MONETARY REGIMES AND CORE INFLATION

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ABSTRACT

This paper examines the interaction of core inflation and monetary policy. Interest in core has grown because of inflation targeting. Core inflation is defined in numerous ways giving rise to many potential measures; I define core inflation as the best forecaster of inflation. A cross-country study finds that core inflation differs across monetary regimes. A theoretical model shows that in an accommodative regime lagged inflation is core inflation and in a non-accommodative regime, such as strict inflation targeting, the trimmed mean is core. Using unconditional regressions I find that the theoretical model holds empirically. Through conditional regressions, inflation expectations are found to be consistent with the accommodativeness of the central bank.

JEL classification: E52, E31 and E58

1. Introduction

This paper presents an empirical examination of the effects of different monetary policy regimes on the measurement of core inflation. Theoretically the idea that the Phillips curve and other empirical specifications differ depending on the monetary policy regime is well known (Lucas, 1976); however, there is little empirical work on the issue of how to best measure core inflation in different monetary policy regimes.

Core inflation is a term that is often used but rarely defined. Popularly core inflation is the measure of inflation excluding food and energy prices. Economists refer to core inflation using several different definitions. Often it is the inflation rate that has no long run effect on the level of real output in the economy or it is the inflation rate given by the changes in input prices (Quah and Vahey, 1995 and Eckstein, 1981). Additionally, empirical work by Byran and Ceccehetti suggest either the trimmed mean or the weighted median of the distribution of price changes might be a good proxy for core inflation. They define core inflation as both the measure with the greatest contemporaneous correlation with a centered-moving average inflation rate and the measure that is highly correlated with measures of money growth (Bryan, Cecchetti and Wiggins, 1997 and Bryan and Cecchetti, 1994). Overall, there is no consensus about the definition of core inflation.

In Smith (2003) core inflation is defined as the best forecaster of future inflation. This definition appeals to the intuitive idea that is often mentioned in discussions about core inflation. Blinder (1982 and 1997) suggests this definition in several papers on inflation by emphasizing the forecasting ability that core inflation should have. Intuitively, core inflation is thought of as a useful measure in tracking future inflation.

Smith tests whether the weighted median or trimmed mean can forecast the 12-month ahead inflation rate better than the inflation rate excluding food and energy and lagged inflation for the United States since 1982. Analyzing several models that use different weightings of past inflation rates and different inflation measures (CPI and PCE) this paper finds that the weighted median is a good proxy for demand-driven inflation. These results are robust to both in-sample and out-of-sample forecasting.

Smith's paper has the limitation that it examines only the current historical period or monetary regime of the United States. The behavior of the economy does change across different monetary policy regimes and as Lucas notes, "any change in policy will systematically alter the structure of the econometric models" (pg. 41). Additionally, Stock and Watson (1999) and Sommer (2001) find that the monetary policy regime affects the forecasting ability of different variables. Additionally, Smith is limited since it provides no theoretical framework to justify the definition of core inflation as the best forecaster of future inflation.

Section 2 provides a theoretical framework. This framework determines which measure is the best measure of core inflation under different monetary policy regimes. The model emphasizes that the level of accommodativeness of the central bank and the nature of inflation expectations determine what measure best represents core inflation. In the unconditional setting the accommodativeness of the central bank determines what measure is core inflation, and in the conditional setting agents' expectations of the accommodativeness of a regime determine what measure is core inflation. The framework lays out the justification of core inflation as the best forecaster of future inflation both conditionally and unconditionally.

Section 3 tests the theoretical model using data from ten Organization for Economic Co-operation and Development (OECD) countries. I examine the historical record for these

countries in groups. I consider several different time periods that have different levels of accommodativeness such as before and after the disinflations of the early 1980s, and pre- and post-inflation targeting.

I conclude that the measure that helps forecast does depend directly on the monetary policy regime. Core inflation is empirically estimated as a weighted average of lagged inflation and a trimmed mean. During the 1970s lagged inflation is core inflation, therefore confirming the accommodativeness of that regime. In inflation targeting regimes core inflation is represented solely by the trimmed mean. This result shows the non-accommodative nature of inflation targeting. These results are broadly similar in the conditional forecasts and demonstrate that inflation expectations are generally consistent with the regime. Finally, section 4 concludes.

2. Theoretical Framework

The framework has two equations. The first equation states that demand-driven inflation is related to inflation expectations and the output gap in a modified expectations-augmented Phillips curve.

$$\pi_t^D = \pi_t^e + \alpha y_t \,, \tag{1}$$

where π^D is demand-driven inflation, π^e is the expectation of inflation and y is the deviation of output from potential output. The second equation describes the relationship between inflation and demand-driven inflation and a supply shock.

$$\pi_t = \pi_t^D + \varepsilon_t \,, \tag{2}$$

where π is the inflation rate and ε is a supply shock. These two equations can be combined to obtain the standard expectations-augmented Phillips curve with supply shocks.

Ball and Mankiw (1995) provide both theoretical and empirical evidence as to why aggregate inflation can be decomposed into demand-driven inflation and supply shocks. They examine how the distribution of price changes affects the aggregate inflation rate and propose a new measure of supply shocks based on the asymmetry of the distribution of price changes. Their model makes a clear distinction between demand-driven inflation and supply shocks and provides a starting point for this theoretical framework.

Bryan and Cecchetti use Ball and Mankiw's model to suggest why a limited-influence estimator such as the trimmed mean would be a good measure of underlying inflation. These two papers show that inflation can be divided into two parts, demand-driven inflation (sometimes called core inflation) and a supply shock. The trimmed mean is considered to be the best representative of demand-driven inflation. Therefore, the difference between the aggregate inflation rate and the trimmed mean is the supply shock.[1] This model stands up to scrutiny even if the trimmed mean is not the best candidate for demand-driven inflation since the logic of this model remains for any proposed measure of demand-driven inflation.

