THE CENTRAL BANK OF THE REPUBLIC OF TURKEY

CREDIBILITY OF MONETARY REGIMES: IS INFLATION TARGETING DIFFERENT?

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RESEARCH DEPARTMENT
Discussion Paper No: 2002/1

ANKARA
January, 2002

* We would like to express our gratitude to Peter Sinclair, the project team members, Runchana Pongsaparn, Bojan Markovic, Alex Valkovszky, Dan Huynh, Gill Hammond, Lavan Mahadeva and Paul Robinson for valuable suggestions. We also thank Tony Ison for excellent research assistance, Çiğdem Koğar and Emma Hollis making data available.

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Paper presented at CCBS conference 'Inflation and Monetary Regimes' on 4 June 2001

This version: January 2002

ABSTRACT

The objective of this paper is to examine whether inflation targeting has added to the credibility of central banks. We examine the information content of the term structure for future inflation. There is strong evidence that there is no built-in credibility of announcing inflation targets. We classify the credibility as *'credibility of intention', 'credibility of ability' and 'credibility of future monetary policy'*. It seems that the initial years of inflation targeting can be interpreted as an effort to gain the credibility of ability.

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I. INTRODUCTION

The objective of this paper is to examine whether inflation targeting has indeed added to the credibility of central banks. Credibility is defined here as the extent to which changes in the yield curve reflect expected changes in inflation. We analyse whether the move to inflation targeting has had an impact on credibility and compare the results to countries that target the growth of monetary aggregates or the exchange rate. The analysis in this paper may also shed light on the importance of the speed of disinflation for monetary policy credibility and the time it takes to develop credibility after a change in regime.

The next section provides a motivation for this paper and a review of the literature on the credibility of inflation targets. Section 3 sets out the monetary transmission mechanism, expectations theory and its relevance for the credibility of monetary policy frameworks. Section 4 describes the approach to the credibility issue, whereas section 5 presents the expectational and causal interpretation of the credibility parameter (β_n) under the assumption of rational expectations. Section 6 gives the empirical results and the last section presents a brief summary and conclusions.

II. MOTIVATION AND LITERATURE SURVEY

The literature on the importance of central bank credibility for the effectiveness of monetary policy has progressed rapidly over the past decade or so (see Cukierman 1992, Briault, Haldane and King, 1996 and Nolan and Schaling, 1996 for an overview). From this literature it appears that central bank (or monetary policy) credibility and transparency are mutually dependent variables. Credibility facilitates the transmission and the acceptance of the central bank's true policy intentions by the public, and conversely policy transparency contributes to credibility. But credibility is not gained overnight, central banks have to pass a test over a number of years in terms of achieving favourable monetary policy outcomes for the domestic economy, as well as being committed to their publicly declared objectives. Since at least the beginning of the 1990s almost every central bank has considered price stability (i.e. low inflation) its primary policy objective. Favourable monetary policy is therefore traditionally interpreted as one that leads to price stability, without significant output losses. When a high inflation country wants to make a transition to price stability a policy of gradualism is most likely to be credible and such a gradual disinflationary approach is more likely to limit output losses than a 'cold turkey' policy.

Credibility has important effects on the public's inflation expectations. Since inflation expectations affect forward-looking wage contracts and long-term nominal interest rates, credibility also has direct links to the real side of the economy. For example, if a central bank changes its monetary regime or lowers its inflation target, and if the economic agents quickly perceive this change as credible, such that their inflation expectations are lowered, expected inflation errors will be non-systematic and output losses will consequently be minimised. In this respect, credibility helps a central bank in achieving its announced policy objectives, because it reduces the output costs of disinflationary monetary policy.

Over decades, both monetary theorists and policy makers have evaluated the costs and benefits of different approaches to achieving price stability, both in terms of monetary regime and in terms of speed of disinflation. During the Bretton Woods era, exchange rate stability was considered to be the best means of achieving domestic price stability. After its breakdown some countries resorted to monetary targeting (e.g. Germany, Switzerland), while others continued to hold on to some form of managed exchange rate system (the most prominent example being the ERM in Europe, which resulted in the creation of the euro in January 1999). Other countries changed regime frequently over time (such as the UK) or did not adhere to an explicit regime at all (e.g. Japan and US). In the 1990s a steadily increasing number of (industrialised and developing) countries have adopted some form of explicit inflation targeting as their main policy strategy (with New Zealand being the first in 1989 and Iceland and Norway as the most recent converts), in which the monetary authorities make explicit commitments to achieving and maintaining low rates of inflation in the medium run.

Siklos (1998) summarises possible ways of gaining credibility in inflation targeting regimes as follows: a) Inflation targeting can help clarify the tasks of the central bank and quantify them in an objective and verifiable manner, b) By adopting statutes that ensure the autonomy of the central bank, the location of the responsibility for meeting the targets is well defined, c) Experience with an inflation targeting regime can readily influence expectations of inflation which are central to economic agents' decision making process. Central bank accountability and transparency than take on important roles. Svensson (99) claims that in a credible inflation-targeting regime, there is no possibility of a liquidity trap since private inflation expectations will be anchored to the inflation target and the level of real interest rates should stimulate the economy.

Due to the limited success of previous monetary regimes, such as exchange rate and monetary targeting, in terms of achieving low and stable inflation, many industrialised and developing economies have adopted a form of direct inflation targeting since the late 1980s. Several authors consider inflation targeting a superior strategy to reduce inflation quickly with relatively minor output losses (see Corbo et all, 2000). This may be because a policy of inflation targeting is more transparent and easier to understand for the public than other monetary regimes. This higher transparency in turn may lead to more and faster gains in central bank credibility. If an inflation targeting central bank clearly states its commitment to low and stable inflation, expectations will be adjusted downward in line with actual inflation outcomes. Such a credible monetary policy has a stabilising effect on the macroeconomy and adds to the success of anti-inflationary measures, while keeping output losses small. It is important in the build-up of credibility that inflation-targeting central banks allow some accommodation of temporary shocks to the economy (see King 1996). This implies that a central bank's reaction function includes other variables in addition to inflation per se. This enhances credibility, because the public learns that price stability is an objective that is not to be met at any cost.

Over the past decade several methods to test the credibility of inflation targets have been used. Svensson (1993) adopts the following procedure: (i) Subtract the maximum and minimum inflation rates which are consistent with the inflation target from the yields to maturity on nominal bonds. This results in a target-consistent range of real bond yields; (ii) If expected real yields (equals the difference between the nominal yield to maturity and the expected inflation rate to maturity), or real interest rates bonds - where available - fall outside the range of target-consistent real yields, monetary policy credibility is rejected. Using this method, Freeman and Willis (1995) derived inflation-target-consistent (ITC) real yield curves from equation (1).

$$i_t = r_t + E(\pi)_t + \theta_t , \qquad (1)$$

where, i_t, is the nominal interest rate, r_t is the real rate of the same maturity, $E(\pi)_t$ is the expected inflation rate over the same time horizon, and θ_t reflects the (time varying) risk premium. But there are important weaknesses of this approach. (i) The suitability of ITC curves as a basis for assessing progress on policy credibility may vary, especially at the short end of the maturity spectrum (Mishkin (1990a) states that most fluctuations in the slope of the term structure at the very short end reflect changes in the slope of the term structure of real interest rates on a one-for-one basis and do not reflect changes in expectations about future changes in inflation). (ii) Long-term interest rates are more likely to be stable than short rates, since, over the very long run, the long-term real interest rate is a deep parameter reflecting the long-run return on capital. However, over a shorter horizon – equal to or less than the length of a typical business cycle – even long-term real rates may not be constant, (iii) shifts in demand for resources and financial capital over the business cycle, along with changes in the current and expected stance of monetary policy, could be important sources of cyclical variation of long-term rates, (iv) other fundamental factors – including changes in fiscal positions, private saving and investment patterns, and technical change (both real and financial) in an economy – might influence real rates as well. But at the same time, shifts over time in the position of an ITC yield curve can happen when either nominal rates change or when the inflation rates required to meet particular benchmarks changes.

In this study, inflation targeting industrial countries – New Zealand, Canada, the UK and Sweden, display substantial drops in ITC curves between the initial date and several years later. These declines – between 3 and 5 percentage points – suggest that a substantial gain in credibility occurred in this period, although it may not be entirely due to the new monetary framework, inflation targeting[1].

Svensson's third method in the study is to use forward rates to extract the credibility. Svensson also suggests that – if available – survey data on inflation expectations can be used to examine the credibility of inflation targets by comparing whether these inflation expectations fall between the target consistent minimum and maximum inflation rates. Using this method, Svensson (99) checked the credibility of inflation targets in Sweden for the period 1993-1999. Using survey data for 3-5 years ahead, inflation expectations and the inflation targets were compared and Svensson found that in the first 3 years of the inflation-targeting regime the credibility of the target was low. But since 1997, inflation expectations have been inside the tolerance interval of the inflation targets. From 1998, five-year expectations and three-to five-year expectations have been close to the 2 percent inflation target. This indicates that to gain credibility is a slow process, which sometimes takes almost a half-decade.

Johnson (1998) uses two approaches by using survey data to test the credibility and success of monetary policy. If a country has a formal inflation target the difference between the inflation forecast in the survey and the announced inflation target is considered a direct measure of credibility. The second approach includes all countries in

[1] It may reflect also the fact that inflation targeting was introduced after crises, when credibility would be below normal.

the survey and analyses forecast errors by comparing the inflation forecast from the survey with actual inflation. Forecast errors of the private sector are related both to the credibility of monetary policy (whether the public has confidence in the central bank meeting its target rate of inflation) and to the ability of the central bank to keep actual inflation close to the target.

The paper concludes that, it was difficult to establish credible inflation targets. Canada and New Zealand were the most credible inflation targeting countries, for most countries –both inflation targeting and non-inflation-targeting countries-the disinflations of the 1990s were unanticipated, and there is substantial evidence that targets were not instantly credible.

Siklos (1998) tests the inflation persistence after the introduction of inflation targeting in the IT countries, found some evidence of a break in inflation persistence for Canada and New Zealand.

