to the general price index (Table 5), with no change in the volatility. Removing the energy item from the general price index does not impact on the long term path of the index, but it also does not contribute to reducing the volatility due to the relatively small weighting of this component in the general price index.

Another type of method for reducing the volatility of the price index used as the target includes various statistical means for smoothing series such as a simple calculation of moving averages in different time windows, the commonly practiced statistical methods such as X-11, and the use of different filters such as Hodrick-Prescott. This approach includes econometric methods that refer specifically to price indices, such as fitting regression curves or techniques based on removing distribution tails (Cecchetti 1996). However the disadvantage of these methods is that they are complex, not conclusive, open to discretion by the researcher and difficult to explain to the general public. Moreover, as such processing is conducted by the central bank, the credibility of these indices in the eyes of the public could be harmed. These disadvantages disqualify them from being used in the defined target index.

When choosing a specific index to be used as the defined target inflation, one must also declare if the target is to be defined in terms of the chosen index or in terms of a derivative index that reflects the *trend* of developments of the chosen price index and allows for reducing the background noise caused by temporary shocks due to exceptional conditions of demand or aggregate supply (such as extreme weather conditions or exceptional security events) while maintaining the long-term changes in the process of rising prices. Focusing on a "smoothed-out" index that represents the core or underlying inflation, allows policy makers to minimize the changes in policy required to maintain the long-term trend of the inflationary process, though it could suffer from a lack of credibility as these methods are inconclusive and largely

dependent on discretion.[18] So there is a fear that the public will attach only partial credibility to the target and to the considerations that guide monetary policy. An alternative mechanism to reduce the need of policy response to temporary shocks could be through defining flexible inflation targeting, that is, allowing for a moderate and temporary deviation from the target as a result of temporary shocks.

In summary, considering the simplicity of the index, its credibility, the need for a definition that is unequivocal, acceptable and known by the public, **it is recommended that the general price index remain as the aggregate used to define the inflation target**. Removing volatile items does not significantly reduce the volatility and could result in a systematic diversion of the partial index from the general price index. Adapting monetary policy to exogenous price shocks (for example in prices of fruit and vegetables or energy) can be done through defining a flexible convergence of inflation toward the target. Allowing a temporary, small divergence from the target range in the event of large shocks will allow a more moderate response of monetary policy. A further consideration in choosing the general index for the target stems from the fact that in most countries that have adopted inflation targets, the aggregate defined as the target is the general price index. Furthermore, as the target in Israel is already defined as the general price index, and as this index is used widely in contracts and agreements throughout the economy, there would be some cost associated in changing the target in terms of harming credibility, as well as in the understanding and acceptance by the public.

b. Parameters of the inflation target

Midpoint of the target

Most countries have adopted positive and small inflation targets (up to 3 percent). There are three reasons for this: the aberration in measuring inflation that stems from not taking into account the improvement in quality of goods; a positive inflation reduces the risk of being constrained by the zero bound on nominal interest rates; a small inflation rate is the oil in the wheels of the relative price system—when there is a general upward trend in prices it is easier to change relative prices of goods by raising prices by more or less than the general rate of inflation (raising a price by 2.5 percent when general inflation is 2 percent is less prominent than raising a price by 0.5 percent when the general level of prices is stable). Moreover, when the general inflation rate is zero, in order to lower the relative price of a good (due to relative changes in demand or costs), the absolute price has to be cut. When both prices and wages are sticky downwards, lowering a relative price could be delayed and thus cause distortion in the allocation of resources. We have no basis to think that in Israel one of these factors is any different from that in other developed countries. And as there is a cost of changing the level of the inflation target, **we recommend not changing the midpoint of the target (2 percent).**

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[18] Even when the index used to define the target inflation is the general price index, the partial or smoothed indices could still be used for analyzing policy. See Box 1 on Indices of Basic Inflation in the Bank of Israel's Inflation Report No.16, August 2005.

Width of the target

An inflation target band, as opposed to a point inflation target, formally reflects the rates of inflation that express price stability. Moreover, a target range highlights the fact that an exact level of inflation is unattainable, given the uncertainty concerning future developments. In other words, the range can serve as a confidence interval for future inflation developments.

