THE SIMPLEST TEST OF INFLATION TARGET CREDIBILITY

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ABSTRACT

The Simplest Test of Inflation Target Credibility*

A simple test of inflation target credibility is constructed by subtracting the maximum and minimum inflation rates consistent with the inflation targets from the yields to maturity on nominal bonds. This results in a target-consistent range of real yields on nominal bonds. If expected real yields, or market real interest rates on real bonds if they are available, fall outside the range of target-consistent real yields, credibility is rejected. Two concepts of credibility, called absolute credibility and credibility in expectation, are distinguished. The credibility of inflation targets of Canada, New Zealand and Sweden are examined diagrammatically.

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NON-TECHNICAL SUMMARY

When central banks announce inflation targets in the form of a range between an upper and a lower bound (constant or time-varying) for the future inflation rate, it is easy to construct a test of whether the inflation target is credible in the sense that market agents believe that future inflation will fall within the target range. The test is similar to the 'simplest test' of exchange rate target zone credibility described in Svensson (1991).

The credibility test consists of computing, for a given horizon, *target-consistent* maximum and minimum inflation rates, that is, the maximum and minimum future inflation rates that are consistent with the inflation targets. These target-consistent maximum and minimum inflation rates are subtracted from the nominal yields to maturity (interest rates) for default-less nominal government bonds of corresponding maturity. This results in target-consistent minimum and maximum real yields (on nominal bonds), that is, the minimum and maximum real yields to maturity that are consistent with the inflation target for the given horizon.

If there exists a well-functioning market for real bonds, with reliable market quotations of real interest rates, the test consists of examining whether the market real interest rate of the given maturity falls between the target-consistent minimum and maximum real yields. If the market real interest rate falls outside the range between the target-consistent minimum and maximum real yields, credibility is rejected.

If there is no well-functioning market for real bonds, so there are no reliable market real interest rates, the credibility test is not quite as simple. It then consists of judging whether or not it is likely that market agents' expected future real yield falls between the target-consistent minimum and maximum real yields. This judgment will then have to rely on other available information, including past *ex post* real yields. If it is considered very likely that expected future yield falls outside the range between the target-consistent minimum and maximum real yields, credibility should be rejected. The above argument is made more precise in the paper by distinguishing and explaining two concepts of credibility, called *absolute credibility* and *credibility in expectation*, respectively.

A brief examination is undertaken for the period up to and including the late Summer of 1993, of the credibility of the inflation targets of Canada, New Zealand and Sweden. The results are: inconclusive for Canada; tend to reject inflation target credibility for the early period of inflation targeting for New Zealand, but do not reject credibility after mid-1992; and by August 1993 reject credibility for the recent inflation targets for Sweden (on a five-year horizon but not on a two-year horizon).

1. Introduction

When central banks announce inflation targets in the form of a range between an upper and a lower bound (constant or time-varying) for the future inflation rate, it is easy to construct a test of whether the inflation target is credible in the sense that market agents believe that future inflation will fall within the target range. The test is similar to the "simplest test" of exchange rate target zone credibility described in Svensson (1991).[1]

Let me first distinguish two concepts of inflation target credibility. A strong concept of credibility, what I shall call *absolute credibility*, is when market agents believe that the future inflation will fall within the target range with 100 percent probability. That is, market agents believe that the probability of missing the target range is zero. A weaker concept of credibility, what I shall call *credibility in expectation*, is when market agent's expected value of the future inflation rate falls within the target range. In the latter case, market agents may still believe that there is some probability that the target will be missed. Obviously absolute credibility implies credibility in expectations but not the other way around.[2]

2. The Test

The credibility test consists of computing, for a given horizon, *target-consistent* maximum and minimum inflation rates, that is, the maximum and minimum future inflation rates that are consistent with the inflation targets. These target-consistent maximum and minimum inflation rates are subtracted from the nominal yields to maturity (interest rates) for default-less nominal government bonds of corresponding maturity. This results in target-consistent minimum and maximum real yields (on nominal bonds), that is, the minimum and maximum real yields to maturity that are consistent with the inflation target for the given horizon.

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[1] The simplest test of target zone credibility consists of examining whether or not forward exchange rates fall within the announced exchange rate band and rejecting credibility if forward rates fall outside the band.

[2] I avoid the terminology "strong" and "weak" credibility since the latter expression might be confused with low credibility. (A third very week credibility concept, which will never be rejected, can also be conceived: namely that there is at least some probability that the target will be fulfilled.)