Kahn and Parrish (99) estimate central bank interest rate reaction functions before and after the adoption of inflation targeting. They test the hypothesis that all reaction function coefficients jointly are the same in the two periods and use the estimated policy reaction function for the pre-inflation targeting regime to forecast the policy rate over the post-inflation targeting period. In this study, it appears that industrialised economies that have adopted inflation targets gained most credibility after the initial successes in lowering inflation. This suggests that credibility is endogenous to the results of inflation targeting. There are no explicit differences between inflation targeting regimes and other regimes in the 1990s; almost all countries analysed show an unexpected decline in inflation rates.

III. MONETARY TRANSMISSION MECHANISM, EXPECTATIONS THEORY AND CREDIBILITY OF THE MONETARY POLICY

The standard view of the monetary policy transmission mechanism is that monetary policy actions affect the economy via market interest rates. The monetary transmission mechanism simply relies on the expectations theory of the term structure of interest rates, which states that long-term rates are an average of current and expected future short-term rates over the maturity of the longer-term asset[2]. A contractionary monetary policy is expected to manifest itself in rising short- and long-term rates of interest. In the absence of credibility effects, the rise in the central bank's policy rate leads to an increase in current and expected future short-term rates (and therefore in longer-term rates across the maturity spectrum as well) by altering market expectations. But if monetary contraction is expected to succeed in reducing inflation it may reduce implicit future nominal short rates in the longer end of the spectrum[3]. However, empirical analysis of the relationship between monetary policy actions and long-term interest rates casts some doubt on this standard view.

The analysis in Roley and Sellon (1995) shows that the response of long-term rates to policy actions can be highly variable depending on the changing views of market participants as to the future direction of monetary policy. Assuming investors have a four-

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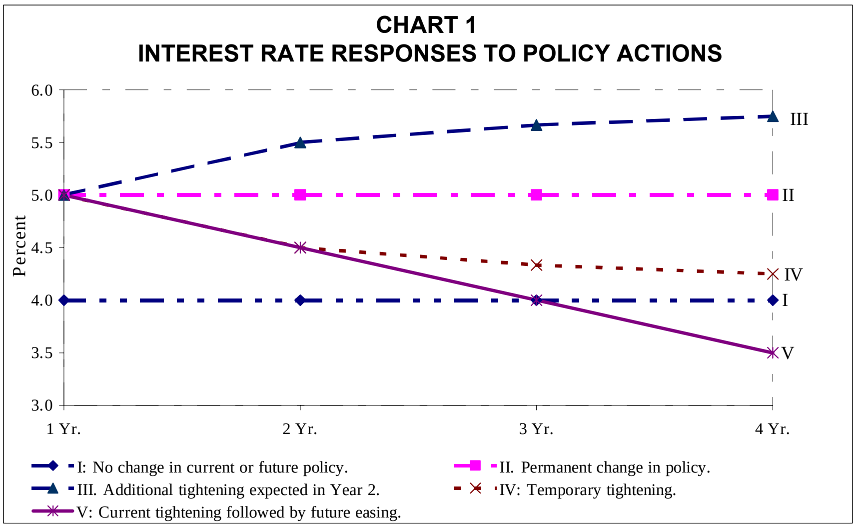
[2] Here, we may ignore the term premium to simplify the analysis. Since the expected future rates are uncertain, the investors demand a risk premium to hold longer-term securities.

[3] An upward-sloping yield curve may point to loose monetary policy and a downward-sloping yield curve to a restrictive monetary policy.

year horizon and current interest rates are at 4% the paper distinguishes five different scenarios according to market expectations of future short-term interest rates. The market's expectation may lead to changes in forward rates, which in turn will result in different responses of long-term rates. In the first scenario, the economic agents expect no change in official rates at all over the four-year horizon. This implies that one-year forward rates will remain the same as short rates and the term structure will be flat across all maturities (Chart 1).

In scenario two, the central bank raises official rates permanently by 1 pp throughout the four-year period. In this case the forward rates will also rise by 1 pp for the following three years, which means that there will be a parallel shift in the yield curve at all maturities to 5 percent. In other words, if investors believe that a policy action will persist over the 4-year period, there will be a one-for-one movement of short and long rates. In the third scenario, agents interpret the 1 pp rise in short rates as the first step in a policy of further tightening by 1 pp in the second year, with no further changes in years three and four. In this case the one-year forward rates increase to 6 percent from year two onwards leading to an upward-sloping term structure. This scenario represents an overreaction of the markets to the rise in short-term rates.



Scenario four is one in which the first year rate rise is expected to be offset in the second year such that forward rates are back at 4% from year two onwards. In this case, the one-year rate rises 1 pp, but the rates for other maturities remain unchanged, leading to a downward sloping term structure. Here, medium- and long-term rates rise less than short-term rates in response to the monetary policy action, such that the further along the maturity spectrum the less rates will rise. Consequently, the yield curve becomes downward sloping. Finally, and crucial for our further analysis, if agents expect the short-term 1 pp tightening in monetary policy to be reversed by a significant easing in the future, forward rates will fall below 4% and long-term rates may fall so much that the yield curve becomes sharply inverted. This effect represents a credible tightening in monetary policy, which results in lower long-term interest rates because inflation expectations fall in response to the policy action.

IV. EMPIRICAL APPROACH

The behaviour of the term structure has been the subject of a wide range of research on whether anti-inflation policies have been credible or not. Mishkin (1990a, 1990b, and 1991) finds that, in addition to information about future interest rate movements, the term structure may also contain information about the future path of inflation. The approach is based on the Fisher decomposition (see derivation in Estrella et al, 2000), which states that the m-period nominal interest rate, $i_t^{(m)}$, can be divided into two components: the *m*-period ex ante real interest rate, denoted $E_t r_t^{(m)}$, and the expected inflation rate over the next *m* periods, denoted $E_t\ \pi_t^{(m)}$:

$$i_t^{(m)} = E_t r_t^{(m)} + E_t\ \pi_t^{(m)}. \tag{2}$$

If expectations are rational, the expected inflation rate can be written as the realised inflation $\pi_t^{(m)}$ plus an error term $\varepsilon^{(m)}_{t+m}$ that is orthogonal to information at time *t*:

$$\pi_t^{(m)} = E_t\ \pi_t^{(m)} + \varepsilon^{(m)}_{t+m}. \tag{3}$$

Substituting for $E_t\ \pi_t^{(m)}$ from equation (1), we obtain:

$$\pi_t^{(m)} = i_t^{(m)} - E_t r_t^{(m)} + \varepsilon^{(m)}_{t+m} \tag{4}$$

The difference between inflation over the next *m* years and inflation over the next *n* years (*m>n)* can be written in estimable form, as follows:

$$\pi_t^{(m)} - \pi_t^{(n)} = a_1^{(m,n)} + \beta_1^{(m,n)} (i_t^{(m)} - i_t^{(n)}) + \eta^{(m,n)}_{1,t+n} \tag{5}$$

Where $a_1^{(m,n)} = -(E_t r_t^{(m)} - E_t r_t^{(n)})$ is the slope of ex ante real rates and

$\eta^{(m,n)}_{1,t+n} = \varepsilon^{(m)}_{t+n} - \varepsilon^{(n)}_{t+m}$ is an error term.

Assuming that the real interest rate is constant over time, that expectations are formed rationally, the risk premium is constant over time and the composite error term has standard properties, the information content of the term structure can be testing whether β_1 is significantly different from zero. If this hypothesis is rejected, the term structure $i_t^{(m)} - i_t^{(n)}$, contains significant information concerning future changes in inflation and the slope of the real term structure does not move one-for-one with that of the nominal term structure.

Mishkin (1990a), estimates equations for the change in inflation in three different periods for US data. The results show that the term structure for maturities of six months or less does not contain significant information about the path of future inflation. Most fluctuations in the nominal term structure reflect fluctuations in the real term structure and do not imply changes in expectations about future inflation. Finally, the estimated β has increased during the period 1964 to 1979, which means that the rise in long rates reflected an increase in inflation expectations. The evidence of much of the research shows that the term structure does have a significant role in forecasting future changes in inflation, particularly at long maturities. This means that the term structure can be used to help assess long-run inflationary pressures: a steepening of the term structure at the longer end may indicate that inflation that will rise several years ahead and, conversely, a negative slope indicates an expectation inflationary pressures will fall. We can therefore use the term structure as an instrument to test the credibility of the relatively young regime of inflation targeting.

V. THE EXPECTATIONAL AND CAUSAL INTERPRETATION OF β_N UNDER ASSUMPTION OF RATIONAL EXPECTATIONS

The coefficient β_n in equation (5) indicates the information content of the nominal term structure of interest rates for future changes in inflation. As mentioned above, a value of β_n statistically different from zero provides evidence that the term structure contains significant information about future changes in inflation. A value of β_n statistically different from one indicates that the slope of the real term structure is not constant over time and that the nominal term structure contains some information about the real term structure.

The theoretical relationship between the term structure of interest rates and changes in future inflation is based on the assumption that the medium-run term structure reflects agents' rational expectations of future changes in inflation. An alternative for this interpretation can be as follows; changes in the term structure reflect the market's assessment of the stance of monetary policy for reasons explained in Section 4.

VI. EMPIRICAL RESULTS

In the first part of our empirical study the inflation difference equations (5) are estimated for each individual country to figure out whether the term structure contains information about future inflation.

The term structure spread is measured as the difference between the yield on a long-term government bond and a 3-month rate. For Australia, Ireland and New Zealand inflation is estimated as 100 times the change in log consumer price index over the previous four quarters. For the remaining countries, inflation is estimated as 100 times the change in the log consumer price index over the previous twelve months. As stated in Kozicki (1998), measuring inflation over a year reduces measurement difficulties that arise when inflation is calculated over shorter intervals. First, month-on-month and quarter-on-quarter measures of inflation tend to be volatile, with much of the volatility regarded as noise or seasonality. Second, rounding problems introduce spurious volatility in these short-period measures of inflation over much of the early sample.

Table 1 contains summary statistics on the term structure spread and one-year inflation rates. For each series, the third column reports the sample mean, the fourth column reports the standard deviation and the fifth and sixth column report correlation coefficient with the spread with one-year inflation rates. The term structure spread and inflation are negatively correlated for 11 countries (Belgium, Canada, France, Germany, Italy, Japan, Norway, Spain, Sweden, Switzerland and USA) and positively correlated for 12 countries in our sample.