There is a trade-off in the choice of band width: a wide band increases the chances of achieving the inflation target, grants the public a more credible confidence interval and allows monetary policy makers to support subsidiary objectives by aiming for a different inflation level. (For example, in times of recession, one could aim for the upper range of the target). Conversely, a narrow band makes the objective of monetary policy clearer to the public, and allows a credible central bank to anchor inflation expectations. This anchoring of expectations helps achieve the target. Moreover a narrow band reduces situations in which the monetary committee, which sets the means (the interest rate) has disagreements over the aim (what inflation rate to aim for).

We believe that an annual inflation rate of between 1 percent and 3 percent can be defined as price stability. In contrast, deviating from this range and particularly the fluctuation of inflation in a wider band makes economic planning (for households, the private and the public sector) difficult and requires defending oneself against changes in inflation, and therefore cannot be defined as price stability. For similar reasons most countries have defined a target with a width of 2 percentage points. Some of them, like Israel, have defined a range while others have defined a point inflation rate with a deviation of 1 percentage point on either side defined as a divergence. Nevertheless, the monthly fluctuation of inflation in Israel is high relative to that in developed countries (see Section 2, Diagram 3). One of the major factors behind Israel's highly volatile consumer price index is the exchange rate, whose influence on the behavior of the consumer price index is still significant (for a discussion on the relationship between the exchange rate and the price indices see Appendix 1). As a result, a target with width of 2 percentage points does not constitute a confidence interval of high credibility. In Israel since 1997 the inflation has strayed from the target about 80 percent of the time, and since 2003 deviations have occurred about 75 percent of the time. Models used by the Bank of Israel show that in the long term too (when the initial situation is no longer relevant) the probability of achieving the target at any given point of time is less than 40 percent. As a result, the Bank of Israel is exposed to frequent criticism for not achieving the target, which harms credibility in the policy. Despite this last consideration, it appears that the Bank of Israel must continue and strive for the inflation level defined by us and by many banks worldwide as that of price stability (1 percent to 3 percent). Although a wide target range from 0 percent to 4 percent would increase the probability of achieving the target to 65 percent,[19] it could be interpreted in Israel and globally as a withdrawal of the Central Bank's commitment to stable inflation. Moreover, despite the difficulty in achieving

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[19] According to the econometric models and actual inflation distribution in 2003-2006.

inflation in the range of 1 percent to 3 percent, each deviation from this range could be explained.[20]

As an alternative to today's situation, a proposal was examined of defining a point target (2 percent), where a deviation of the inflation rate by more than 1 percentage point on either side would require the Bank to issue a report (for rules of such a report see Chapter 3). This method would grant the center of the target a formal status and would stress it in the public's eyes. It would clearly define the policy's objective and allow the central bank to choose how to operate its tools in order to achieve it.[21] This fact is particularly important in a regime where the interest rate is set by a committee with no clear hierarchy. Furthermore, the method blurs the illusion that the target range is a reasonable confidence interval for future inflation, while not harming the Bank of Israel's accountability, as it would have to explain any inflation deviating by more than 1 percentage point. In 1996, the UK changed its target range definition (1 percent to 4 percent) to a point target with reporting boundaries. The principal aim was to remove the ambiguity concerning the objectives of monetary policy, and hence to anchor inflation expectations and even to reduce the inflationary risk premium which stems from the ambiguity over objectives (see Appendix 2).

A point inflation target has several potential disadvantages. The method reduces the flexibility in managing monetary policy. In particular, it could be considered as marginalize the secondary objectives defined in the new Bank of Israel Law. The method also reduces the transparency in relation to the Bank of Israel's tolerance concerning inflation's distance from the mid-point of the range. Furthermore, changing the parameter in the regime method holds short-term disadvantages in store; against a background of missing the inflation target in the past year, a change could be regarded as an attempt by the Bank to remove future criticism as, by definition, one cannot attain any particular point inflation target.