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2.1. The test with a market for real bonds

If there exists a well-functioning market for real bonds with reliable market quotations of real interest rates, the test consists of examining whether the market real interest rate of the given maturity falls between the target-consistent minimum and maximum real yields. If the market real interest rate falls outside the range between the target-consistent minimum and maximum real yields, *absolute credibility* can be rejected. This is so, because if there were absolute credibility, market agents would believe that the real yields to maturity on a nominal bond would with 100 percent probability fall between the target consistent real yields. Then there would be a safe minimum positive profit from borrowing real and lending nominal (if the market real interest rate on real bonds would fall below the target-consistent minimum real yield on nominal bonds), or lending real and borrowing nominal (if the market real interest rate would fall above the target-consistent maximum real yield). That would not be consistent with an equilibrium in a well-functioning capital market.

If the market real interest rate falls outside the range between the target-consistent minimum and maximum real yields, *credibility in expectation* can also be rejected, *if* the inflation risk premium is small. The inflation risk premium is the difference between the expected real yield to maturity on a nominal bond and the market real interest rate on a real bond. Therefore a small inflation risk premium means that the expected real yields on a nominal bond is approximately equal to the market real interest rate and hence outside the range between the target-consistent minimum and maximum real yields. Since the expected real yield to maturity on a nominal bond equals the difference between the nominal yield to maturity and the expected inflation rate to maturity, it must then be the case that the expected inflation rate falls outside the target inflation range. Finally, the inflation risk premium should indeed be small under credibility in expectation. The inflation risk premium is, according to standard portfolio theory, determined by the conditional variance of the inflation rate and the conditional covariance between the inflation rate and other risks (see for instance Svensson (1993c)). It is likely that credibility in expectation is associated with a small conditional variance and hence a small conditional covariance of the inflation rate. This implies a small inflation risk premium. In summary, if the market real interest rate on real bonds falls outside the range between the target-consistent minimum and maximum real yields on nominal bonds, not only absolute credibility but also credibility in expectation should be rejected.

If the market real interest rate falls between the target-consistent minimum and maxi-

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mum real yields to maturity, it does not follow that absolute credibility should be accepted, since nothing prevents market agents from still assigning some positive probability to future inflation rates falling outside the target range. Credibility in expectation should be accepted, though, by the same argument about the inflation risk premium as above.

2.2. The test without a market for real bonds

If there is no well-functioning market for real bonds, so there are no reliable market real interest rates, the credibility test is not quite as simple. It then consists of judging whether or not it is likely that market agents' expected future real yield fall between the target-consistent minimum and maximum real yields. This judgment will then have to rely on other available information, including past ex post real yields. If it is considered very likely that expected future yield falls outside the range between the target-consistent minimum and maximum real yields, absolute credibility and credibility in expectation should be rejected. If it is considered very likely that the expected future yields fall between the target-consistent minimum and maximum real yields, credibility in expectation should be accepted, but not necessarily absolute credibility.

2.3. The test with forward rates

The test can also be done for forward interest rates. For forward rates the target-consistent minimum and maximum real forward rates are constructed by subtracting from nominal forward rates the maximum and minimum target inflation rates for the relevant future period. If there is a market for real bonds, and reliable (implied) market real forward rates are available, the test consists of examining whether the market real forward rates fall within the target-consistent minimum and maximum real forward rates. If there are no reliable market real forward rates, the test consists of judging whether or not it is likely that market agents' expected real forward rates fall between the target-consistent minimum and maximum real forward rates.

Next I shall examine three examples of inflation targets, namely those of Canada, New Zealand and Sweden.[3]

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[3]It might appear that the United Kingdom would be an ideal example to examine with the simplest test. The U.K. announced inflation targets in October 1992 (Bank of England (1993a)). The U.K. is also one of the few countries that has a market for index bonds, so market real interest rates could potentially be used with the test. A closer look reveals that U.K. is less suitable for the test, though. First, the inflation target is rather wide, ranging from 1 to 4 percent per year. Second, the inflation target is formally only "for the duration of this parliament," and formally not long-run commitment. Third, the

3. Example 1: Canada

Bank of Canada announced inflation targets in February 1991 (Bank of Canada (1991a,b)): The 1-year inflation rate should reach 3 percent per year by the end of 1992, 2.5 percent per year by mid 1994, and 2 percent per year by the end of 1995. A target range of ±1 percentage points per year around these target levels was also specified.