Table 2 reports autocorrelation coefficients for one-year inflation rates. Inflation persistence refers to an important statistical property of inflation, namely that its current value is influenced strongly by its past history. In particular, persistence after 24 months is low in Germany, Japan, Korea, Sweden and the US. Persistence is high in Canada, France, Italy, Portugal, South Africa and Spain.

Data constraints limit this study to estimate the basic inflation-change equations of Jorion and Mishkin (1991), Gerlach (1995) and Day and Lange (1997) that match the inflation horizons to the band maturities in the term structure spread. Inflation-change equations of the form,

$$\pi_{n,t+1} - \pi_{3,t+1} = a_n + \beta_n (R_{120,t} - R_{3,t}) + \text{resid}_{t+1} \qquad (6)$$

are estimated, where ($R_{120,t}$ – $R_{3,t}$) is the term structure spread between 10 year bond and 3 month treasury bill rate and ($\pi_{n,t+1}$ – $\pi_{3,t+1}$) is the difference between $\pi_{n,t+1}$, (the n month ex-post inflation rate from month t to month t+n expressed at an annual rate) and current inflation $\pi_{3,t+1}$.

The 1-year inflation rate from month t-9 to month t+3 is used for $\pi_{3,t+1}$, instead of the 3-month inflation rate from t to t+3 to reduce volatility due to noise and rounding of the price index. The horizon, n, of the forecast varies between 12, 36 and 60 months[4].

Table 3 reports the estimation of the inflation-change equation (6)[5]. The β_n tends to increase in magnitude with n, which can be explained by the variability of inflation increasing relative to that of the real term structure. Since inflation rates are less variable than real interest rates in the short-run, coefficients on the term structure can be expected to be smaller for shorter-term maturities than for longer maturities. Furthermore, the coefficient is larger for higher correlations between the change in expected inflation and the slope of the real term structure (Day and Lange, 1997).

For n = 12, only for Iceland and Japan does the nominal term structure of interest rates have information for the future path of the inflation, but the sign for β_n for Iceland is negative. This result is consistent with the previous results in Mishkin (1990a,b and 1991).

For n = 36, the estimates for β_n are significant for 11 of the 23 countries: Australia, Canada, Finland, France, Germany, Iceland, Japan, Portugal, Spain, Sweden, Switzerland, United Kingdom and

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[4] Estrella and Mishkin (1997) and Kozicki (1998) also relax the maturity-matching restrictions.

[5] Standard errors of coefficient estimates are corrected for heterocedasticity and serial correlation using Newey and West (1987) procedure.

USA. All counties' β_n estimates are positive except for Iceland, Portugal and Spain.

For n = 60, the estimates for β_n are significant for 15 of the 23 countries: Australia, Belgium, Canada, Denmark, Finland, Iceland, Ireland, Japan, New Zealand, Portugal, Spain, Sweden, Switzerland, United Kingdom and USA. R^2 increases with n for almost all countries, which is in line with the findings of Mishkin and Jorion (1991). At longer horizons the variability of expected inflation changes increases in relation to the variability in the real-term-structure, which leads to term structure containing more information about future inflation.

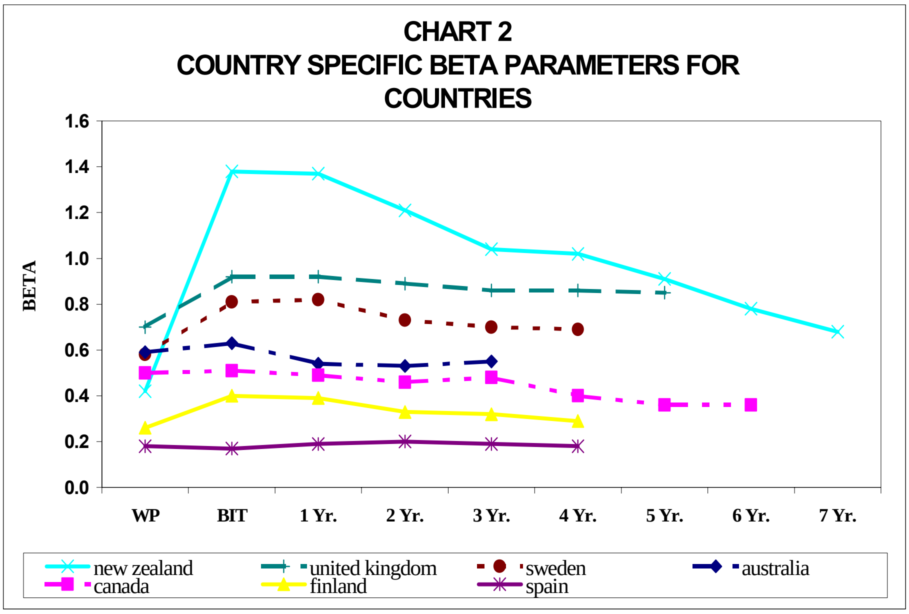
VI.1. A Proxy for the Credibility of Inflation Targeting

VI.1. a. Individual Country Results

The extent of the flattening of the yield curve in response to a change in the monetary framework or to central bank actions can be interpreted as the credibility of the new framework. In this argument, the recursive estimation results of the individual countries are given in Table 4.

The expected 1-year-ahead inflation rate for 1997 is the change in the CPI from January 1997 to January 1998; the 3-year-ahead inflation rate is measured from January 1997 to 2000 January and so on. Since the last observation is January 2000 for most of the countries, 3-year ahead inflation rate is used to compare the country specific β_n before and after inflation targeting was introduced. The chosen starting date for the regressions is 1977, after the end of the Bretton Woods era and after first and most of the second round effects of the first oil shock to 1997.

For all inflation targeting countries, the slope of the term structure flattens during the inflation-targeting regime (Table 4). But there is no significant change in the term structure spread in the initial years of the new regime which means that announcing inflation targets does not bring immediate credibility which would reduce inflation expectations (Chart 2).

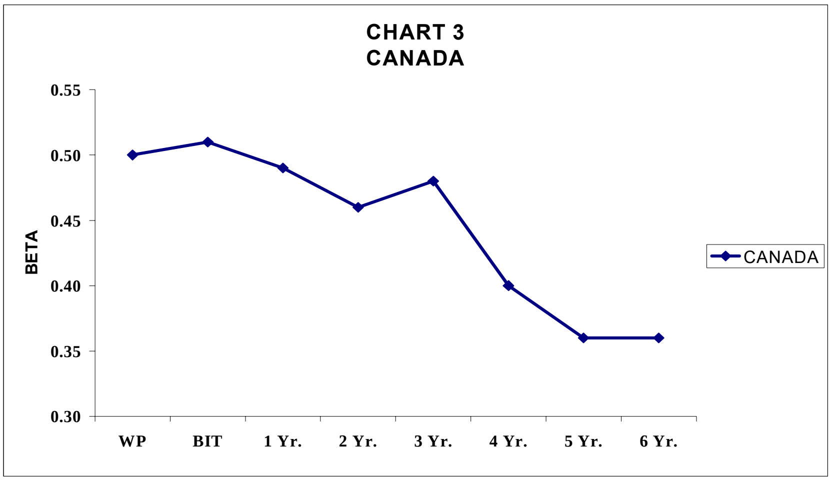


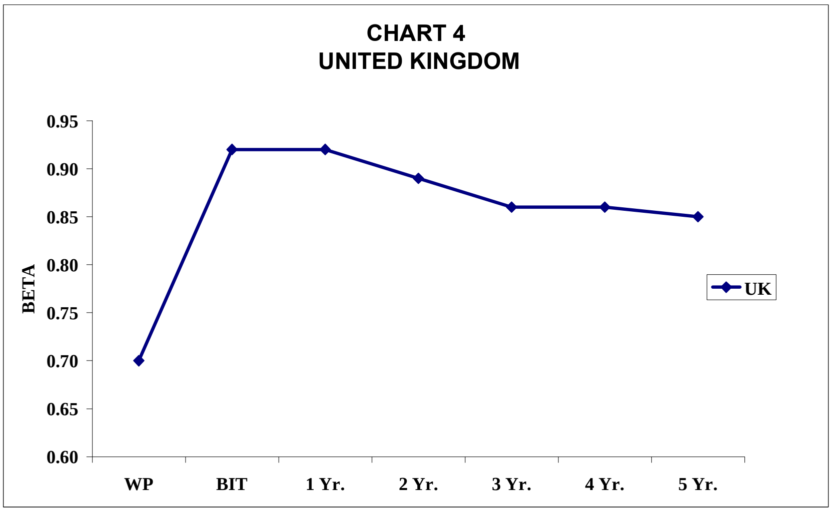
As stated in King (1996), "*in general, an announcement by the central bank that in the future the inflation target will be consistent with price stability does not command immediate credibility. It takes time for the private sector to be convinced that the target will be chosen to be consistent with price stability. The private sector will try to learn about the true preferences of the central bank. Their announcements will not necessarily be taken at face value. Modelling learning is difficult*".

To interpret carefully the initial years of inflation targeting, we can use Miller's (1997) discussion of Johnson's paper. She distinguishes two types of credibility: one is *'credibility of intent'* and the other is "*credibility of ability"*. If agents believe that the central bank will try to hit its target, we can define this as "credibility of intent", and if agents believe that the central bank will be able to control inflation, this is the credibility of ability. For an inflation target to be credible, a central bank needs both types of credibility. This distinction is very important in explaining the initial years of inflation targeting regimes, when the central banks have the intention to reach their target, which be may describe as them as the credibility of intent. But, since they do not yet have a track record in fighting inflation, they don't have the credibility of ability. So, we can interpret the initial years of inflation targeting regime as an effort to gain 'credibility of ability'.

To test if there is a structural change after the adaption of the inflation-targeting regime, the Chow Breakpoint Test is used for equation 5 for parameter β_n and the results are summarised in Table 6. For Canada, Finland, New Zealand and Sweden the null hypothesis of no structural change is rejected at 1- percent significance level[6].

[6] The test for Australia is not so powerful compared to other countries in the sample. To carry out this test, the data are split into two groups and each sub-sample requires at least as many observations as the number of parameters. Since there is no monthly inflation available for Australia, the inflation targeting regime test is done with insufficient number of observations.