As the advantages of a point target are not equivocal and there is some cost to changing the definition of the inflation target, there is apparently no place for a change in definition and **it is recommended to leave the definition of the target as a range of between 1 percent and 3 percent.**

c. Rules of reporting

For the Bank of Israel to be held accountable for the attainment of an inflation target, certain rules of reporting must be defined regarding the target and the implications for not meeting it. We propose the following rules of reporting:

a) Not achieving the target shall be defined, as today, as a rise in the consumer price index during the past 12 months by a rate that is outside of the boundaries of the inflation target range (that is a rate of change of prices greater than 3 percent or less than 1 percent).

b) It is recommended that the Bank of Israel publish an Inflation Report quarterly in which it reports on developments in the economy and particularly about price

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[20] It is difficult to explain, in economic terms, why inflation was 2.5 percent and not 2 percent. However it is easy to pinpoint and describe the explanation for why inflation is 4 percent and not 2 percent.

[21] The central bank would be free to choose the speed at which inflation would be brought back to the point target.

stability. In the event of inflation deviating from the target for a period of six consecutive months, the report should include the reasons for the deviation, the policies required to bring inflation back to within the target range and the length of time expected to achieve this.

The major considerations behind this recommendation are:
In order that the measure of the attainment of the inflation target is transparent to the public, then it should be based on real-time data of the consumer price index. Therefore in terms of examining the measure of attaining the target we propose looking at the inflation rate that has occurred.[22] Looking back over 12 months was chosen because of its simplicity and clarity for the public. This is despite our wish to see that over any time period, whether longer or shorter, the rise in prices is in line with the target.

In order to improve the transparency of policy and to stress the continuity of the inflation target (as opposed to taking a calendar viewpoint) it is important that the Bank of Israel reports regularly on its level of achieving the target. Therefore, **we recommend that the inflation report in its current extensive format be published soon after the end of the year (in January); this report will analyze inflation, monetary policy, the background conditions, achievement of the target, and the expected path of inflation. In addition, a quarterly summary report will be published (in April, July and October).** The summary report will describe the major developments of the quarter, update assessments, and could also serve as a report and analysis of any deviation from the target (even if the deviation should last less than six months). The publication of a quarterly inflation report is common practice in inflation targeting countries. However, in light of the inflation volatility in Israel, an in-depth analysis of inflation and the macroeconomic environment cannot be supplied on a quarterly basis; this will be provided in the extensive report in January. A similar approach is taken in Canada and Hungary.

Deviations from the target occur frequently in Israel as in the other inflation targeting countries. However, the credibility of the central bank is dependent on the temporariness of the deviation. In most inflation targeting countries where rules of reporting are defined for deviations from the target, and particularly in the UK, the central bank is required to explain why inflation deviated from the range, what the monetary policy makers intend to do and what is the expected time for inflation to return to its target. In several inflation targeting countries, including the UK, Iceland, the Philippines and Thailand, the reporting of not achieving the target is by means of a letter. As the reporting on inflation and the discussion on achieving the inflation target is conducted continually, each quarter, we recommend that there should be no reporting requirement in the form of an open letter to government.

From Figure 4 we see that from 2003 up till the end of 2006 inflation in Israel deviated from the target range of 1 percent to 3 percent in 75 percent of the months. The asterisks in the figure refer to those times when inflation deviated from the target

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[22] This approach does not conflict with policy management, which, in order to stabilize inflation over time, examines the expected future inflation rate and not the CPI that has occurred and on which the Bank of Israel is measured in practice.

for a consecutive period of six months, and to which we propose that special reference is made in the inflation reports.