The test of inflation target credibility for Canada is illustrated for a 5-year horizon in *Figure 1a*. The parallel curves with long dashes at the bottom of the graph starting in February 1991 show the target-consistent (TC) maximum and minimum future 5-year inflation rates.[4] The dotted curve shows the 1-year inflation rate (the percentage increase in the price level over the previous 12 months). The 1-year inflation rate came down rapidly towards the end of 1991 and even fell below the target range of 2-4 percent per year for part of 1992. The curve at the top of the graph with short dashes shows the interest rate on Canadian government bonds with a maturity of approximately 5 years. The target-consistent maximum and minimum real 5-year yields are shown by the parallel solid curves; they are constructed by subtracting the target-consistent maximum and minimum 5-year target inflation rates from the 5-year interest rate. We see that the target-consistent minimum real 5-year yield was around 5.5 percent per year in February 1991 and that it has since fluctuated quite a bit but shown a downward trend and fallen below 5 percent per year after mid 1992. In the second half of 1993 the target-consistent real 5-year rate fell below 4 percent per year.

If there were a well-functioning market for 5-year real bonds in Canada the test of

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construction of the British index-linked gilts is not designed for easy extraction of real interest rates. Semiannual coupons are indexed to the price level 8 months prior to the coupon payment. The same 8-month lag applies to the principal. This makes the real value of the principal and the coupon payments a function of the inflation rate that occurs during the 8 months prior to the payment. Furthermore, differential tax treatment between conventional and index-linked gilts complicate matters. Capital gains on British gilts are exempt from capital gains taxes. The scaling up of the principal of index-linked gilts is considered a capital gain and hence not taxed. Conventional gilts provide this compensation for expected inflation through higher coupons. Coupon payments are taxed, though. This gives a tax advantage to low-coupon index-linked gilts over high-coupon conventional gilts. Under the assumption that the post-tax return on conventional and index-linked gilts are equalized, the differences in the pre-tax return will depend on the marginal tax rate of the marginal investor, as will the calculations of real interest rates. The difference between real interest rates calculated with and without consideration of taxes can the be several percentage points per annum. The uncertainty about the marginal tax rate of the marginal investor then unfortunately makes estimates of U.K. real interest rates uncertain. Woodward (1990) discusses in detail and estimates marginal tax rates, pre and post-tax nominal and real interest rates, and inflation expectations for the period 1982-1989. See also the discussion in Bank of England (1993b).

[4]The maximum 1-year inflation rates has been set to 6 percent per year for 1991, 4 percent per year for 1992 and 1993, 3.5 percent per year for 1994, and 3 percent per year for 1995 onwards. The minimum 1-year inflation rates are 2 percentage points per year below the maximum rates.

inflation target credibility would simply consist of examining whether market real interest rates would fall between the target-consistent minimum and maximum real yields. Absent such a market[5] we have to judge whether it is likely that expected real 5-year yields on Canadian government bonds could sometimes be so high as 5 or 6 percent per year. Expected real returns are according to conventional wisdom usually lower, say between 1 and 4 percent per year.

What have ex post real yields been? In *Figure 1b* the curve showing the 1-year past inflation rate has been removed. Instead the dotted line shows the realized future 5-year inflation rate. It ends in August 1988 since the latest observations in the dataset of the price level are from August 1993. Subtracting this inflation rate from the 5-year interest rate results in the ex post real 5-year yield shown by the solid curve ending in late 1988. For the period shown the ex post real yield has fluctuated between 4 and 9 percent per year, and its mean is quite high, 6.3 percent per year. Without further information it seems that we cannot exclude that expected real 5-year yields on Canadian bonds may be of the same magnitude as the target-consistent minimum real yield. Therefore, without further information inflation target credibility cannot be rejected for Canada. Neither can it be accepted, since we cannot exclude that expected real yields may indeed be lower than the target-consistent minimum real yield.

4. Example 2: New Zealand

Reserve Bank of New Zealand announced inflation targets in February 1991 (Reserve Bank of New Zealand (1992)): 2.5-4.5 percent per year for 1991, 1.5-3.5 percent per year for 1992, and 0-2 percent per year from the end of 1993.