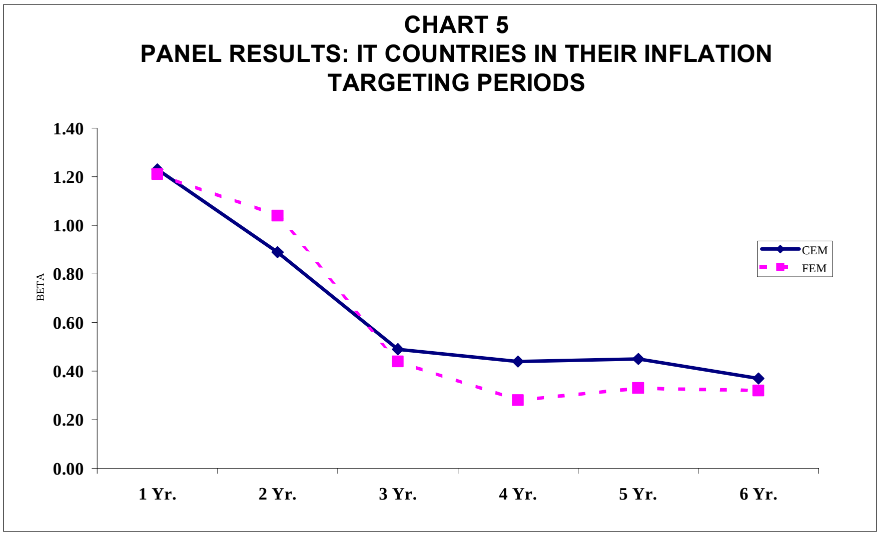


We find no evidence for a structural shift in the United Kingdom. This result is consistent with the result of Ricketts and Rose (1995) which points out that the fall in inflation in the 1990s has not been interpreted as a move to a low-inflation state for the United Kingdom (Chart 3 and Chart 4)[7].

[7] For the UK the differences between indexed and unindexed bond yields are interesting to observe. Long-term nominal interest rates fell sharply after "operational independence" was announced in May 1997.

VI.1. b. Panel Results for Inflation Targeting Countries

For IT countries, Table 7 summarises the panel regression results for Canada, Finland, Sweden and the United Kingdom, which are consistent with the individual country results. The coefficients are significant statistically and have the expected signs. The slope term that is a proxy for inflation expectations slows down considerably after 1994, almost 3 years after the implementation of the first inflation-targeting regime (Chart 5).



Due to the volatility of Spanish data, the results including this country are given at Table 8. The exclusion of Spain does not change the results significantly. Another interesting result is that the slope of the term structure spread increases after 1996, which is an early indication that the inflation expectations increase for the year 1999. This result is consistent with Siklos (1997) who finds that the private sector inflation expectations in inflation targeting countries picked up in 1996, for the year 1997.

The panel results regardless of the regime (money, exchange rate or inflation targeting) of the inflation targeting countries are summarised in Tables 9 and 10. The term structure spread flattens but not as much as in the results shown in Table 7 and 8. There is no indication of the rise in inflation expectations for 1999 that we have found in Table 7 and 8.

Table 11 compares the inflation targeting countries over different monetary regimes. When we compare their monetary regimes and the period over which they target inflation, there is no difference if we take into consideration the common effects model. But according to the fixed effects model, they do better in inflation targeting periods compared to periods when they adhere to other monetary regimes. So, the result is inconclusive if we compare monetary and inflation targeting periods for countries that target inflation at the moment.

If we compare monetary and inflation targeting regimes with exchange rate targeting periods, there is evidence that the monetary and inflation targeting regimes are superior to exchange rate targeting regimes in reducing inflation expectations. Section 6.3 provides more detail on the differences in credibility between IT and other monetary regimes.

This result is consistent with the results of Alogoskoufis and Smith (1991). In their study, they find that monetary and exchange-rate accommodation increases stet the gold standard and Bretton Woods to managed-exchange-rate regimes. These shifts coincide with the increase in the persistence of both average and relative inflation rates. Fixed-exchange rate regimes based on gold seem to have resulted in low monetary accommodation and low inflation persistence. What is required for low inflation persistence is *credible* lack of accommodation. This credibility can be achieved through some form of precommitment. A gold standard is one way to achieve it, another way is central bank independence, coupled with monetary constitutions that put a lot of weight on price stability (Barro, 1982).

The common approach in both inflation targeting regimes and money targeting regimes is their pre-commitment to a pre-announced policy of targeting a nominal anchor. Both of them have credible lack of accommodation, which obtain low inflation persistence and expectations.

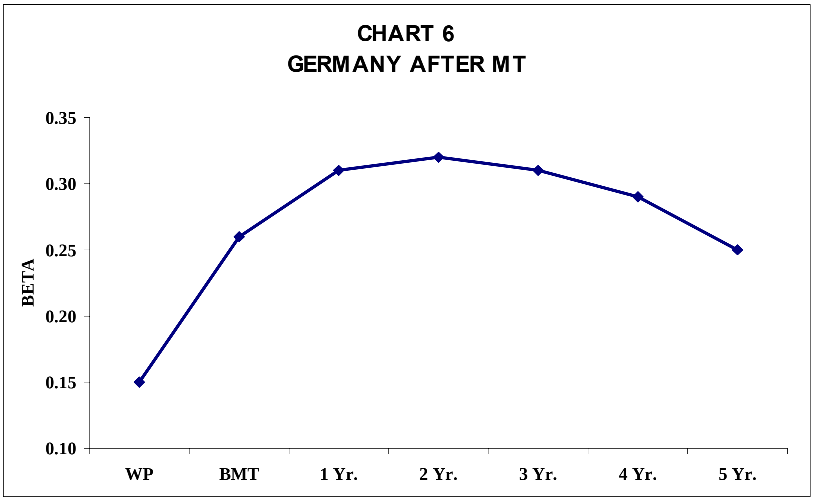
VI.2. A Proxy for the Credibility of the European Union (EU) Nominees after the Maastricht Treaty

The most important stage of the EU was the Treaty for European Economic and Monetary Union, which was agreed in December 1991 and signed in Maastricht on 7 February 1992. This treaty established the institutional framework for monetary policy under European Monetary Union, a timetable for the creation of a monetary union, and the criteria for country participation. One of the most influential criteria in the Maastricht Treaty (MT) is about the inflation rate, which requires an ambitious inflation target rate[8], from their nominees to be realised in 1998.

Tables 12a and 12b summarise the results of the EU countries after the announcement of the Treaty. The slope of the term structure picks up in Germany and Austria in the following two years after the MT, which indicates that the credibility of the Treaty was not sufficient to flatten the term structure in these countries. On the contrary, agents believed that the interest rates would be higher for a couple of years, which fits our second and third scenario in section 3. Although the reputation in fighting inflation has been very high for Germany, this result is surprising. Here, we should bear in mind the re-unification of Germany and its spill over effects for a number of years which may have led to some loss in credibility in their monetary policy (Chart 5). For the other nominees, we found negative signs for the β_n for the countries Belgium, Netherlands, Portugal and Spain.

The term structure flattens for Belgium, France, Ireland, Italy and Netherlands that points out which indicate that there is no common conclusion for slope of the term structure spread for the countries of the EU nominees after the MT.

The panel results for EU nominees indicate that there is no change in the slope term of the term structure spread in the initial years after the MT. In 1992, financial markets did not expect EMU to happen in the 1990s[9].



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[8] It was to have inflation no more than 1% higher than the average of 3 lowest countries

[9] In fact, markets continued doubt the timely arrival of EMU until late 1997 and early 1998.

This points out that to promise a regime change or an announcement of ambitious economic targets for the future do not provide initial (or ex-ante) credibility for the countries. This result is similar for the inflation targeting countries, which do not gain important credibility at the beginning of their regimes.

VI. 3. The Credibility of the Inflation Targeting Regime Compared to Other Regimes

Table 14 summarises the results of the world regimes during the period 1960 to 1997. In addition to inflation targeting countries and EU members, we add more countries where data are available for long-term interest rates. These countries are Iceland, Japan, Korea, Norway, South Africa, Switzerland and the US. For the whole period, October 1960 to December 1997, which encompasses the credibility parameter, is 0.22. When we exclude inflation-targeting periods from our sample, the credibility parameter increases 0.22 to 0.27, which implies that there is evidence that the inflation expectations surged compared to the average of our sample, for all whole monetary targeting regimes before 1992. If only the inflation-targeting period is taken into consideration, there is an important downward change in the credibility parameter, but this is statistically insignificant. Here we may conclude that there is a worldwide fall in the inflation expectations for the period 1992 and 1997.

To check the role of the inflation targeting countries during the inflation-targeting period, we exclude inflation targeting countries from the world sample and run the same regressions for the other countries. The results are summarised in Table 15. The credibility parameters decline almost 50 percent for the whole sample, which suggests the credibility of inflation targeting regimes, is lower on average compared to the other regimes in our sample period 1960 to 1997.

The world regressions are repeated excluding the EU nominees to test the importance of convergence criteria for world inflation expectations. Table 16 summarises the results of the regression, which points out that the parameters for the whole period and the period before inflation targeting increase above the level that we find for the world and for the sample excluding inflation targeting countries. This result gives some evidence to conclude that the convergence criteria for the EU nominees have led to a decrease in inflation expectations and for the whole period they have been doing better than the other countries.

VII. CONCLUSION

This study analyses the credibility of the inflation-targeting monetary framework. Although in the recent literature, there is a tendency to interpret all credible monetary regimes (like Germany and Switzerland) as being in practice equivalent to inflation targeting regimes (Bernanke et all 1999, Svensson 2000), we define their regimes as announced by the central banks. We find strong evidence that there is no in-built credibility of announcing inflation targets. There is a learning process of the private sector to figure out the true intentions and capability of central banks in reaching their targets.

The answer for the EU nominees is no different. There is strong evidence that the announcement of the convergence criteria has led to increase in inflation expectations in Germany after the announcement of EMU which – until the start of the euro - has been accepted by the public at large as the most credible monetary regime in the world so far. This is a clear indication that if a country already has a credible monetary regime and its announcement to converge its economy with other less credible regimes may lead to a loss of credibility of that country in the initial periods. Here, we should point out the fact that the re-unification of Germany might have affected the credibility of the monetary policy as well.