Figure 4
Inflation in Previous 12 Months, the Inflation Target, and Deviations from It, in Israel
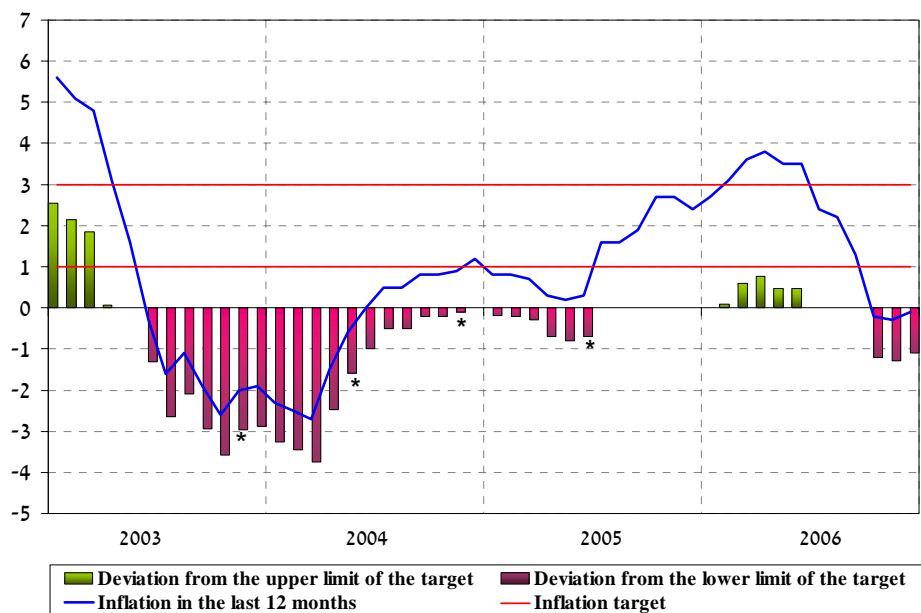
Appendix 1: The Relationship between the Exchange Rate and the Price Indices

One of the major factors behind the relatively high volatility of the consumer price index is the exchange rate, whose effect on the behavior of the index is still significant. The exchange rate regime[23] has seen many changes since the initial declaration of an inflation target, as was briefly described above. Despite this, there has been no significant change in the correlation between it and the consumer price index, and changes in the exchange rate still have great influence on price developments. From the table below that describes the correlation between changes in the exchange rate and changes in the various price indices, we can see that the general price index is usually highly correlated—by 70 to 80 percent—with the changes in the exchange rate. Excluding the fruit and vegetables, and energy items, the fluctuations of which are not connected to the exchange rate, slightly raises the correlation of the partial index. Excluding the housing item from the general index reduces, as expected, the rate of correlation. Except for the period between 1992 and 1997 during which there was no correlation between the variables, this correlation between the exchange rate and the CPI remains high until today.

Table A.1
The Correlation between Changes in the CPI and Changes in the NIS/$ Exchange Rate over Previous 12 months, in Various Periods

Index	1988.01–1992.06	1992.07–1997.11	1997.12–1999.06	1999.07–2006.11
CPI	0.717	0.029	0.829	0.832
CPI excl. fruit and veg.	0.749	0.064	0.770	0.845
CPI excl. housing	0.424	-0.159	0.734	0.514
CPI excl. fruit and veg. and housing	0.569	-0.189	0.669	0.533
CPI excl. fruit and veg., housing, clothing and footwear	0.509	-0.122	0.523	0.464
CPI excl. fruit and veg., housing, clothing and footwear, and price-controlled items	-0.023	-0.404	0.514	0.445
CPI excl. energy goods	0.745	0.058	0.847	0.857

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[23] A full description of the exchange rate regime can be found in D. Elkayam, *The Long Road from Adjustable Peg to Flexible Exchange Rate Regimes: The Case of Israel*, (2003), Monetary Studies, Discussion Paper Series, Bank of Israel.

Table A.2
Correlation of the Standard Deviation of the CPI and the CPI Excluding Housing with the NIS/$ Exchange Rate over Previous 12 months, in Various Periods

	1988.01–1992.06	1992.07–1997.11	1997.12–1999.06	1999.07–2006.11
CPI	0.812	0.400	0.994	0.738
CPI excl. housing	0.565	0.265	0.988	0.396

Table A.2 shows a high correlation between the standard deviation of the shekel/dollar exchange rate and the general price index and a lower correlation with the CPI excluding housing. In other words, fluctuations in the exchange rate, which are expected in a floating exchange rate regime, are reflected also in fluctuations in the consumer price index. The ratio between fluctuations in the exchange rate and fluctuations in the CPI is about 0.3, i.e., noises in the exchange rate are expected to be expressed in a far smaller way (in the short term) in the price index.