In *Figure 2a*, the analog of Figure 1a, the parallel curves with long dashes show the corresponding target-consistent maximum and minimum 5-year inflation rates. The dotted curve shows the 1-year past inflation rate; the curve with short dashes shows the interest rate on 5-year government bonds. The parallel solid curves show the target-consistent minimum and maximum real yields. They show a strong downward trend. In February 1991 the target-consistent minimum real yield was almost 9 percent per year; in mid 1993 it had fallen below 5 percent per year. This is still a bit high compared to conventional-wisdom real returns between 1 and 4 percent per year.

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[5]A longer real bond, maturing in year 2021, has been emitted in Canada, but there is no 5-year real bond, as far as I know.

Absent market real interest rates on real bonds, we have to judge whether expected real yields on nominal bonds might fall between the target-consistent minimum and maximum real yields. What have ex post real yields been? The dotted and solid curves in *Figure 2b* ending in mid 1988 show the future 5-year inflation rate and the ex post 5-year real yield, respectively. The ex post real 5-year yield in 1987 and 1988 was extremely high, between 10 and 13 percent per year. This occurred during a rapid disinflation period (see the 1-year inflation rate in Figure 2a), so it is likely that ex post real yields were higher than previously expected real yields.

It seems unlikely that the inflation target was credible in February 1991 when the target-consistent minimum real yield was as high as 9 percent per year. The strong downward trend and the much lover target-consistent minimum real yield below 5 percent per year in mid 1993 makes it more likely that inflation target credibility cannot be rejected by then, or at least that inflation target credibility soon can probably no longer be rejected.

5. Example 3: Sweden

Sveriges Riksbank announced inflation targets in January 1993 (Sveriges Riksbank (1993)), namely that the 1-year inflation rate shall fall between 1 and 3 percent per year from 1995 onwards. For 1993 and 1994 the Riksbank has not announced any explicit target but referred to the Government's announcement in December 1992 that inflation for 1993 above 5 percent per year "cannot be tolerated." Let me interpret this as meaning that the maximum target inflation rate is 5 percent per year for 1993. For 1994 it is set to 4 percent per year, the midpoint between the maximum rates for 1993 and for 1995. The minimum target inflation rate is set to 2 percentage points per year below the maximum target rate.

Figure 3a is analogous to Figures 1a and 2a. The curves showing the target-consistent maximum and minimum 5-year inflation rates and the target-consistent minimum and maximum real yields are much shorter since they start only in January 1993. In early 1993 the target-consistent maximum and minimum 5-year inflation rates were 3.6 and 1.6 percent per year, respectively. The 1-year inflation rate, shown by the dotted curve, has fluctuated between 3 and 12 percent per year since 1984. It came down rapidly in early 1992 towards 2 percent per year. After the float and depreciation of the krona beginning in November 1992 the 1-year inflation rate has risen to again to about percent per year in early 1993 but then come down to below 4.5 percent per year in September 1993.

The target-consistent minimum real 5-year yield was about 6 percent per year in early

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1993, about the same level as for Canada when Bank of Canada announced its inflation targets in February 1991 and it fell to about 4 percent per year in the fall of 1993. Is it likely that expected real 5-year yields on Swedish government bonds could be as high as around 4 percent? The future 5-year inflation rate and ex post real 5-year yield is shown in *Figure 3b*. The ex post real yield fluctuated between 2 and 8.5 percent per year during the period shown, with a mean of 5.4 percent per year, clearly above the same magnitude as the target-consistent minimum real 5-year yield in the fall of 1993. An expected real 5-year yield of 4 percent is in the high range according to conventional wisdom, but without further information it seems that inflation target credibility in expectation cannot be rejected. Absolute credibility can be rejected, though, since with the expected real 5-year yield at best near the minimum target-consistent real yield, certainly some probability must be attached to the inflation rate falling outside the target range.

5.1. The yield curve

Some further information is however provided by the full term structure of interest rates for Sweden. In *Figure 4a* the curve with short dashes shows the nominal spot rate curve (nominal zero-coupon yield curve) for Sweden on the trade date August 18, 1993 (expressed as annually compounded yields to maturity and plotted against the maturity date). The spot rate curve has been estimated from Swedish Treasury bill rates and government bond yields.[6] The curves with long dashes show the target-consistent maximum and minimum target inflation rates from August 1993 to the maturity dates. The target-consistent maximum inflation rate starts out at 5 percent per year for 1993 and then falls gradually towards 3 percent per year. Since it is the average of the maximum target inflation rates for each year from 1993 onwards, it approaches the 3 percent per year level only asymptotically. The solid curves show the target-consistent minimum and maximum real yields, the real yields resulting from subtracting the target-consistent maximum and minimum target inflation rates from the spot rate curve.