The model attempts to answer the question what is core inflation in both the unconditional and conditional setting. The best unconditional forecaster of future inflation provides information about the accommodativeness of the central bank. I assume that the central bank can move output to control future demand-driven inflation or whatever variable the central bank is targeting.[2] Given that they can choose demand-driven inflation by picking a level of output, the central bank is either accommodative or non-accommodative. If the central bank is accommodative then $\pi_t^D = \pi_{t-1}$ and if it is non-accommodative then $\pi_t^D = \pi_{t-1}^D$. Under an

[1] Sommer specifically tests if the difference between the aggregate inflation rate and the trimmed mean is a good measure of supply shocks. He finds that it performs better than some measures proposed by Ball and Mankiw.

accommodative regime the "temporary" increase in inflation from a supply shock becomes permanent because the central bank pushes demand-driven inflation up in order to take advantage of the increased output that can be produced. In the non-accommodative regime the supply shock is truly temporary since demand-driven inflation is held constant. There can also be a partial accommodation of a supply shock. In this case demand-driven inflation is a weighted average of past inflation and past demand-driven inflation.

In the conditional case demand-driven inflation is determined by agents' inflation expectations. Now, policy makers cannot directly control demand-driven inflation but their behavior does affect what happens to output and therefore inflation. If agents believe that the monetary authority is accommodative then $\pi_t^e = \pi_{t-1}$ since agents know of no reason why inflation should deviate from its previous level. If agents think that the monetary authority is non-accommodative then $\pi_t^e = \pi_{t-1}^D$. People have no reason to think that inflation should move around because the central bank will not attempt to push output above potential. In the conditional case agents' beliefs about the accommodativeness of the monetary policy regime determine demand-driven inflation and the policy makers' actions have a secondary effect on inflation. For example, if agents' expectations are accommodative and there is an adverse supply shock conditional demand-driven inflation will rise. Policy makers cannot stop this but they do have the ability to decide if demand-driven inflation stays high by taking action during the next period.

From my theoretical model I can conclude that empirically I should find that different measures are core inflation for different monetary policy regimes. The measure that is core

[2] Analogously I could write a model where the central bank influences output by controlling the interest rate. The central bank does not need to directly control output for this model to work.

inflation is dependent on two factors: the accommodativeness of the regime and agents' beliefs about the accommodativeness of the regime. Lagged inflation should be core inflation when the central bank is accommodative and when agents' expectations are accommodative. The trimmed mean should be core inflation when the central bank is non-accommodative and when agents' expectations are non-accommodative.

3. Empirical Analysis

A. Data

I have data for ten countries: Australia, Canada, Belgium, France, Ireland, Japan, New Zealand, Spain, the United Kingdom, and the United States. For each of these countries a limited-influence estimator either the weighted median or a trimmed mean is available.[3] I use the term trimmed mean to refer to both since the weighted median is a special case of the trimmed mean. The frequency and data availability are presented in Table 1. The headline inflation rates used are listed in Table 1.[4]

Empirically, I use quarterly data for all variables. I transform the data so that it is consistent across countries. The trimmed means for Belgium, Japan, Spain, Australia, and New Zealand are given as the year-over-year averages at either a quarterly or monthly frequency. For the countries that have the year-over-year changes at a monthly frequency, I use the end of quarter months to obtain the quarterly data. For Ireland the weighted median is the quarter-over-

[3] The weighted median or trimmed means are available from the following sources: Belgium, Luc Aucremanne (Central Bank of Belgium); France, Herve Le Bihan (Bank of France); Japan, Hitoshi Mio (Bank of Japan); United States, Federal Reserve Bank of Cleveland web site; Ireland, Aidan Meyer (Central Bank of Ireland); Canada, Allan Crawford and Anne De Champlain (Bank of Canada); Spain, Luis Alvarez (Central Bank of Spain); United Kingdom, Joanne Cutler (Bank of England); Australia, Reserve Bank of Australia web site; New Zealand, Christopher Smith (Reserve Bank of New Zealand). I thank these economists for making these measures available.

[4] The headline inflation rates are available from the same sources as the trimmed means except as noted here: United States, Bureau of Labor Statistics web site and United Kingdom, UK Statistics web site.

quarter change, and I convert that to the year-over-year change by transforming the quarter-over-quarter changes in the following method:

$$X_t = ((1+x_t)*(1+x_{t-1})*(1+x_{t-2})*(1+x_{t-3})-1)*100\,, \qquad (3)$$

where X is the year-over-year change and x is the quarterly change. For Canada, France, the United Kingdom and the United States the trimmed mean is the month-over-month change. I convert that to the year-over-year change by transforming the month-over-month changes in the following method:

$$X_t = ((1+x_t)*(1+x_{t-1})*(1+x_{t-2})*(1+x_{t-3})*(1+x_{t-4})*(1+x_{t-5})*(1+x_{t-6})*(1+x_{t-7}) \\ *(1+x_{t-8})*(1+x_{t-9})*(1+x_{t-10})*(1+x_{t-11})-1)*100\,, \qquad (4)$$

where X is the year-over-year change and x is the monthly change in the trimmed mean. To obtain data at the quarterly frequency, I simply take the year-over-year rates for the end of quarter months (March, June, September, and December). A similar transformation is done to the headline inflation rates.

The above procedure is not exactly correct. The correct procedure, suggested by Bryan and Cecchetti, is to use the disaggregated data, produce the year-over-year price changes for each component, weight the components by relative importance and find the trimmed mean.[5] Empirically there is very little difference between the results obtained using the weighted median for the United States computed from the above methodology versus using the weighted median for the United States computed as dictated by Bryan and Cecchetti. Therefore, I use the data as transformed above rather than deriving the trimmed mean from the component level data for each country since these data are more readily available.

[5] See Smith (2003) for details.

For the conditional regressions I use real Gross Domestic Product (GDP) and industrial production at a quarterly frequency.[6] To get the output gap or industrial production gap I take the log of quarterly real GDP and industrial production and apply the Hodrick-Prescott (HP) filter (with smoothing parameter 16,000). I use the HP filtered series as potential output. To find the output gap I subtract potential output from the actual quarterly series.