Appendix 2: The UK: The Move from an Inflation Target Range to a Point Inflation Target[24]

Between 1992 (when an inflation targeting policy was adopted) and 1995, the inflation target in the United Kingdom was defined as a range of 1 percent to 4 percent, annually. Later, the Bank of England moved to a point inflation target of 2.5 percent. The move serves several purposes:

1. Most importantly, it removes any ambiguity about what monetary policy should be set relative to, and hence it anchors inflation expectations. During the entire period that the target was defined as a range, inflation expectations in the UK were around 4 percent, and the inflation target appeared as a "range of indifference" for the policymakers. On moving to a point inflation target, inflation expectations fell.

2. A further benefit is that it makes transparent the symmetry of monetary policy actions. An inflation targeting framework is as much a safeguard against deflation as against inflation, and symmetry is a desirable characteristic of any steady-state inflation target.

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[24] From A. Haldane, *Targeting Inflation: The United Kingdom in Retrospect*, presented as background material for an IMF conference, March 2000.

Appendix 3: Countries with Inflation Target Aggregates other than the General Price Index

Five countries with an inflation target regime have since changed the index which serves to measure inflation and on which the inflation target is built:

The Czech Republic: Adopted an inflation target regime in 1998. Until 2000 the inflation target was set by the 'net inflation,' which excluded government regulated products (such as energy and housing rentals) from the general price index; the total items excluded constituted 18 percent of the general price index. In 2001 the inflation target was then set by the general price index. The motivation behind this move was based on three factors:

1. 'Net inflation' was never fully understood by the public. For example, during wage negotiations, the workers' union referred mainly to inflation by the general price index and not to the 'net inflation' (which was then relevant to the target).
2. Many of the products regulated by the government began to be set in a way that reflected the rest of the general price index (that is, the changes in prices of regulated products were similar to the changes in prices of the other items in the index).
3. The improved communications between the Czech National Bank and the government, and EU requirements led to a program of gradually reducing the regulation of price supervision.

New Zealand: Adopted an inflation target regime in 1990, when the target was set by the CPIX (All Groups Consumer Price Index excluding Credit Services). From September 1999, the policy moved to using the All Groups Consumer Price Index instead of the CPIX. The reason for the move was the change in definition of the general price index (the change in the CPI was the removal of the interest rates from the index), so that the index was then more appropriate as the base for setting the inflation target. Furthermore, they noted that the use of two indices was confusing to the public.

At the time, Treasurer Bill English said he welcomed the change. "The distinction between the CPI and underlying or CPIX inflation has been confusing. We saw this recently when we had CPI deflation and CPIX inflation well within the 0-3 percent inflation target. This change will remove this source of confusion…"

Then Reserve Bank of New Zealand Governor Don Brash added: "… for the public's understanding of how monetary policy works this is a great step forward. As of today, the Reserve Bank's communications task has been made easier."

Australia: Adopted an inflation targeting regime in 1993. Until September 1998 the partial price index which did not include the volatile components of the general price index—fresh fruit and vegetables, products whose prices were fixed outside of the market, such as tobacco—was used. The most important component that was excluded from the general price index was the changes in interest rate. After changes in the interest rate were removed from the general price index, it became the index of

the inflation target. The Reserve Bank of Australia noted that the move did not change the bank's policies but was intended to make inflation clearer to the public.

United Kingdom: Adopted an inflation target regime in 1992, and until December 2003 the inflation target was set by the RPIX. This is the Retail Prices Index excluding mortgage interest payments, but it does include housing prices and local property taxes, items which the consumer price index does not include. From 2004, the target moved to the consumer price index (the general prices index). The main differences between the RPIX and the CPI are a) method of calculation (arithmetic mean as opposed to geometric mean) and b) the CPI does not include housing costs for home owners, and local property taxes.