The target-consistent minimum real yield to maturity falls to less than 3 percent for bonds and treasury bills maturing in 1994 and then rises to about 3.6 percent per year for bonds maturing in 1998, that is, in 5-years. The latest observations in Figures 3a and 3b are from September 1993. The observation from August 1993 in Figures 3a and 3b

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[6]Since coupon bond yields depend on the coupon, the standard yield curve is an ambiguous indicator of the term structure of interest rate. The zero-coupon rates have been estimated with the functional form of Nelson and Siegel (1987). See Dahlquist and Svensson (1993) or Svensson (1993b) for details.

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should correspond approximately to that in Figure 4a for maturity in August 1998.[7] For maturities past year 2000 the target-consistent minimum real yield rises above 4 percent per year, which is on the borderline of being high.

5.2. The forward rate curve

The forward rate curve extracts additional information from the spot rate curve. The curve with short dashes in *Figure 4b* shows the overnight forward interest rates implied by the spot rate curve of Figure 4a. An overnight forward rate is an interest rate determined on the trade day for an investment that starts at a future date, the settlement date, and ends one day later, the maturity date. The forward rates in Figure 4b are for the trade date August 18, 1993, expressed as annually compounded rates and plotted against the settlement date. [8]

The curves with long dashes in Figure 4b show the maximum and minimum 1-year target inflation rates plotted against each year (rather than the target-consistent average maximum and minimum inflation rates to maturity in Figure 4a). Subtracting these inflation rates from the nominal forward rates results in the target-consistent minimum and maximum real forward rates. These are shown by the solid lines. The target-consistent minimum real forward rate rises from below 2.5 percent per year in 1994 to almost 6 percent per year after year 2000. It seems unlikely that market agents' expected marginal real rate of return from lengthening an investment beyond 2000 could be as high as 6 percent per year. Therefore it seems that inflation target credibility in August 1993 (absolute and in expectation) must indeed be rejected.

5.3. Survey data on inflation expectations

Finally, when survey data on inflation expectations are available, the easiest test of inflation target credibility is of course to directly compare these inflation expectations with the target-consistent maximum and minimum inflation rates, although there are some

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[7]The correspondence is not exact since the interest rate in Figures 3a and 3b is a monthly average of a yield to maturity on a coupon bond, whereas the yield curve in Figure 4a is for a particular date and for a zero-coupon bond.

[8]A forward rate can be seen as the increase in the total return to a spot investment from a marginal lengthening of the investment period. Therefore forward rates and spot rates are related as marginal and average cost, and the forward yield curve and the spot yield curve are related as marginal and average cost curves. See Shiller (1990) for definitions and a discussion of forward rates, and see Svensson (1993a,b) for a recent discussion of the use of forward rates to extract expectations of future interest rates, inflation and currency depreciation.

well-known general problems with using survey data on expectations. A survey of the inflation expectations of the largest Swedish and foreign investors on the Swedish bond market has been made each quarter since February 1991 by Aragon Securities Fondkommission AB. The investors are asked about their expected 2 and 5-year Swedish inflation rates. According to the survey on August 18, 1993, the mean expected 2 and 5-year inflation rates were 3.3 and 4.0 percent per year, respectively (Aragon (1993)).

In *Figure 5a* Aragon's time series of 5-year inflation expectations has been added to Figure 3b (the thin solid curve). We see that the expected 5-year inflation rate exceeds the target-consistent maximum inflation rate by about 1 percentage point per year in early 1993, but that the distance to that inflation rate has fallen during the rest of 1993. In *Figure 5b* the expected inflation rates of August 18, 1993, have been plotted against August 1994 and August 1998 (the thin solid curve) and added to the graphs of Figure 4a. (The observation for August 1993 is the past 1-year inflation in August, 4.8 percent per year.) We see that the expected inflation rate (from August 1993) to August 1995 is below the maximum target-consistent inflation rate to that month, whereas the expected inflation rate to August 1998 is about 0.5 percentage points above the maximum target inflation rate to that month. Absolute credibility and credibility in expectation is therefore rejected for the 5-year horizon, but not for the 2-year horizon.