I divide my data into six time periods and I rank them in Table 2 according to their a priori level of accommodativeness. The first two periods I compare are the pre-1979 period and the post-1984 period. The period from the early 1970s until the end of 1979 is considered to be accommodative. Taylor (1999) examines several different monetary regimes over time in the United States. According to his analysis the pre-1979 period is more accommodative than others since the response of the nominal interest rate to changes in inflation is less than one. If the coefficient is greater than one it implies that the central bank is "leaning against the wind" or is raising nominal interest rates when inflation is rising. Mankiw (2001) undertakes a study of monetary policy in the 1990s. In this paper he also mentions the 1970s and states, "the Fed was too expansionary during the 1970s" (pg. 32). Empirically, I have quarterly data for three countries (France, Japan and the United States) during the 1970s.

For the post-1984 period I have data for all ten countries. The post-1984 period is a less accommodative regime than the pre-1979 regime. Taylor finds the coefficient on inflation is greater than one. In this case policy makers raise the nominal interest rate as inflation increases. I specifically exclude the period from 1980 to 1983. During this period there were large disinflations in most OECD countries, and there was a transition to a new monetary policy regime. During the 1980 to 1983 period the public learned the new goals and targets of

[6] For New Zealand I use manufacturing production instead of industrial production and for Ireland real GDP is not

monetary policy and the level of accommodation of the regime. I exclude this transition period because I want to specifically examine the ability to forecast future inflation within a monetary policy regime. Empirically, I use the sample from 1984 to the late 1990s.[7] I also divide the countries into two categories, inflation targeting and non-inflation targeting. Although I am not specifically examining inflation targeting at this point, the sample does include the inflation targeting regime for some countries. In order to be confident that the results are not a construct of the inflation targeting regime I keep the inflation targeting and non-inflation targeting regimes separate.

After comparing those two regimes I focus on the post-1984 period. For the inflation targeting countries (Australia, Canada, New Zealand, Spain, the United Kingdom) I break each country's sample at the start date of its inflation targeting regime.[8] For the non-inflation targeting countries (Belgium, France, Ireland, Japan, and the United States) I break each country's sample in March 1992 (1992:Q1). This date is the average start date of inflation targeting for the inflation targeting countries included in this study. Sheridan (2001) recommends this specification and specifically uses the average break date from her inflation targeting countries to break her sample of comparison countries. I follow her procedure.

There is also a discussion about whether non-inflation targeting countries have become less accommodative in the 1990s. By examining these two periods separately for the non-inflation targeting countries this question can be studied. Mankiw contends that the Federal Reserve of the United States has been conducting "covert inflation targeting" in the 1990s. He goes on to state that if the Federal Reserve had enacted an inflation target of 3 percent in the

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available on a quarterly basis so I exclude it from that part of the analysis.

[7] The end dates vary from 1998 to 1999 based on the individual data availability for each country.

[8] See Table 1 for start dates of inflation targeting regimes.

early 1990s monetary policy might not have been any different. Tchaidze (2001) similarly maintains that monetary policy under Alan Greenspan's tenure as Chairman of the Federal Reserve (1987- present) is significantly less accommodative than the monetary policy of previous chairmen. Both papers emphasize that the nature of monetary policy may have changed in the United States during the 1990s. If the United States is covertly targeting inflation during the 1990s other OECD countries may also be covert inflation targeters.

For the inflation targeting countries the inflation targeting period should be less accommodative than the pre-inflation targeting period since anchoring inflation and anchoring inflation expectations is the goal of inflation targeting. Specifically, inflation targeting is a framework for monetary policy under which the central bank announces a quantitative inflation target over a certain time horizon. The main objective of this monetary policy is to maintain a low, stable inflation rate. When countries switch to inflation targeting I do not have a transition period because inflation targeting is generally an announced switch in monetary policy regimes. The transparency and credibility of inflation targeting provides a clear policy objective to the public.

In this paper I use a non-stationary specification for inflation. This follows the work of Smith and Stock and Watson (1999). The non-stationary specification lends itself in this framework because future inflation is estimated as a weighted average of lagged inflation and the trimmed mean. From this specification the relative contribution of each variable is easily understood and can be compared across regimes. Assuming that inflation and core inflation are cointegrated is reasonable in order to ensure that inflation and core inflation do not wander too far from one another. The theoretical model also emphasizes the cointegrated nature of inflation and demand-driven inflation or core inflation.

B. Unconditional results

The unconditional results show the level of accommodativeness different time periods or regimes have. If lagged inflation is core inflation then the regime is accommodative and supply shocks have permanent effects. But if the trimmed mean is core inflation then the regime is non-accommodative and supply shocks are transitory. If core inflation is a combination of the two variables then the regime is partially accommodative.

Since I am using year-over-year quarterly data I need to correct for serial correlation of the error terms that arises due to the overlapping nature of the data. Also, I want to examine the countries as groups and allow for cross-country correlation within groups (i.e. within the non-inflation targeting group and within the inflation targeting group). Allowing for the cross-country correlation suggests that when one country is hit with an inflation shock it is likely that the other countries face a similar shock.

I use a two-step process since there is both serial correlation in the errors within a country and contemporaneous correlation in the errors across countries. First, I correct for the serial correlation in each country's errors by allowing the data to pick the best fitting Autoregressive (AR) model. The AR model is a reasonable approximation of the error structure. After eliminating the serial correlation I allow for contemporaneous correlation across countries and I estimate the system using Seemingly Unrelated Regression (SUR). I do not examine the details of each country's regression, but I consider the averages. I want to observe the regimes in general and note any differences or similarities. Sheridan follows this approach in her examination of changes in inflation and inflation expectations persistence. I estimate the following equation for each group of countries.

$$\pi^*_{t,t+4} = \beta x^*_{t-4,t} + (1-\beta)\pi^*_{t-4,t} + u_t\,, \qquad (5)$$

where π^* is the transformed inflation rate and x^* is the transformed trimmed mean. Appendix A explains the procedure in detail.