Structural break point tests indicate that there is a structural change in inflation expectations after the IT regime for Canada, Finland, New Zealand and Sweden, but we find no evidence of that for the UK, Spain and Australia. The panel data study for the inflation targeting countries indicates that they are not doing better in terms of inflation expectations than under monetary targeting regimes period but they are better off compared to their exchange rate targeting periods. This result is consistent with Alogoskoufis and Smith (1991), who point out the importance of commitment after finding evidence of the superiority of monetary targeting regimes to exchange rate regimes. Here, we can conclude that the details of the monetary regimes are not so important for gaining credibility. The important factor for credibility is the perception by the public of the central bank's previous performance (track record) and its willingness (eagerness) to fight inflation in the future. An alternative way to gain credibility may be convergence of the economy to another economy with a credible monetary policy. In other words, anchoring your monetary policy to the more credible other monetary regimes. For example, in a monetary union, a central bank cannot respond to domestic shocks if this conflicts with the state of the economy in other member states[10].

[10] An example is Ireland which cannot reduce inflation because of the weakness of the German and French economies.

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TABLE 1
SUMMARY STATISTICS

Country	Series	Data Interval	Mean	Standard Deviation	Correlation with Spread	Inflation
AUSTRALIA	SPREAD	69:q3 - 2000:q4	0.97	1.65	1.00	0.29
	INFLATION	61:q1 - 2000:q3	**5.82**	**4.30**	0.29	1.00
AUSTRIA	SPREAD	71:m1 - 1998:m12	1.62	1.57	1.00	0.05
	INFLATION	61:m1 - 2000:m3	**3.93**	**2.17**	0.05	1.00
BELGIUM	SPREAD	60:m1 - 2000:m12	0.62	1.18	1.00	-0.16
	INFLATION	61:q1 - 2000:m12	**4.27**	**3.05**	-0.16	1.00
CANADA	SPREAD	60:m1 - 2000:m12	0.8	1.36	1.00	-0.47
	INFLATION	61:q1 - 2000:m12	**4.69**	**3.30**	-0.47	1.00
DENMARK	SPREAD	79:m2 - 2001:m2	1.48	2.47	1.00	0.48
	INFLATION	68:m1 - 2000:m12	**5.99**	**3.93**	0.48	1.00
NETHERLAND	SPREAD	64:m11 - 1998:m12	1.38	2.02	1.00	0.17
	INFLATION	61:m1 - 2000:m12	**4.13**	**2.74**	0.17	1.00
FINLAND	SPREAD	71:m5 - 2000: m4	1.33	2.34	1.00	0.18
	INFLATION	61:m1 - 2000:m12	**6.24**	**4.47**	0.18	1.00
FRANCE	SPREAD	70:m1 - 2000:m12	0.58	1.41	1.00	-0.14
	INFLATION	61:m1 - 2000:m12	**5.45**	**3.89**	-0.14	1.00
GERMANY	SPREAD	75:m7 - 2000:m12	1.54	1.06	1.00	-0.45
	INFLATION	61:m1 - 2000:m12	**3.14**	**1.88**	-0.45	1.00
ICELAND	SPREAD	92:m1 - 2001:m1	1.75	1.82	1.00	0.01
	INFLATION	84:m1 - 2000:m12	**11.8**	**12.3**	0.01	1.00
IRELAND	SPREAD	72:q3 - 2000:q4	1.28	3.19	1.00	0.47
	INFLATION	61:q1 - 2000:q3	**7.24**	**5.93**	0.47	1.00
ITALY	SPREAD	77:m3 - 2000:m12	0.31	0.94	1.00	-0.25
	INFLATION	61:m1 - 2000:m12	**7.87**	**6.00**	-0.25	1.00

JAPAN	SPREAD	69:m1 - 2001:m2	0.41	1.86	1.00	-0.72
	INFLATION	61:m1 - 2000:m12	**4.45**	**4.49**	-0.72	1.00
KOREA	SPREAD	76:m8 - 2000:m12	1.54	2.92	1.00	0.46
	INFLATION	71:m1 - 2000:m12	**9.35**	**7.73**	0.46	1.00
NEW ZEALAND	SPREAD	60:q1 - 2000:q4	1.19	1.58	1.00	0.02
	INFLATION	61:q1 - 2000:q3	**7.26**	**5.59**	0.02	1.00
NORWAY	SPREAD	71:m8 - 2000:m12	-0.29	2.10	1.00	-0.09
	INFLATION	61:m1 - 2000:m12	**5.73**	**3.33**	-0.09	1.00
PORTUGAL	SPREAD	82:m4 - 1999:m3	1.83	1.46	1.00	0.10
	INFLATION	61:m1 - 2000:m12	**11.22**	**8.77**	0.10	1.00
SOUTH AFR.	SPREAD	60:m1 - 2000:m11	2.02	2.40	1.00	0.02
	INFLATION	61:m1 - 2000:m11	**9.28**	**5.02**	0.02	1.00
SPAIN	SPREAD	74:m1 - 2000:m11	-0.22	2.93	1.00	-0.44
	INFLATION	61:m1 - 2000:m11	**8.72**	**5.76**	-0.44	1.00
SWEDEN	SPREAD	60:m3 - 2000:m12	0.99	1.80	1.00	-0.08
	INFLATION	61:m1 - 2000:m11	**5.81**	**3.70**	-0.08	1.00
SWITZERLAND	SPREAD	74:m1 - 2000:m12	0.25	1.88	1.00	-0.62
	INFLATION	61:m1 - 2000:m11	**3.44**	**2.40**	-0.62	1.00
UNITED KINGDOM	SPREAD	64:m1 - 2000:m12	1.10	1.99	1.00	0.29
	INFLATION	61:m1 - 2000:m12	**6.88**	**5.32**	0.29	1.00
USA	SPREAD	60:m1 - 2000:m12	0.71	1.03	1.00	-0.42
	INFLATION	61:m1 - 2000:m12	**4.54**	**3.04**	-0.42	1.00

TABLE 2
INFLATION
AUTOCORRELATIONS

Country	Autocorrelations Lag (months)		
	1	12	24
AUSTRALIA	0.97	0.79	0.59
AUSTRIA	0.97	0.68	0.50
BELGIUM	0.99	0.77	0.53
CANADA	0.99	0.82	0.64
DENMARK	0.98	0.70	0.63
FINLAND	0.99	0.76	0.55
FRANCE	0.99	0.87	0.74
GERMANY	0.98	0.69	0.42
ICELAND	0.93	0.59	0.53
IRELAND	0.96	0.81	0.65
ITALY	0.99	0.81	0.69
JAPAN	0.98	0.66	0.44
KOREA	0.99	0.58	0.25
NETHERLAND	0.97	0.74	0.61
NEW ZEALAND	0.96	0.73	0.60
NORWAY	0.98	0.64	0.54
PORTUGAL	0.98	0.73	0.65
SOUTH AFR.	0.99	0.82	0.73
SPAIN	0.94	0.73	0.67
SWEDEN	0.98	0.67	0.53
SWITZERLAND	0.97	0.63	0.29
UNITED KINGDOM	0.99	0.72	0.53
USA	0.99	0.77	0.46

TABLE 3
ESTIMATION RESULTS - INFLATION-CHANGE EQUATIONS
$$\pi_{n,t+1} - \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} - R_{3,t}] + resid_{t+1}$$

Country	Period	Horizon (N)	β_n	SE (β_n)	R^2
	1969:3 - 1999:3	4	0.20	0.33	0.02
AUSTRALIA	1969:3 - 1997:3	12	0.59*	0.23	0.09
	1969:3 - 1995:3	20	0.73*	0.27	0.10
	1971:01 - 1998:12	12	0.04	0.07	0.003
AUSTRIA	1977:01 - 1997:12	36	0.07	0.13	0.004
	1971:01 - 1995:12	60	0.21	0.15	0.03
	1960:10 - 1998:12	12	0.02	0.10	0.0005
BELGIUM	1960:10 - 1997:12	36	0.28	0.18	0.03
	1960:10 - 1995:11	60	0.50*	0.23	0.07
	1960:10 - 1999:12	12	0.12	0.10	0.02
CANADA	1960:10 - 1997:12	36	0.50*	0.16	0.15
	1960:10 - 1995:12	60	0.88*	0.16	0.26
	1979:02 - 1999:12	12	?0.03	0.08	0.004
DENMARK	1979:02 - 1997:12	36	?0.12	0.09	0.05
	1979:02 - 1995:12	60	?0.24*	0.09	0.15
	1971:05 - 1999:12	12	0.18	0.09	0.04
FINLAND	1971:05 - 1997:12	36	0.26*	0.13	0.09
	1971:05 - 1995:12	60	0.50*	0.23	0.10
	1970:01 - 1999:12	12	0.11	0.14	0.01
FRANCE	1970:01 - 1997:12	36	0.36*	0.18	0.04
	1970:01 - 1995:12	60	0.44	0.24	0.03
	1960:10 - 1998:12	12	0.03	0.07	0.002
GERMANY	1960:10 - 1997:12	36	0.15*	0.06	0.05
	1960:10 - 1995:12	60	0.42	0.12	0.14
	1992:01 - 1999:12	12	?0.47*	0.17	0.20
ICELAND	1992:01 - 1997:12	36	?0.49*	0.11	0.28
	1992:01 - 1995:12	60	?0.42*	0.13	0.19
	1972:1 - 1999:3	4	-0.04	0.12	0.001
IRELAND	1972:1 - 1997:3	12	0.11	0.20	0.04
	1972:1 - 1995:3	20	0.66*	0.22	0.09
	1977:03 - 1999:12	12	0.38	0.24	0.05
ITALY	1977:03 - 1997:12	36	0.58	0.43	0.04
	1977:03 - 1995:12	60	0.54	0.58	0.02
	1971:06 - 1999:12	12	0.97*	0.30	0.20
JAPAN	1971:06 - 1997:12	36	1.54*	0.31	0.29
	1971:06 - 1995:12	60	1.77*	0.37	0.37
	1976:08 - 1999:12	12	0.05	0.25	0.002
KOREA	1976:08 - 1997:12	36	?0.30	0.33	0.02
	1971:08 - 1995:12	60	?0.64	0.39	0.05
	1964:11 - 1998:12	12	?0.08	0.06	0.012
NETHERLAND	1964:11 - 1997:12	36	?0.09	0.10	0.009
	1964:11 - 1995:12	60	?0.08	0.11	0.005
	1960:4 - 1998:4	4	?0.16	0.20	0.006
NEW ZEALAND	1960:4 - 1997:3	12	0.42	0.24	0.06
	1960:4 - 1995:3	20	0.79*	0.39	0.05
	1971:08 - 1999:12	12	0.03	0.06	0.001
NORWAY	1971:08 - 1997:12	36	0.14	0.09	0.01
	1971:08 - 1995:12	60	0.14	0.12	0.01
	1984:04 - 1999:03	12	?0.0089	0.17	0.00
PORTUGAL	1984:04 - 1997:12	36	?0.53*	0.12	0.06
	1984:04 - 1995:12	60	?1.06*	0.18	0.39
	1960:10 - 1999:11	12	?0.040	0.12	0.002
SOUTH AFRICA	1960:10 - 1997:11	36	?0.12	0.15	0.01
	1960:10 - 1995:11	60	?0.088	0.17	0.004
	1977:01 - 1999:12	12	0.13	0.12	0.03
SPAIN	1977:01 - 1997:12	36	?0.16*	0.04	0.17
	1977:01 - 1995:12	60	?0.27*	0.06	0.21
	1960:10 - 1999:12	12	0.24	0.14	0.04
SWEDEN	1960:10 - 1997:12	36	0.58*	0.15	0.16
	1960:10 - 1995:12	60	0.73*	0.15	0.19
	1974:01 - 1999:12	12	0.08	0.10	0.008
SWITZERLAND	1974:01 - 1997:12	36	0.51*	0.15	0.17
	1974:01 - 1995:12	60	0.79*	0.31	0.31
	1964:01 - 1999:12	12	0.14	0.22	0.007
UNITED KINGDOM	1960:01 - 1997:12	36	0.70*	0.28	0.09
	1960:01 - 1995:12	60	1.07*	0.30	0.17
	1960:10 - 1999:12	12	0.03	0.18	0.00
USA	1960:10 - 1997:12	36	0.70*	0.26	0.09
	1960:10 - 1995:12	60	0.89*	0.31	0.12