The corresponding expected real yields to maturity on August 18, 1993, are given by the vertical difference between the yield curve and the expected inflation curve in Figure 5b. The expected real yields are 3-3.5 percent per year for 2 and 5-years maturity, roughly 2 percentage points below the mean ex post 5-year yields reported above.

From the observations of the expected inflation rates it follows that the expected "forward" inflation rate from August 1995 to August 1998 is 4.5 percent per year, higher than the expected inflation rate of 4.0 percent per year from August 1993 to August 1995.[9] The thin solid curve in *Figure 5c* shows these expected forward inflation rates, plotted against the midpoints of the period to which they refer (August 1994 being the midpoint of August 1993-August 1995, February 1997 being the midpoint of August 1995-August 1998). The expected inflation rate from August 1995 to August 1998 exceeds the maximum target inflation rate for those years by 1.5 percentage points. The corresponding expected real forward rates are about 3 percent per year for 1994 through 1996.[10]

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[9] We have $[(5 \text{ yrs} \cdot 4.0\%/\text{yr}) - (2 \text{ yrs} \cdot 3.3\%/\text{yr})]/(3 \text{ yrs}) \approx 4.5\%/\text{yr}$.

[10] This indicates that the assumption of an expected future real interest rate equal to 4 percent per year that is used in extracting inflation expectations from forward rates in Svensson (1993a) is unlikely to be an overestimate.

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6. Summary and Conclusions

Two concepts of credibility, called absolute credibility and credibility in expectation, can be distinguished. A simple test of inflation target credibility has been demonstrated, namely to subtract from the nominal interest rate the target-consistent range of inflation rates to the corresponding maturity. This results in a target-consistent range of real yields to the relevant maturity. If market real interest rates on real bonds are available, the test is simply to examine whether or not the market real interest falls within the target-consistent range of real yields. Without market real interest rates, the test consists of judging whether or not expected real yields are likely to fall within the target-consistent range of real yields. The test can be done on time series data for a particular maturity, on the yield curve for a particular trade date, or on the forward rate curve for a particular trade date. If survey data on inflation expectations are available, the easiest test is to simply compare these with the target-consistent range of inflation rates.

A brief examination of the credibility of the inflation targets of Canada, New Zealand and Sweden is inconclusive for Canada, tends to reject inflation target credibility for the early period of inflation targeting for New Zealand but not reject credibility after mid 1992, and currently rejects credibility for the recent inflation targets for Sweden (on a 5-year horizon but not on a 2-year horizon). That inflation target credibility is currently rejected for Sweden should perhaps not be surprising: the experiences of Canada and New Zealand indicate that some time may be needed after the inflation targets are announced to achieve credibility.

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Figure 1a
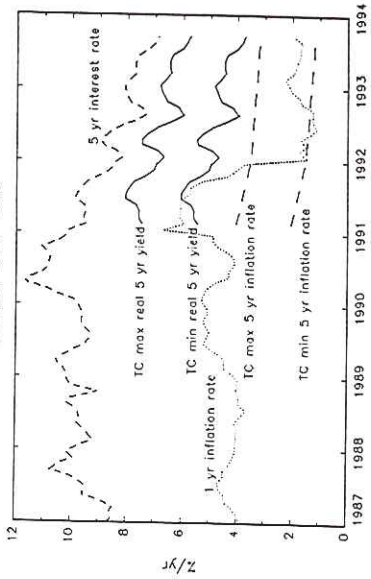Target-Consistent Min and Max Real 5-Year Yields
Canada, 1987-1993