The unconditional results are in Table 3. First, I compare the pre-1979 period and the post-1984 period. During the early period, lagged inflation is a better forecaster of future inflation than the trimmed mean. The coefficient on the trimmed mean is .09 and is insignificant for the pre-1979 period suggesting that the weight on lagged inflation is equal to one. In the historically known accommodative period of the 1970s, lagged inflation forecasts headline inflation well. During a period of accommodation any shock will be allowed to feed through to inflation permanently since the central bank does not take any action to counteract the shock.

During the post-1984 period, the results show that the trimmed mean forecasts future inflation better than lagged inflation. The coefficient on the trimmed mean is highly significant and close to one for both sets of countries with coefficient estimates of .84 and .74 for the non-inflation targeting countries and the inflation targeting countries, respectively. This suggests that this period was much less accommodative than the earlier period.

The second set of comparisons in Table 3 examines the differences in regimes during the post-1984 period. I examine both inflation targeting and non-inflation targeting countries. For the non-inflation targeting countries the coefficients are similar in the pre- and post-1992:Q1 periods. The coefficient on the trimmed mean is .83 for both periods. The coefficients are not significantly different from one implying that only the trimmed mean is helpful for forecasting future inflation. The similarity of the results demonstrates that there is not any change in the level of accommodativeness of the central bank between the 1980s and 1990s. These results show that the central bank was basically non-accommodative of supply shocks after the disinflation of the early 1980s. The similarity of the coefficients for the non-inflation targeting

countries in the full post-1984 period and the two sub-samples demonstrates the strong commitment of the central banks to fight inflation after the disinflation of the early 1980s.[9]

For the inflation targeting countries the results demonstrate a change in the accommodativeness of the central bank after the institution of inflation targeting. In the pre-inflation targeting period both the trimmed mean and lagged inflation contribute to forecasting future inflation with a coefficient of .63 on the trimmed mean and .37 on lagged inflation indicating a regime that accommodates some supply shocks. But in the post-inflation targeting period only the trimmed mean is useful for forecasting inflation with a coefficient of 1.06. This coefficient implies that lagged inflation plays no role in forecasting once inflation targeting is instituted. Even more interesting is that the confidence intervals for the two coefficients do not overlap; therefore, inflation targeting anchors inflation. Sheridan finds similar results that inflation is less persistent or inflation is anchored under inflation targeting. The question that arises is whether inflation expectations are similarly anchored by moving to inflation targeting. To answer this question and to check if inflation expectations are consistent with the level of accommodativeness the conditional regressions are examined.

C. Conditional results

Conditioning on the output gap and then determining whether lagged inflation or the trimmed mean is core inflation provides information about whether inflation expectations are consistent with the levels of accommodativeness found in the unconditional results. A similar estimation procedure is followed to correct for serial correlation. The following equation is estimated by SUR:

[9] In the full-sample results the lagged inflation term is significant but in the sub-sample results the lagged inflation

$$\pi^*_{t,t+4} = \beta x^*_{t-4,t} + (1-\beta)\pi^*_{t-4,t} + \alpha y^*_{t,t+4} + u_t\,, \qquad (6)$$

where all variables are as described in the unconditional case and y^* is the transformed output gap.[10] Recall if agents believe that there is an accommodative regime then lagged inflation is a better forecaster and if agents believe there is a non-accommodative regime than the trimmed mean is a better forecaster when conditioning on output. Policy makers do not determine if inflation rises with a supply shock but they do determine whether inflation stays high after a shock.

These results presented in Tables 4 and 5 are slightly different from the unconditional results. Agents seem to think that the central bank is less accommodative then it actually is. First, comparing the pre-1979 and post-1984 period one can see that during the 1970s lagged inflation did most of the work forecasting. Now the trimmed mean does contribute partially to forecasting inflation in the accommodative monetary policy regime. Conditioning on GDP the coefficient on the trimmed mean is .27(.13) and conditioning on industrial production the coefficient is .37(.09).[11] Both the trimmed mean and lagged inflation contribute to forecasting future inflation. In the post-1984 period the trimmed mean alone is core inflation. The coefficients on the trimmed mean are .93 and .89 for the non-inflation targeting and inflation targeting countries, respectively when conditioning on real GDP and .88 and .92 for the non-inflation targeting and inflation targeting countries, respectively when conditioning on industrial production. Thus, both inflation expectations dynamics and inflation dynamics have changed after the disinflation.

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term is not significant. The difference may be due to the fact that in the full sample the standard error is smaller because there are more data.

[10] Ireland is excluded from this analysis since quarterly real GDP is not available before 1997.

Also interestingly the coefficient on real GDP falls substantially from 1.66 to .21 and the coefficient on industrial production decreases from .63 to .06 for the non-inflation targeting countries. The slope of the Phillips curve is flatter and therefore the central bank faces an increased tradeoff between inflation and output. Ball, Mankiw and Romer (1988) discuss how the lower average inflation over this period should make the Phillips curve flatter.

The pre- and post-1992:Q1 periods support similar results. In both periods the trimmed mean alone is core inflation for the non-inflation targeting countries. Inflation expectations do not change for the non-inflation targeting countries. Specifically, the coefficient on the trimmed mean increases from .79 to .91 when conditioning on output. Since the confidence intervals of these estimates overlap substantially it implies that the coefficients are basically equivalent. When conditioning on industrial production the trimmed mean coefficient decreases from .88 to .85. None of these coefficients are statistically different from one. Inflation expectations have not changed between the 1980s and 1990s for non-inflation targeting countries.