TABLE 4
RECURSIVE ESTIMATION RESULTS - INFLATION-CHANGE EQUATIONS FOR INFLATION TARGETING COUNTRIES

$$\pi_{n,t+1} - \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} - R_{3,t}] + resid_{t+}$$

AUSTRALIA		Whole Period	Before IT Regime	After IT Regime 1 Year	2 Year	3 Year				
		69:3 - 97:3	77:1 - 94:2	77:1 - 95:3	77:1 - 96:3	77:1 - 97:3				
	Est. β_n	0.59*	0.63*	0.54*	0.53*	0.55*				
	t	2.52	3.15	2.76	2.74	2.86				
	R^2	0.09	0.22	0.17	0.16	0.16				
CANADA		Whole Period	Before IT Regime	After IT Regime 1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	
		60:10 - 97:12	77:1 - 91:01	77:1 - 92:02	77:1 - 93:02	77:01 - 94:02	77:01 - 95:02	77:01 - 96:02	77:01 - 97:02	
	Est. β_n	0.50*	0.51*	0.49*	0.46*	0.48*	0.40*	0.36*	0.36*	
	t	3.53	3.01	2.92	2.83	3.14	2.63	2.55	2.47	
	R^2	0.17	0.16	0.15	0.15	0.17	0.13	0.13	0.12	
FINLAND		Whole Period	Before IT Regime	After IT Regime 1 Year	2 Year	3 Year	4 Year			
		71:05 - 97:12	77:1 - 93:01	77:1 - 94:02	77:1 - 95:02	77:01 - 96:02	77:01 - 97:02			
	Est. β_n	0.26*	0.40*	0.39*	0.33*	0.32*	0.29*			
	t	2.51	3.12	3.03	3.06	3.18	3.15			
	R^2	0.09	0.26	0.25	0.22	0.22	0.2			
NEW ZEALAND		Whole Period	Before IT Regime	After IT Regime 1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year
		60:04 - 97:3	77:1 - 89:04	77:1 - 91:01	77:1 - 92:01	77:01 - 93:01	77:01 - 94:01	77:01 - 95:01	77:01 - 96:01	77:01 - 96:01
	Est. β_n	0.42	1.38*	1.37*	1.21*	1.04*	1.02*	0.91*	0.78	0.68
	t	1.76	2.33	2.47	2.54	2.45	2.47	2.21	1.96	1.80
	R^2	0.06	0.25	0.25	0.22	0.18	0.17	0.15	0.12	0.1
SPAIN		Whole Period	Before IT Regime	After IT Regime 1 Year	2 Year	3 Year	4 Year			
		78:01 - 97:12	78:1 - 93:10	78:1 - 94:11	78:1 - 95:11	78:01 - 96:11	78:01 - 97:11			
	Est. β_n	(-)0.18*	(-)0.17*	(-)0.19*	(-)0.20*	(-)0.19*	(-)0.18*			
	t	-4.39	-3.60	-4.20	-4.70	-4.67	-4.43			
	R^2	0.18	0.15	0.18	0.22	0.2	(-)0.18			
SWEDEN		Whole Period	Before IT Regime	After IT Regime 1 Year	2 Year	3 Year	4 Year			
		60:10 - 97:12	77:1 - 92:12	77:1 - 94:01	77:1 - 95:01	77:01 - 96:01	77:01 - 97:01			
	Est. β_n	0.58*	0.81*	0.82*	0.73*	0.70*	0.69*			
	t	3.98	3.48	3.46	3.18	3.03	3.14			
	R^2	0.16	0.27	0.27	0.23	0.21	0.21			
UNITED KINGDOM		Whole Period	Before IT Regime	After IT Regime 1 Year	2 Year	3 Year	4 Year	5 Year		
		64:01 - 97:12	77:1 - 92:09	77:1 - 93:10	77:1 - 94:10	77:01 - 95:10	77:01 - 96:10	77:01 - 97:10		
	Est. β_n	0.70*	0.92*	0.92*	0.89*	0.86*	0.86*	0.85*		
	t	2.49	3.54	3.74	3.85	3.86	3.91	3.93		
	R^2	0.09	0.25	0.25	0.25	0.24	0.24	0.24		

TABLE 5
WALD TEST FOR β_n = 1

	x^2	p
AUSTRALIA	5.5	0.02
CANADA	20	0.00
FINLAND	61.8	0.00
NEW ZEALAND	0.82	0.36
SPAIN	835	0.00
SWEDEN	2.52	0.11
UNITED KINGDOM	0.45	0.50

*** Significant at 5 percent level.**

TABLE 6
TEST FOR STRUCTURAL BREAK *

AUSTRALIA	1.060	0.59
CANADA	9.20	0.00
FINLAND	19.4	0.00
NEW ZEALAND	16.65	0.00
SPAIN	5.43	0.07
SWEDEN	25.3	0.00
UNITED KINGDOM	2.95	0.23

* Column 1 and 2 give the likelihood ratio Chow test statistic and its significance level respectively.

Notes: For each country its regime change date (below) was used in the test.

Country	end
AUSTRALIA	–
CANADA	–
FINLAND	Haz.98
NEW ZEALAND	–
SPAIN	Haz.98
SWEDEN	–
UNITED KINGDOM	–

TABLE 7
IT COUNTRIES ONLY THEIR INFLATION TARGETING PERIOD
PANEL RESULTS

$\pi_{n,t+1}$? $\pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Common Effects Model)**

	Whole Period	1 Period	2 Period	3 Period	4 Period	5 Period
	91:02 - 97:12	91:02 - 92:12	91:02 - 93:12	91:2 - 94:12	91:02 - 95:12	77:1 - 96:12
Est. β_n	**0.37***	**1.23***	**0.89***	**0.49***	**0.44***	**0.45***
t	6.17	4.02	6.65	4.60	5.39	6.47
R^2	0.12	0.37	0.35	0.17	0.14	0.16

$\pi_{n,t+1}$? $\pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Fixed Effects Model)**

	Whole Period	After IT 1 Period	2 Period	3 Period	4 Period	5 Period
	91:02 - 97:12	91:02 - 92:12	91:02 - 93:12	91:02 - 94:12	91:02 - 95:12	91:02 - 96:12
Est. β_n	**0.32***	**1.21***	**1.04***	**0.44***	**0.28***	**0.33***
t	4.51	4.09	4.76	2.94	3.34	4.11
R^2	0.24	0.50	0.62	0.38	0.41	0.36
Constant Parameters						
Canada	-1.08	-3.55	-3.27	-1.28	-1.08	-1.21
Finland	-0.79		-1.69	-1.44	-0.95	-0.93
Spain	-1.29			-2.85	-2.45	-2.11
Sweden	-1.62		-2.25	-2.11	-2.14	-1.74
United Kingdom	-0.37	-1.47	-1.21	-0.15	-0.18	-0.29

TABLE 8
IT COUNTRIES ONLY THEIR INFLATION TARGETING
(EXCLUDING SPAIN)
PANEL RESULTS

$\pi_{n,t+1}$? $\pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Common Effects Model)**

	Whole Period	1 Period	2 Period	3 Period	4 Period	5 Period
	91:02 - 97:12	91:02 - 92:12	91:02 - 93:12	91:2 - 94:12	91:02 - 95:12	77:1 - 96:12
Est. β_n	**0.43***	**1.23***	**0.89***	**0.59***	**0.47***	**0.46***
t	6.67	4.03	6.65	4.72	5.43	6.03
R^2	0.18	0.37	0.35	0.18	0.17	0.18

$\pi_{n,t+1}$? $\pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Fixed Effects Model)**

	Whole Period	After IT 1 Period	2 Period	3 Period	4 Period	5 Period
	91:02 - 97:12	91:02 - 92:12	91:02 - 93:12	91:02 - 94:12	91:02 - 95:12	91:02 - 96:12
Est. β_n	**0.41***	**1.21***	**1.04***	**0.37***	**0.31***	**0.38***
t	4.53	4.09	4.76	3.32	3.50	4.59
R^2	0.31	0.50	0.62	6.36	0.37	0.32
Constant Parameters						
Canada	-1.30	-3.55	-3.27	-1.28	-1.14	-1.34
Finland	-1.03		-1.69	-1.44	-1.02	-1.09
Sweden	-2.80		-2.25	-2.21	-2.17	-1.82
United Kingdom	-0.53	-1.47	-1.21	-0.15	-0.24	-0.42