   The advantages of using the consumer price index for measuring inflation are:
- CPI has certain advantages over the RPIX in representing inflation; it better covers home expenditures and maintenance.
- Using the CPI allows for international comparisons.
- Measurement by the CPI is the most accurate and relevant in measuring inflation. Moving to the CPI was taken after a global consensus was reached over the CPI's advantages in measuring inflation.

   We can see that sometimes the reason for moving from a partial index to a full index is the change in definition of the index itself, so that the definition of the general price index no longer includes changes in the interest rate which create the anomaly of the interest rate's effects on inflation. However most countries testify to the fact that a partial price index confuses the public.

Only one country has moved from the use of a full index to a partial index—Korea: Adopted an inflation target regime in 1998, when the target was set according to the general price index. The main reason for choosing the full price index was the public's familiarity with the index. In 2000 it was decided to move to using a partial price index which excludes those prices that are most affected by external markets. The items removed from the index were: prices of fuel products and prices of agricultural products (other than grain). The reason for this change to a partial index was missing the target on several occasions due to fluctuations in the general price index. In 2007 Korea returned to using the full price index in determining the inflation target.

Appendix 4: Reports in the Event of Missing the Inflation Target, an International Comparison:[25]

1. Special Reports

<u>The Philippines</u>

Type of Reporting: An open letter to the president and the general public, when the bank fails to achieve the inflation target.

Subject of report: 1) Reasons for not achieving the inflation target, and 2) note future action to be taken in order to bring inflation back to target.

Timing of initial report: In January following the publication of the last data for the calendar year.

Frequency of reporting in the event that inflation does not return to the target: As meeting the target is measured by the average annual CPI, the report is once a year in the event of there being a deviation.

Frequency of Inflation Reports: Quarterly.

<u>United Kingdom</u>

Type of Reporting: An open letter from the governor of the Bank of England to the Chancellor of the Exchequer (Minister of Finance) in the event that inflation deviates by more than 1 percentage point on either side from the target. This will also necessarily be referred to in the Inflation Report.

Subject of report: 1) Reasons for inflation deviating by more than 1 percent from the target; 2) actions taken to deal with the deviation; 3) the time expected for inflation to return to the target, and 4) how this approach relates to monetary policy objectives (price stability).

Timing of initial report: Generally, the report is on the same day that the inflation rate is published.

Frequency of reporting in the event inflation does not return to the target: In the event that the deviation of more than 1 percentage point persists, then a further letter will be sent after three months.

Comments: It should be stressed that the limits for reporting are not the range of the inflation target, but rather they serve to define the situations when the Chancellor expects a letter of explanation from the central bank governor.

Frequency of Inflation Reports: Quarterly.

<u>Brazil</u>

Type of Reporting: An open letter from the president of the central bank to the Minister of Finance in the event of inflation deviating from the target.

Subject of report: 1) Detailed description of the reasons for not meeting the target; 2) actions taken to return to the target, and 3) the time expected for these actions to have an effect.

Timing of initial report: As the inflation target is for the calendar year, the open letter is published soon after the beginning of the new year (January/February).

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[25] From central banks' websites, Heenan et al. (2006), Roger & Stone (2005).

Frequency of reporting in the event inflation does not return to the target: Once a year.

Comments: In addition to the letter, the bank president must appear before Congress, twice a year, to give a full account of the bank's activities.

Frequency of Inflation Reports: Quarterly.

Iceland

Type of Reporting: In the event of inflation deviating by more than 1.5 percentage points from the target, the bank must submit a report to the government, which will be publicly available.

Subject of report: 1) Presentation of the reasons for not meeting the target; 2) how the bank plans to respond, and 3) the time needed to bring inflation back to the target.

Timing of initial report: The timing of the initial report is not defined but in practice the report is submitted during the month following the non-achievement of the target.

Frequency of reporting in the event inflation does not return to the target: There is no further reporting requirements in the event of persistent deviation.

Comments: The boundaries of +/- 1.5 percent do not suggest any additional formal obligation to which the bank must respond.[26]

Frequency of Inflation Reports: Quarterly.

Thailand

Type of Reporting: In the event of a deviation from the target, the central bank must provide explanations to the public.