Even for the inflation targeting countries there is no change in inflation expectations. The coefficient on the trimmed mean decreases from 1.17 to .99 conditioning on real GDP and increases from .98 to 1.11 conditioning on industrial production. When conditioning on either measure of aggregate activity, the coefficient on the trimmed mean is not significantly different from one. From these results it appears that inflation targeting did not anchor inflation expectations any more than the disinflation of the early 1980s. Also, for the inflation targeting countries the coefficient on the output gap has fallen significantly during the inflation targeting period demonstrating that the tradeoff between inflation and output changes due to inflation targeting. The Phillips curve is flatter in these inflation targeting regimes suggesting an

[11] The standard errors are in parentheses.

increased tradeoff between inflation and unemployment. This result is also consistent with the finding of Ball, Mankiw and Romer that lower average inflation (as one would expect in an inflation targeting regime) flattens the Phillips curve.

Inflation expectations have not changed with the introduction of inflation targeting. This result is interesting in light of Sheridan. She finds that inflation expectations are more anchored under inflation targeting. There are several reasons why we might find different conclusions. First, Sheridan's data is at an annual frequency. Second, the sample of countries is different because of data availability. The contradictory nature of the results suggests that further investigation of inflation expectations in inflation targeting with more countries and a longer sample is needed. In recent work, Ball and Sheridan (2003) find that inflation targeting does not matter for economic performance. This supports the finding that inflation expectations may not change after enacting inflation targeting.

4. Conclusions

This paper examines the question of whether the monetary policy regime and the measure of core inflation are related. In the empirical analysis I conclude that the monetary regime has an effect on the measure that forecasts future inflation best. Core inflation is dependent on the monetary policy regime. I demonstrate through a theoretical model why core inflation differs across monetary policy regimes. Moreover, I demonstrate why it is possible for core inflation to be either lagged inflation or the trimmed mean. Both the level of accommodativeness of the central bank and the inflation expectations of agents affect which measure is core inflation.

This paper has made several points. First, in post-1984 period central banks were much less accommodating than they had been in the 1970s. Also, the public believed that the central bank was less accommodative. Second, for non-inflation targeting countries, the level of

accommodativeness of the central bank and agents' beliefs did not change between the 1980s and 1990s despite the idea that these countries were covert inflation targeters. Third, for inflation targeting countries the level of accommodativeness did decrease with the introduction of inflation targeting but agents' beliefs did not change, as they already believed that monetary policy was non-accommodative. Overall from these results it appears that there is a gain from moving from an accommodative to less accommodative regime for both inflation and inflation expectations but the gain from moving from a less accommodative to non-accommodative regime such as strict inflation targeting only arises for inflation. Under inflation targeting inflation is more anchored but inflation expectations are not.

Appendix A: Derivation of Empirical Model

Here is the formal derivation of my empirical model. I use this specification so that I can allow both serial correlation and cross country correlation in the regressions. In order to find the nature of serial correlation I run Ordinary Least Squares (OLS) for the basic regression.

$$\pi_{t,t+4} = \beta x_{t-4,t} + (1-\beta)\pi_{t-4,t} + \varepsilon_{t+4} \quad \text{(A1)}$$

where *t,t+4* is the one-year ahead inflation rate and *t-4,t* is the previous year's inflation. From this regression I construct the errors, and I then run various autoregressive (AR) models using 1 to 7 lags. I pick the best AR model by choosing the one with the smallest Schwarz criterion (SC). After obtaining the best AR model I transform the original data. For example, suppose that the best AR model is an AR(2) for the United States. I would transform the data in the following method.

$$\varepsilon_{t+4} = \rho_1 \varepsilon_{t+3} + \rho_2 \varepsilon_{t+2} + u_t \quad \text{(A2)}$$

$$\pi^*_{t,t+4} = \beta x^*_{t-4,t} + (1-\beta)\pi^*_{t-4,t} + u_t \text{ where} \quad \text{(A3)}$$

$$\begin{aligned} \pi^*_{t,t+4} &= \pi_{t,t+4} - \rho_1 \pi_{t-1,t+3} - \rho_2 \pi_{t-2,t+2} \\ x^*_{t-4,t} &= x_{t-4,t} - \rho_1 x_{t-5,t-1} - \rho_2 x_{t-6,t-2} \\ \pi^*_{t-4,t} &= \pi_{t-4,t} - \rho_1 \pi_{t-5,t-1} - \rho_2 \pi_{t-6,t-2} \end{aligned} \quad \text{(A4)}$$

After obtaining the transformed data, I run SUR. SUR is a two-step process. In the first step the weighted data from serial correlation correction is used to estimate an equation for each country using OLS. From this set of regressions the variance-covariance of the residuals across countries is obtained. In the second step the coefficient estimates are obtained using this estimated variance-covariance matrix.[12] I estimate a system (with equation A3 for each country) for each time period.

[12] See Kmenta (1971) page 517-529 for more details.

Appendix B: Alternative Specification

There is an alternative framework that may be more appealing, especially under the strict inflation targeting period. This framework arises from the loss function of a central banker who cares about minimizing the deviations of inflation from its target and output from potential. Under this framework the optimal policy depends on the preferences of the central bank.

From the loss function, an empirical specification can be derived. The empirical specification is

$$\pi_{t+4,t} = (1-\rho)\pi^{\text{target}}_{\text{t, t-4}} + \rho(\beta x_{t,t-4} + (1-\beta)\pi_{t,t-4}) + \varepsilon_{t+4,t} \qquad \text{(B1)}$$

where future inflation is a weighted average of the target inflation rate, lagged inflation and the trimmed mean inflation rate.[13] Now future inflation depends on not just the trimmed mean and lagged inflation but also the target inflation rate chosen by the central bank.[14] The question that arises is what is non-accommodation under this specification. There are now two variables that give the level of accommodation. For a monetary policy regime that does not accommodate inflation in general, meaning that neither demand nor supply shocks are accommodated, ρ will have a low or zero value. If a regime does accommodate inflation, does the regime only accommodate demand shocks or does it also accommodate supply shocks? For a regime that does not accommodate supply shocks, β will have a high value, close to one. Using this regression that permits the central bank to have a target inflation rate, allows for a distinction between accommodating inflation in general and accommodating only supply shocks.