TABLE 9
INFLATION TARGETING COUNTRIES WITHOUT TAKING INTO CONSIDERATION OF THEIR MONETARY REGIMES
PANEL RESULTS

$\pi_{n,t+1} ? \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Common Effects Model)**

	Whole Period	Before Inf. Targeting	After IT Regime 1 Year	2 Year	3 Year	4 Year	5 Year	6 Year
	60:10 - 97:12	77:1 - 91:12	77:1 - 92:12	77:1 - 93:12	77:1 - 94:12	77:1 - 95:12	77:1 - 96:12	77:1 - 97:12
Est. β_n	**0.54***	**0.74***	**0.68***	**0.66***	**0.61***	**0.58***	**0.56***	**0.55***
t	10.2	10.56	10.00	10.17	10.29	10.30	10.6	10.72
R^2	0.10	0.22	0.20	0.20	0.18	0.17	0.17	0.17

$\pi_{n,t+1} ? \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Fixed Effects Model)**

	Whole Period	Before Inf. Targeting	After IT Regime 1 Year	2 Year	3 Year	4 Year	5 Year	6 Year
	60:10 - 97:12	77:1 - 91:12	77:1 - 92:12	77:1 - 93:12	77:1 - 94:12	77:1 - 95:12	77:1 - 96:12	77:1 - 97:12
Est. β_n	**0.54***	**0.75***	**0.68***	**0.66***	**0.60***	**0.58***	**0.56***	**0.55***
t	10.9	10.63	9.98	10.13	10.17	10.17	10.44	10.58
R^2	0.10	0.22	0.20	0.20	0.18	0.17	0.17	0.17
Constant Terms								
Canada	0.03	-0.14	-0.21	-0.32	-0.29	-0.35	-0.42	-0.45
Finland	-0.51	-0.52	-0.50	-0.55	-0.66	-0.69	-0.71	-0.72
Sweden	-0.19	-0.73	-0.48	-0.58	-0.67	-0.77	-0.76	-0.80
United Kingdom	0.04	-0.80	-0.77	-0.74	-0.75	-0.77	-0.75	-0.75

TABLE 10
INFLATION TARGETING COUNTRIES WITHOUT TAKING INTO CONSIDERATION OF THEIR MONETARY REGIMES (EXCL. SPAIN)
PANEL RESULTS

$\pi_{n,t+1} ? \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Common Effects Model)**

	Whole Period	Before Inf. Targeting	After IT Regime 1 Year	2 Year	3 Year	4 Year
	60:10 - 97:12	77:1 - 91:12	77:1 - 92:12	77:1 - 93:12	77:1 - 94:12	77:1 - 95:12
Est. β_n	**0.44***	**0.47***	**0.44***	**0.43***	**0.40***	**0.38***
t	10.00	7.60	7.60	7.74	7.90	8.20
R^2	0.09	0.13	0.12	0.12	0.11	0.10

$\pi_{n,t+1} ? \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} ? R_{3,t}] + resid_{t+1}$ **(Fixed Effects Model)**

	Whole Period	Before Inf. Targeting	After IT Regime 1 Year	2 Year	3 Year	4 Year
	60:10 - 97:12	77:1 - 91:12	77:1 - 92:12	77:1 - 93:12	77:1 - 94:12	77:1 - 95:12
Est. β_n	**0.46***	**0.49***	**0.46***	**0.45***	**0.41***	**0.38***
t	10.3	7.70	7.60	7.76	7.83	7.70
R^2	0.09	0.14	0.13	0.12	0.12	0.11
Constant Terms						
Canada	0.13	-0.07	-0.13	-0.21	-0.17	-0.21
Finland	0.40	0.49	-0.49	-0.52	-0.61	-0.60
Spain	0.41	-0.13	-0.15	-0.12	-0.28	-0.43
Sweden	-0.11	-0.56	-0.39	-0.49	-0.57	-0.66
United Kingdom	0.14	-0.70	-0.69	-0.64	-0.63	-0.64

TABLE 11

PANEL 1		
Common Effects Model		
IT countries only in their inflation targeting periods		
Period 1991:02 to 1997:12		
Est. β_n	**0.37***	
t	6.16	
R^2	0.12	
Fixed Effects Model		
Est. β_n	**0.31***	
t	4.52	
R^2	0.24	
		t-values
Canada	-1.09	-4.02
Finland	-0.79	-3.67
Spain	-1.29	-5.39
Sweden	-1.62	-9.21
UK	-0.37	-2.44
PANEL 2		
Common Effects Model		
IT countries only in their money targeting periods		
Period 1975:01 to 1989:2		
Est. β_n	**0.37***	
t	3.54	
R^2	0.05	
Fixed Effects Model		
Est. β_n	**0.37***	
t	3.55	
R^2	0.06	
		t-values
Canada	0.74	2.38
United Kingdom	1.03	4.55
PANEL 3		
Common Effects Model		
IT countries only in their exchange rate targeting periods		
Period 1962:01 to 1997:12		
Est. β_n	**0.73***	
t	6.99	
R^2	0.47	
Fixed Effects Model		
Est. β_n	**0.69***	
t	5.71	
R^2	0.49	t-values
Canada	-0.04	-0.28
Finland	-0.52	-7.41
Spain	0.22	1.34
UK	-2.16	-7.41

TABLE 12A
RECURSIVE ESTIMATION RESULTS - INFLATION-CHANGE EQUATIONS FOR EU NOMINIES

$$\pi_{n,t+1} - \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} - R_{3,t}] + resid_{t+1}$$

		Whole Period	Before MT	After MT 1 Year	2 Year	3 Year	4 Year	5 Year
		71:01 - 97:12	77:1 - 92:01	77:1 - 93:02	77:1 - 94:02	77:01 - 95:2	77:01 - 96:02	77:01 - 97:02
AUSTRIA	Est. β_n	0.07	0.34*	0.36*	0.38*	0.32*	0.28*	0.23*
	t	1.47	2.51	3.01	3.21	2.82	2.54	2.21
	R^2	0.03	0.9	0.12	0.13	0.10	0.08	0.06
		Whole Period	Before MT	After MT 1 Year	2 Year	3 Year	4 Year	5 Year
		60:10 - 97:12	77:1 - 92:01	77:1 - 93:02	77:01 - 94:02	77:01 - 95:02	77:01 - 96:02	77:01 - 97:02
BELGIUM	Est. β_n	0.28	(-)0.34*	(-)0.32*	(-)0.30	(-)0.27	(-)0.23	(-)0.23*
	t	1.47	(-)1.90*	(-)1.80	(-)1.67	(-)1.74	(-)1.74	(-)1.97
	R^2	0.03	0.05	0.06	0.05	0.05	0.04	0.05
		Whole Period	Before MT	After MT 1 Year	2 Year	3 Year	4 Year	5 Year
		71:05 - 97:12	77:01 - 92:01	77:01 - 93:02	77:01 - 94:02	77:01 - 95:02	77:01 - 96:02	77:01 - 97:12
FINLAND	Est. β_n	0.26*	0.40*	0.40*	0.39*	0.33*	0.32*	0.29*
	t	2.51	3.02	3.13	3.04	3.06	3.18	3.15
	R^2	0.09	0.26	0.27	0.25	0.22	0.22	0.20
		Whole Period	Before EMU	After MT 1 Year	2 Year	3 Year	4 Year	5 Year
		70:01 - 97:12	77:01 - 92:01	77:01 - 93:02	77:01 - 94:02	77:01 - 95:02	77:01 - 96:02	77:01 - 97:02
FRANCE	Est. β_n	0.36*	0.51*	0.30	0.25	0.24	0.21	0.16
	t	2.02	1.56	1.24	1.10	1.25	1.16	1.02
	R^2	0.04	0.04	0.02	0.02	0.02	0.01	0.01
		Whole Period	Before EMU	After MT 1 Year	2 Year	3 Year	4 Year	5 Year
		60:10 - 97:12	77:01 - 92:01	77:01 - 93:02	77:01 - 94:02	77:01 - 95:02	77:01 - 96:02	77:01 - 97:02
GERMANY	Est. β_n	0.15*	0.26*	0.31*	0.32*	0.31*	0.29*	0.25*
	t	2.53	2.47	3.40	3.60	3.70	3.64	3.10
	R^2	0.05	0.10	0.16	0.17	0.17	0.15	0.11

TABLE 12B
RECURSIVE ESTIMATION RESULTS - INFLATION-CHANGE EQUATIONS FOR EU NOMINIES

$$\pi_{n,t+1} - \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t} - R_{3,t}] + resid_{t+1}$$

		Whole Period	Before EMU	After EMU 1 Year	2 Year	3 Year	4 Year	5 Year
		72:1 - 97:3	77:1 - 92:1	77:1 - 93:1	77:1 - 94:1	77:1 - 95:1	77:1 - 96:1	77:1 - 97:1
IRELAND	*Est.* β_n	0.11	0.62*	0.43	0.43	0.35	0.37	0.37
	t	0.54	2.19	1.81	1.87	1.77	1.78	1.84
	R^2	0.00	0.08	0.05	0.05	0.04	0.04	0.04
		Whole Period	Before EMU	After EMU 1 Year	2 Year	3 Year	4 Year	5 Year
		77:03 - 97:12	77:03 - 92:01	77:03 - 93:02	77:03 - 94:02	77:03 - 95:02	77:03 - 96:02	77:03 - 97:02
ITALY	*Est.* β_n	0.58	1.02	0.92	0.90	0.75	0.62	0.59
	t	1.35	1.69	1.63	1.65	1.60	1.37	1.33
	R^2	0.04	0.10	0.09	0.09	0.07	0.05	0.04
		Whole Period	Before EMU	After EMU 1 Year	2 Year	3 Year	4 Year	5 Year
		64:01 - 97:12	77:01 - 92:01	77:01 - 93:02	77:01 - 94:02	77:01 - 95:02	77:01 - 96:02	77:01 - 97:02
NETHERLAND	*Est.* β_n	-0.09	-0.12	-0.10	(-)0.09	(-)0.09	(-)0.07	(-)0.06
	t	-0.82	-1.14	-1.06	(-)0.99	(-)1.07	(-)0.85	(-)0.70
	R^2	0.009	0.014	0.01	0.009	0.001	0.006	0.004
		Whole Period	Before EMU	After EMU 1 Year	2 Year	3 Year	4 Year	5 Year
		84:4 - 97:12	84:04 - 92:01	84:04 - 93:02	84:04 - 94:02	84:04 - 95:02	84:04 -96:02	84:4 - 97:2
PORTUGAL	*Est.* β_n	(-)0.53*	(-)0.67*	(-)0.68*	(-)0.66*	(-)0.54*	(-)0.54*	(-)0.54*
	t	(-)4.46	(-)5.45	-4.97	(-)4.93	(-)4.15	(-)4.11	(-)4.31
	R^2	0.21	0.28	0.28	0.27	0.20	0.20	0.21
		Whole Period	Before EMU	After EMU 1 Year	2 Year	3 Year	4 Year	5 Year
		76:01 - 97:12	77:01 - 92:01	77:01 - 93:02	77:01 - 94:02	77:01 - 95:02	77:01 - 96:02	77:01 - 97:02
SPAIN	*Est.* β_n	(-)0.16*	(-)0.16*	(-)0.16*	(-)0.16*	(-)0.18	(-)0.19	(-)0.18*
	t	(-)3.56*	(-)3.90*	(-)3.90*	(-)3.9*	(-)4.76*	(-)5.2*	(-)5.10*
	R^2	0.12	0.15	0.15	0.15	0.19	0.21	0.20