Subject of report: 1) Reasons for the deviation from the target; 2) the policy reaction to the deviation, and 3) the time needed to bring inflation back to the target.

Comments: 1) Inflation is measured by the quarterly average compared to 12 months previously. 2) The central bank is currently preparing legislation that will yield a clear policy framework.

Frequency of Inflation Reports: Quarterly.

2. Explanations during normal periodic reporting

New Zealand

Type of reporting: Explanations in the Monetary Policy Statement (equivalent to an Inflation Report) when there is a deviation from the target or when a deviation is expected.

Subject of report: 1) Reasons for the deviation (actual or expected); 2) what steps are or will be taken in order to ensure that inflation remains on target.

Frequency of reporting: Published regularly every quarter.

Comments: It is important to remember that the price index in New Zealand is published quarterly and not monthly as in most countries.

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[26] The obligation of the monetary policy (as presented by the bank) is to maintain inflation as near as possible to the target (2.5 percent) and not necessarily within "tolerable" boundaries.

Canada
Type of reporting: Explanations in the Monetary Policy Report (equivalent to an Inflation Report).
Subject of report: 1) Reasons for the deviation; 2) steps taken in order to bring inflation back to the target; and 3) time until inflation returns to target.
Frequency of reporting: Published regularly every six months, and in the interim quarters a shorter report (Monetary Policy Report Update) is published with updates to the last report.

Sweden
Type of reporting: Explanations of a deviation from the target in the annual appearance of the governor before Parliament.
Frequency of reporting: Annually.
Comments: Explanations of a deviation are also published in the Inflation Reports which are published three times a year.

3. Countries that do not have specific reporting rules
Australia
Reference to deviation from the target: As the definition of the inflation target is an average to be achieved over a period of time, the deviations from the target in the short term are caused, sometimes knowingly, through a trade-off of policy goals, forgoing the inflation target by concentrating on economic activity or unemployment. However such a policy trade-off is nevertheless conditional on achieving the inflation target, on average, over the business cycle.
Frequency of inflation reports: Statements on Monetary Policy (equivalent to an inflation report) are published quarterly.
Comments: The inflation target band is defined as the average to be achieved over the business cycle (a period of several years).

Czech Republic
Reference to deviation from the target: Allows for some 'escape events' from the inflation target due to exogenous shocks.
Frequency of inflation reports: Quarterly.

Poland
Frequency of inflation reports: Quarterly.

Chile
Reference to deviation from the target: The central bank provides explanations to the public on deviations from the target through the inflation reports.
Frequency of inflation reports: Three times a year.

Colombia
Frequency of inflation reports: Report to Congress (equivalent of an Inflation Report) is published once a quarter.

South Africa

Reference to deviation from the target: The South African Reserve Bank must report on an 'explanation clause' to the public—the characteristics of shocks to the economy, their expected effect on inflation, the policy to be taken in response to ensure that inflation returns to the target and how long this is expected to take. (In the past, there was an 'escape clause' which in effect referred to factors that justified inflation's deviating from the target boundaries).

Frequency of inflation reports: Monetary Policy Review (equivalent to an Inflation Report) is published twice a year.

Korea

Frequency of inflation reports: Monetary Policy Report is published twice a year.

Mexico

Frequency of inflation reports: Quarterly.

Norway

Reference to deviation from the target: In the event of a significant gap between actual inflation and the target, the central bank will provide a thorough assessment in its annual report. Special emphasis will be on deviations greater than +/- 1 percentage point from the target.

Frequency of inflation reports: Monetary Policy Reports (formerly Inflation Reports) are published three times a year.

Comments: The operative aim of monetary policy is of inflation close to 2.5 percent.

Hungary

Reference to deviation from the target: The central bank will assess its achievement of the inflation target at quarterly intervals in the statement of the Monetary Council which is published simultaneously with the Quarterly Report on Inflation, and annually in the bank's Annual Report.

Frequency of inflation reports: The Report on Inflation is published twice a year, and in the interim months, a shorter report is published with updates to the last report.

Peru

Frequency of inflation reports: Three times a year.