[13] More formally, the variables used in this regression are transformed similarly to the original specification as discussed in Appendix A.

[14] Also, the choice of a target inflation rate is difficult except under the strict inflation targeting regime. For target inflation rates, I used the average inflation rate from the 1960s for the 1970s regressions, the average inflation rate from the concurrent period for the post-1984 regressions and the actual inflation targets in the inflation targeting period. A future robustness check would be to check if the results vary with the choice of targets.

The results obtained from regression B1 are very similar to those in our original regression and are found in Tables 6 – 8. One important point to note is that if ρ is approaching zero, especially if ρ is not significantly different from zero, then β is irrelevant to the discussion and will be estimated poorly.

The unconditional results are similar to the earlier results. Both inflation and supply shocks are accommodated during the 1970s but as central banks move toward strict inflation targeting, inflation is less accommodated and therefore supply shocks are less accommodated. The non-inflation targeting regimes seem to be less accommodative of supply shocks earlier, perhaps in the 1980s than the inflation targeting countries.

The conditional results provide information about the inflation expectations of individuals during each of the monetary policy regimes. During the 1970s people believed inflation (demand shocks) and most supply shocks would be accommodated. In the post-1984 period, in non-inflation targeting countries people believed that inflation would not be accommodated on average. There is a different result for the inflation targeting countries where people believed demand shocks would be partially accommodated by the central bank and the evidence is mixed on whether individuals thought that supply shocks would be accommodated.

Considering inflation expectations in the pre- and post-inflation targeting eras, the results are slightly more difficult to interpret. There is a consistent result for the non-inflation targeting countries that the public believes that they do not accommodate inflation at all. It appears that people think that the average inflation that has been produced in the past is basically the inflation that the central bank will produce in the future. In inflation targeting countries, before inflation targeting was instituted people either thought the central bank was non-accommodative of all inflation or at least the central bank did not accommodate supply shocks. The good news is that

the public does believe that once inflation targeting started that the central bank would generally produce inflation equal to its target and that it would no longer accommodate supply shocks.

This alternative regression analysis confirms most of the findings from the main part of the paper. In addition, these results support the idea that inflation targeting may not have changed the behavior of the economy greatly especially in the role of modifying inflation expectations.

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TABLE 1: Data Availability

Country (Frequency median or trimmed mean is available)	Unconditional Data availability	Industrial Production data availability	Real GDP data availability	Start date of inflation target	Headline inflation rate and trimmed mean rate
Belgium (Monthly)	77:06 to 99:08	60:01 to 2000:09	85:Q1 to 2000:Q2		Consumer price index
France (Monthly)	72:02 to 97:12	60:01 to 2000:09	70:Q1 to 98:Q4**		Consumer price index
Japan (Monthly)	71:01 to 99:06	60:01 to 2000:09	61:Q1 to 2000:Q2		Consumer price index
United States (Monthly)	70:01 to 99:08	60:01 to 2000:09	61:Q1 to 2000:Q3		Consumer price index
Ireland (Quarterly)	76:Q4 to 98:Q4	60:Q1 to 2000:Q1	NA		Harmonized index of consumer prices
Canada (Monthly)	85:12 to 99:08	60:01 to 2000:09	61:Q1 to 2000:Q2	1991:02	Consumer price index
Spain (Monthly)	87:01 to 98:09	61:01 to 2000:09	70:Q1 to 98:Q4**	1995:01	Consumer price index
United Kingdom (Monthly)	88:01 to 99:06	60:01 to 2000:09	61:Q1 to 2000:Q2	1992:10	Retail price index
Australia (Quarterly)	77:Q3 to 99:Q2	60:Q1 to 2000:Q3	61:Q1 to 2000:Q2	1993:Q1	Consumer price index
New Zealand (Quarterly)	81:Q1 to 99:Q2	77:Q2 to 2000:Q2*	82:Q1 to 2000:Q2	1990:Q1	Consumer price index

* New Zealand only produces a manufacturing production index.

** GDP is based on the old base year since it allows a longer sample period. It has no effect on the data availability since the trimmed mean determines the sample length.

TABLE 2: A priori Ranking of Monetary Policy Regimes

Most Accommodative	
1	Pre-1979
2	Post-1984
3	Pre-Inflation targeting: Inflation targeting countries
3	Pre-1992: Non-inflation targeting countries
5	Post-1992: Non-inflation targeting countries
6	Post-Inflation targeting: Inflation targeting countries

There is no a priori reason to believe that there is any difference between the pre-inflation targeting regime and the pre-1992 regime for the non-inflation targeting countries. Hence they are ranked equivalently.

TABLE 3: Unconditional Results

Non-inflation targeting countries

Coefficient on:	Pre-79 Trimmed mean	Post-84 Trimmed mean	1984-1992:Q1 Trimmed mean	1992:Q2-End Trimmed mean
Belgium		0.8 *	0.67 *	1.45 *
		(0.12)	(0.14)	(0.25)
France	0.28	0.33 *	0.41	-0.09
	(0.34)	(0.15)	(0.22)	(0.25)
Japan	-0.01	1.28 *	0.86 *	1.26 *
	(0.14)	(0.25)	(0.29)	(0.35)
US	-0.01	1.01 *	1.18 *	1.05 *
	(0.22)	(0.11)	(0.14)	(0.13)
Ireland		0.79 *	1.05 *	0.48 *
		(0.18)	(0.19)	(0.23)
Average	**0.09**	**0.84 ***	**0.83 ***	**0.83 ***
	(0.14)	**(0.08)**	**(0.10)**	**(0.12)**

Inflation targeting countries

Coefficient on:	Post-84 Trimmed mean	Pre-IT Trimmed mean	Post-IT Trimmed mean
Canada	1.56 *	1.49 *	1.27 *
	(0.16)	(0.19)	(0.16)
Spain	0.63 *	0.51 *	1.44 *
	(0.17)	(0.20)	(0.06)
UK	0.15 *	0.15	0.34 *
	(0.07)	(0.09)	(0.15)
Australia	1.27 *	1.31 *	1.1 *
	(0.14)	(0.20)	(0.19)
New Zealand	0.07	-0.31	1.15 *
	(0.43)	(0.66)	(0.15)
Average	**0.74 ***	**0.63 ***	**1.06 ***
	(0.10)	**(0.15)**	**(0.07)**

Standard errors are in parentheses. * indicates significance at the 5% level.