Figure 1b
Target-Consistent Min and Max Real 5-Year Yields
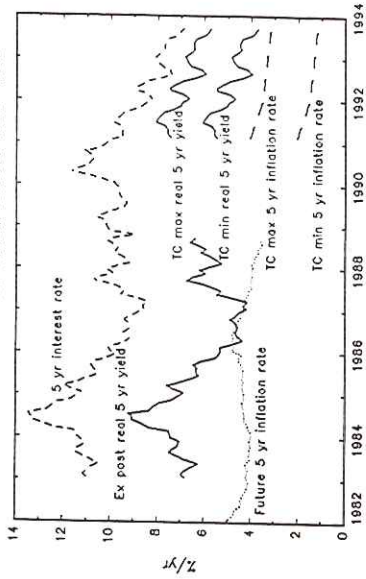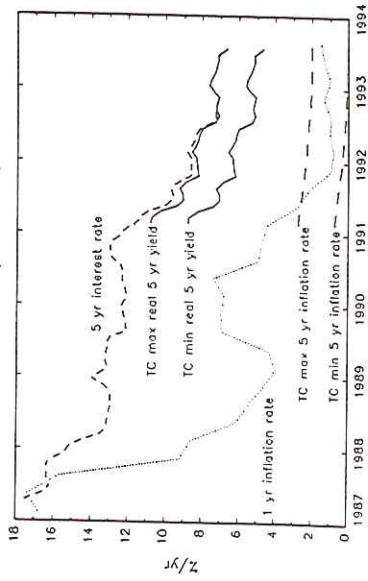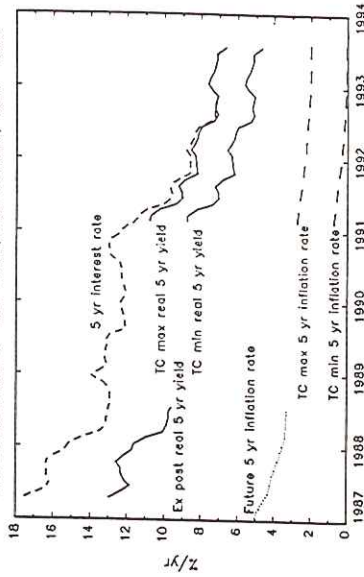and Ex Post Real 5-Year Yields, Canada, 1983-1993

Figure 2a
Target-Consistent Min and Max Real 5-Year Yields
New Zealand, 1987-1993

Figure 2b
Target-Consistent Min and Max Real 5-Year Yields
and Ex Post Real 5-Year Yields, New Zealand, 1987-1993

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Figure 3b
Target—Consistent Min and Max Real 5—Year Yields
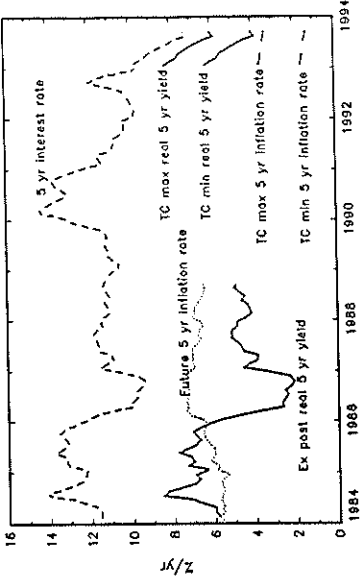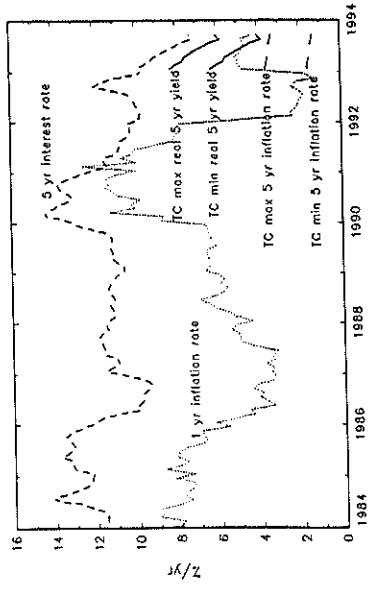and Ex Post Real 5—Year Yields, Sweden, 1984—1993

5 yr interest rate

TC max real 5 yr yield
TC min real 5 yr yield

Future 5 yr inflation rate

Ex post real 5 yr yield

TC max 5 yr inflation rate —
TC min 5 yr inflation rate —

%/yr

16
14
12
10
8
6
4
2
0

1984   1986   1988   1990   1992   1994

Figure 4b
Target—Consistent Min and Max Real Forward Rates
Sweden, 18 Aug 1993

Nominal forward rate

TC max real forward rate

TC min real forward rate

Max target inflation rate

Min target inflation rate

%/yr

12
11
10
9
8
7
6
5
4
3
2
1
0

1993   1996   1999   2002

Settlement date

Figure 3a
Target—Consistent Min and Max Real 5—Year Yields
Sweden, 1984—1993

5 yr interest rate

TC max real 5 yr yield
TC min real 5 yr yield

TC max 5 yr inflation rate
TC min 5 yr inflation rate

1 yr inflation rate

%/yr

16
14
12
10
8
6
4
2
0

1984   1986   1988   1990   1992   1994

Figure 4a
Target—Consistent Min and Max Real Yields to Maturity
Sweden, 18 Aug 1993