TABLE 13
EU NOMINEES AFTER THE MAASTRICHT TREATY
PANEL RESULTS

$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\,?} R_{3,t}] + resid_{t+1}$ **(Common Effects Model)**

	Whole Period		After MT 1 Year	2 Year	3 Year	4 Year	5 Year	6 Year
	60:10 - 97:12	77:01 - 91:01	77:01 - 92:2	77:01 - 93:2	77:01 - 94:2	77:01 - 95:2	77:01 - 96:2	77:01 - 97:2
Est. β_n	**0.16***	**0.16***	**0.15***	**0.13***	**0.13***	**0.11***	**0.10***	**0.10***
t	5.61	3.83	3.55	3.45	3.41	0.01	3.21	3.28
R^2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\,?} R_{3,t}] + resid_{t+1}$ **(Fixed Effects Model)**

	Whole Period	Before MT	After MT 1 Year	2 Year	3 Year	4 Year	5 Year	6 Year
	60:10 - 97:12	77:01 - 91:01	77:01 - 92:2	77:01 - 93:2	77:01 - 94:2	77:01 - 95:2	77:01 - 96:2	77:01 - 97:2
Est. β_n	**0.21***	**0.18***	**0.17***	**0.17***	**0.17***	**0.14***	**0.13***	**0.12***
t	6.75	3.72	3.69	3.99	4.23	3.94	3.76	3.67
R^2	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Constant Terms								
Austria	-0.45	-0.16	-0.13	-0.17	-0.21	-0.25	-0.27	-0.31
Belgium	0.09	-0.16	-0.16	-0.17	-0.18	-0.21	-0.21	-0.25
Finland	-0.07	-0.39	-0.45	-0.49	-0.49	-0.53	-0.49	-0.44
France	0.15	-0.39	-0.42	-0.38	-0.35	-0.34	-0.37	-0.40
Germany	-0.22	-0.03	0.03	-0.06	-0.16	-0.19	-0.19	-0.20
Italy	-0.13	0.25	0.13	0.14	0.13	0.09	-0.08	-0.13
Netherlands	-0.22	-0.36	-0.36	-0.34	-0.35	-0.34	-0.32	-0.30
Portugal	-1.59	-1.32	-1.54	-1.71	-1.77	-1.70	-1.61	-1.53
Spain	0.30	-0.54	-0.57	-0.52	-0.51	-0.61	-0.70	-0.72

TABLE 14
FOR ALL COUNTRIES

PANEL RESULTS
Common Effects Model

$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\,?} R_{3,t}] + resid_{t+1}$

	Whole Period	Before Inf. Targeting	After IT
	60:10 - 97:12	60:10 - 91:12	92:1 - 97:12
Est. β_n	**0.22***	**0.27***	**0.03**
t	8.55	8.59	1.68
R^2	0.02	0.03	0.00

PANEL RESULTS
Fixed Effects Model

$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\,?} R_{3,t}] + resid_{t+1}$

	Whole Period		Before Inf. Targeting		After IT	
	60:10 - 97:12		60:10 - 91:12		92:1 -97-12	
Est.	**0.22***		**0.30***		**0.02**	
t	8.67		9.67		1.4	
R^2	0.04		0.05		0.13	
	Constant	t - stat	Constant	t - stat	Constant	t - stat
AUSTRIA	-0.48	-4.59	-0.44	-3.32	-0.77	-11.95
BELGIUM	0.07	0.60	0.14	1.06	-0.35	-5.40
CANADA	0.41	3.94	0.52	4.46	0.05	0.43
DENMARK	-0.98	-8.38	-1.60	-10.3	0.19	3.54
FINLAND	-0.09	-0.52	-0.02	-0.10	-0.18	-1.67
FRANCE	0.14	0.99	0.27	1.58	-0.36	-6.24
GERMANY	-0.24	-2.90	-0.16	-1.62	-0.97	-9.63
ICELAND	-0.62	-2.95			-0.09	-0.53
ITALY	-0.13	-0.62	0.15	0.51	-0.68	-4.95
JAPAN	-0.28	-1.26	-0.17	-0.59	-0.46	-3.42
KOREA	-0.18	-0.44	-0.48	-0.83	-0.26	-1.43
NETHERLAND	-0.25	-2.29	-0.29	-2.17	-0.19	-3.17
NORWAY	0.22	1.52	0.30	1.61	0.13	1.67
PORTUGAL	-1.63	-4.35	-1.77	-2.97	-1.28	-7.95
SOUTH AFRICA	0.93	6.07	1.20	6.99	-0.92	-3.72
SPAIN	0.31	1.63	0.74	3.02	-0.71	-6.11
SWEDEN	0.12	0.92	0.26	1.87	-0.83	-5.12
SWITZERLAND	-0.40	-3.04	-0.24	-1.42	-0.71	-5.98
UNITED KINGDOM	0.43	1.93	0.50	1.88	0.04	0.37
USA	0.17	1.44	0.26	1.90	-0.21	-2.99

TABLE 15
FOR ALL COUNTRIES (EXCLUDING CANADA, FINLAND, SPAIN, SWEDEN, UNITED KINGDOM)

PANEL RESULTS
Common Effects Model

$$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\,?} R_{3,t}] + resid_{t+1}$$

	Whole Period	Before Inf. Targeting	After IT
	60:10 - 97:12	60:10 - 91:12	92:1 - 97:12
Est. β_n	**0.11***	**0.14***	**0.005**
t	3.48	3.49	0.24
R^2	0.01	0.01	0.00

PANEL RESULTS
Fixed Effects Model

$$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\,?} R_{3,t}] + resid_{t+1}$$

	Whole Period		Before Inf. Targeting		After IT	
	60:10 - 97:12		60:10 - 91:12		92:1 -97-12	
Est. β_n	**0.10***		**0.13***		**0.03**	
t	3.16		3.41		1.38	
R^2	0.03		0.04		0.13	
	Constant	t - stat	Constant	t - stat	Constant	t - stat
AUSTRIA	-0.27	-2.56	-0.15	3.40	-0.77	-11.93
BELGIUM	0.18	1.56	0.28	-1.13	-0.35	-5.39
DENMARK	-0.79	-7.13	-1.27	2.04	0.19	3.48
FRANCE	0.20	1.41	0.35	-8.59	-0.36	-6.24
GERMANY	-0.08	-0.91	0.07	1.99	-0.97	-9.57
ICELAND	-0.29	-1.45			-0.10	-0.55
ITALY	-0.11	-0.52	0.14	0.67	-0.68	-4.95
JAPAN	-0.25	-1.10	-0.17	0.47	-0.46	-3.42
KOREA	0.03	0.07	0.01	-0.57	-0.26	-1.42
NETHERLAND	-0.07	-0.64	-0.06	0.02	-0.19	-3.15
NORWAY	0.19	1.33	0.23	-0.43	0.13	1.67
PORTUGAL	-1.39	-3.71	-1.43	1.24	-1.28	-7.94
SOUTH AFRICA	1.19	7.61	1.55	-2.40	-0.92	-3.70
SWITZERLAND	-0.38	-2.81	-0.25	8.94	-0.71	-5.97
USA	0.27	2.18	0.36	-1.44	-0.21	-2.97

TABLE 16
FOR ALL COUNTRIES (EXCLUDING EU NOMINIEES

PANEL RESULTS
Common Effects Model

$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\ ?} R_{3,t}] + resid_{t+1}$

	Whole Period	Before Inf. Targeting	After IT
	60:10 - 97:12	60:10 - 91:12	92:1 - 97:12
Est. β_n	**0.26***	**0.32***	**0.02**
t	6.59	6.62	0.99
R^2	0.03	0.03	0.00

PANEL RESULTS
Fixed Effects Model

$\pi_{n,t+1?}\ \pi_{3,t+1} = \alpha_n + \beta_n [R_{120,t\ ?} R_{3,t}] + resid_{t+1}$

	Whole Period		Before Inf. Targeting		After IT	
	60:10 - 97:12		60:10 - 91:12		92:1 -97-12	
Est. β_n	**0.24***		**0.33***		**0.02**	
t	6.01		6.96		0.61	
R^2	0.04		0.06		0.10	
	Constant	t - stat	Constant	t - stat	Constant	t - stat
CANADA	0.39	3.59	0.49	4.09	0.07	0.55
DENMARK	-1.00	-7.96	-1.66	-9.84	0.19	3.55
ICELAND	-0.65	-2.93			-0.07	-0.41
JAPAN	-0.28	-1.27	-0.17	-0.59	-0.45	-3.31
KOREA	-0.21	-0.51	-0.57	-0.99	-0.27	-1.48
NORWAY	0.23	1.54	0.32	1.67	0.14	1.69
SOUTH AFRICA	0.90	5.34	1.14	5.83	-0.90	-3.57
SWEDEN	0.10	0.80	0.24	1.63	-0.83	-5.00
SWITZERLAND	-0.40	-3.06	-0.24	-1.41	-0.70	-5.81
UNITED KINGDOM	0.42	1.85	0.47	1.76	0.05	0.47
USA	0.16	1.33	0.25	1.76	-0.19	-2.52