TABLE 4: Conditional Results (Real GDP)

Non-inflation targeting countries

	Pre-79		Post-84	
Coefficient on:	Trimmed mean	Real GDP gap	Trimmed mean	Real GDP gap
Belgium			0.9 *	0.24
			(0.16)	(0.12)
France	1.07 *	2.24 *	0.43 *	0.09
	(0.28)	(0.24)	(0.17)	(0.15)
Japan	-0.06	1.48 *	1.4 *	0.31 *
	(0.19)	(0.21)	(0.24)	(0.12)
US	-0.19	1.27 *	0.97 *	0.19
	(0.16)	(0.09)	(0.12)	(0.13)
Ireland				
Average	**0.27 ***	**1.66 ***	**0.93 ***	**0.21 ***
	(0.13)	**(0.12)**	**(0.09)**	**(0.08)**

Inflation targeting countries

	Post-84	
Coefficient on:	Trimmed mean	Real GDP gap
Canada	1.41 *	0.23 *
	(0.14)	(0.08)
Spain	0.66 *	0.17
	(0.18)	(0.11)
UK	0.71 *	0.77 *
	(0.15)	(0.27)
Australia	1.4 *	0.04
	(0.15)	(0.26)
New Zealand	0.28	0.65 *
	(0.45)	(0.26)
Average	**0.89 ***	**0.37 ***
	(0.11)	**(0.1)**

Standard errors are in parentheses. * indicates significance at the 5% level.

TABLE 4 (cont'd)

Non-inflation targeting countries

	1984-1992:Q1		1992:Q2-End	
Coefficient on:	Trimmed mean	Real GDP gap	Trimmed mean	Real GDP gap
Belgium	0.63 *	0.13	0.87 *	0.43 *
	(0.22)	(0.19)	(0.24)	(0.13)
France	0.42	-0.01	0.21	0.2
	(0.24)	(0.21)	(0.3)	(0.17)
Japan	0.92 *	0.16	1.61 *	0.42 *
	(0.31)	(0.18)	(0.37)	(0.15)
US	1.19 *	0.15	0.98 *	0.37 *
	(0.16)	(0.19)	(0.12)	(0.13)
Ireland				
Average	**0.79 ***	**0.11**	**0.91 ***	**0.35 ***
	(0.13)	**(0.1)**	**(0.14)**	**(0.08)**

Inflation targeting countries

	Pre-IT		Post-IT	
Coefficient on:	Trimmed mean	Real GDP gap	Trimmed mean	Real GDP gap
Canada	1.41 *	0.13	1.37 *	0.53 *
	(0.19)	(0.07)	(0.15)	(0.15)
Spain	0.61 *	0.1	0.84 *	0.46 *
	(0.21)	(0.13)	(0.28)	(0.23)
UK	0.75 *	0.85 *	0.35 *	-0.09
	(0.22)	(0.26)	(0.15)	(0.66)
Australia	2.15 *	0.83 *	1.21 *	-0.29
	(0.2)	(0.22)	(0.18)	(0.39)
New Zealand	0.92	1.95 *	1.19 *	0.08
	(0.96)	(0.81)	(0.15)	(0.15)
Average	**1.17 ***	**0.77 ***	**0.99 ***	**0.14**
	(0.21)	**(0.18)**	**(0.08)**	**(0.17)**

Standard errors are in parentheses. * indicates significance at the 5% level.

TABLE 5: Conditional Results (Industrial Production)

Non-inflation targeting countries

	Pre-79		Post-84	
Coefficient on:	Trimmed mean	IP gap	Trimmed mean	IP gap
Belgium			0.83 *	0.06
			(0.12)	(0.03)
France	0.76 *	0.77 *	0.46 *	0.02
	(0.07)	(0.07)	(0.16)	(0.08)
Japan	0.04	0.60 *	1.38 *	0.14 *
	(0.16)	(0.07)	(0.25)	(0.05)
US	0.32	0.53 *	0.94 *	0.07
	(0.19)	(0.06)	(0.12)	(0.08)
Ireland			0.80 *	0.01
			(0.19)	(0.06)
Average	**0.37 ***	**0.63 ***	**0.88 ***	**0.06**
	(0.09)	**(0.04)**	**(0.08)**	**(0.03)**

Inflation targeting countries

	Post-84	
Coefficient on:	Trimmed mean	IP gap
Canada	1.40 *	0.11 *
	(0.15)	(0.05)
Spain	0.74 *	0.16 *
	(0.15)	(0.05)
UK	0.76 *	0.70 *
	(0.14)	(0.16)
Australia	1.38 *	-0.01
	(0.14)	(0.15)
New Zealand	0.30	0.47 *
	(0.44)	(0.16)
Average	**0.92 ***	**0.29 ***
	(0.11)	**(0.05)**

Standard errors are in parentheses. * indicates significance at the 5% level.