Nominal yield to maturity

TC max real yield to maturity

TC min real yield to maturity

TC max inflation rate to maturity

TC min inflation rate to maturity

%/yr

11
10
9
8
7
6
5
4
3
2
1
0

1993   1996   1999   2002

Maturity date

Figure 5b
Expected Inflation Rates to Maturity and Target-Consistent
Max and Min Inflation Rates to Maturity, Sweden, 18 Aug 1993

Nominal yield to maturity
TC max real yield to maturity
TC min real yield to maturity
Exp inflation rate to maturity
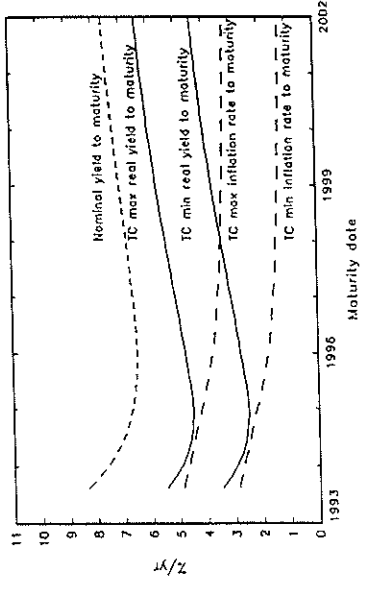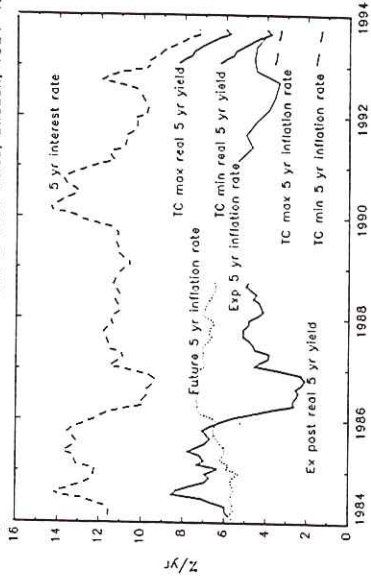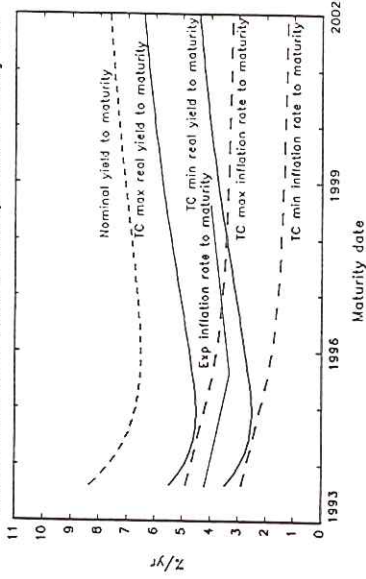TC max inflation rate to maturity
TC min inflation rate to maturity

Maturity date

%/yr

Figure 5a
Expected 5-Year Inflation Rates and
Target-Consistent Min and Max Real 5-Year Yields, Sweden, 1984-1993

5 yr interest rate
TC max real 5 yr yield
TC min real 5 yr yield
Future 5 yr inflation rate
Exp 5 yr inflation rate
TC max 5 yr inflation rate
TC min 5 yr inflation rate
Ex post real 5 yr yield

%/yr

Figure 5c
Expected Forward Inflation Rates and
Max and Min Target Inflation Rates, Sweden, 18 Aug 1993

Nominal forward rate
TC max real forward rate
TC min real forward rate
Expected forward inflation rate
Max target inflation rate
Min target inflation rate

Settlement date

%/yr
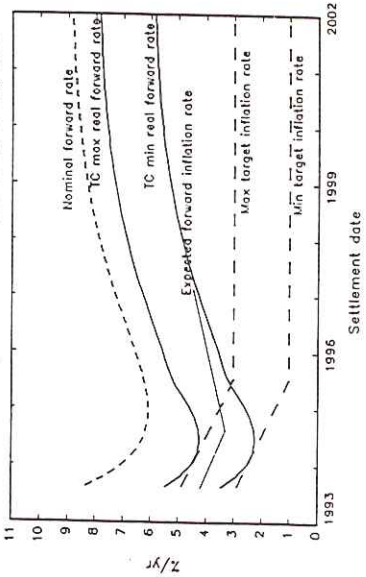
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