TABLE 5 (cont'd)

Non-inflation targeting countries

	1984-1992:Q1		1992:Q2-End	
Coefficient on:	Trimmed mean	IP gap	Trimmed mean	IP gap
Belgium	0.73 *	0.04	1.30 *	0.10 *
	(0.15)	(0.08)	(0.23)	(0.03)
France	0.45	-0.09	0.23	0.10
	(0.23)	(0.13)	(0.31)	(0.07)
Japan	1.02 *	0.08	1.30 *	0.10
	(0.31)	(0.08)	(0.37)	(0.06)
US	1.19 *	0.08	1.00 *	0.15
	(0.14)	(0.10)	(0.13)	(0.11)
Ireland	1.03 *	0.02	0.42	-0.02
	(0.20)	(0.08)	(0.25)	(0.07)
Average	**0.88 ***	**0.03**	**0.85 ***	**0.08 ***
	(0.10)	**(0.05)**	**(0.12)**	**(0.03)**

Inflation targeting countries

	Pre-IT		Post-IT	
Coefficient on:	Trimmed mean	IP gap	Trimmed mean	IP gap
Canada	1.38 *	0.06	1.48 *	0.32
	(0.20)	(0.04)	(0.18)	(0.18)
Spain	0.71 *	0.14 *	0.83 *	0.18 *
	(0.20)	(0.06)	(0.26)	(0.09)
UK	0.85 *	0.86 *	0.81 *	0.43
	(0.19)	(0.17)	(0.23)	(0.36)
Australia	2.06 *	0.48 *	1.14 *	-0.18
	(0.21)	(0.14)	(0.17)	(0.16)
New Zealand	-0.11	0.53	1.28 *	0.12
	(0.74)	(0.51)	(0.16)	(0.10)
Average	**0.98 ***	**0.42 ***	**1.11 ***	**0.17**
	(0.17)	**(0.11)**	**(0.09)**	**(0.09)**

Standard errors are in parentheses. * indicates significance at the 5% level.

TABLE 6: Unconditional Results (Alternative specification)

Non-inflation targeting countries

	Pre-79		Post-84		1984-1992:Q1		1992:Q2-End	
	ρ	β	ρ	β	ρ	β	ρ	β
Belgium			0.07	0.55	0.11	-2.74	-0.23	-1.31
			(0.18)	(1.73)	(0.23)	(8.12)	(0.33)	(3.67)
France	0.94 *	0.27	0.10	-5.01	0.22	-2.35	-0.61	1.14 *
	(0.13)	(0.43)	(0.16)	(9.83)	(0.36)	(5.94)	(0.22)	(0.44)
Japan	0.40 *	-0.07	0.12	0.16	-0.03	-6.86	-0.22	-1.83
	(0.14)	(0.38)	(0.14)	(1.43)	(0.16)	(47.84)	(0.19)	(2.69)
US	0.97 *	0.06	0.40 *	1.14 *	-0.14	-0.60	-0.10	-3.58
	(0.08)	(0.24)	(0.2)	(0.29)	(0.42)	(4.85)	(0.24)	(9.42)
Ireland			0.28 *	0.99 *	0.39 *	1.75 *	-0.54	0.37
			(0.09)	(0.39)	(0.08)	(0.41)	(0.17)	(0.37)
Average	**0.77 ***	**0.09**	**0.20 ***	**-0.43**	**0.11**	**-2.16**	**-0.34**	**-1.04**
	(0.08)	**(0.21)**	**(0.08)**	**(2.00)**	**(0.13)**	**(9.77)**	**(0.11)**	**(2.08)**
Avg w/o France			**0.22 ***	**0.22 ***				
			(0.09)	**(0.09)**				

Inflation targeting countries

	Post-84		1984-1992:Q1		1992:Q2-End	
	ρ	β	ρ	β	ρ	β
Canada	0.33	2.56	0.57	2.05 *	-0.57	0.06
	(0.27)	(1.39)	(0.31)	(0.71)	(0.52)	(0.89)
Spain	0.63 *	0.58 *	0.46 *	0.46	1.07 *	1.42 *
	(0.15)	(0.26)	(0.18)	(0.4)	(0.05)	(0.07)
UK	0.29	0.52	0.00	24.76	-0.58	0.14
	(0.17)	(0.41)	(0.32)	(2948.49)	(0.16)	(0.2)
Australia	0.99 *	1.23 *	0.60 *	2.16 *	0.43	1.61 *
	(0.11)	(0.14)	(0.29)	(0.52)	(0.32)	(0.72)
New Zealand	0.13	-0.63	-0.28	-0.34	0.44 *	0.29
	(0.11)	(2.68)	(0.2)	(1.81)	(0.21)	(0.59)
Average	**0.47 ***	**0.85**	**0.27 ***	**5.82**	**0.16**	**0.70 ***
	(0.08)	**(0.61)**	**(0.12)**	**(589.7)**	**(0.14)**	**(0.26)**

TABLE 7: Conditional Results (Real GDP)

Non-inflation targeting countries

	Pre-79			Post-84		
	ρ	β	α	ρ	β	α
Belgium				-0.22	0.55	0.19
				(0.2)	(0.75)	(0.12)
France	0.94 *	1.03 *	2.21 *	-0.04	0.93	-0.01
	(0.08)	(0.4)	(0.24)	(0.16)	(4.06)	(0.12)
Japan	0.72 *	-0.17	1.45 *	-0.20	-2.07	0.54 *
	(0.06)	(0.23)	(0.17)	(0.12)	(2.02)	(0.09)
US	0.86 *	-0.32	1.25 *	0.32	0.71	0.27 *
	(0.06)	(0.19)	(0.09)	(0.19)	(0.38)	(0.12)
Ireland						
Average	**0.84 ***	**0.18**	**1.64 ***	**-0.04**	**0.03**	**0.25 ***
	(0.04)	**(0.17)**	**(0.11)**	**(0.09)**	**(1.16)**	**(0.07)**

Inflation targeting countries

	Post-84		
	ρ	β	α
Canada	0.31	2.66	0.28 *
	(0.25)	(1.42)	(0.09)
Spain	0.70 *	0.66 *	0.14
	(0.15)	(0.24)	(0.11)
UK	0.10	2.37	0.88 *
	(0.14)	(3.15)	(0.18)
Australia	0.90 *	1.32 *	0.01
	(0.12)	(0.17)	(0.25)
New Zealand	0.19	0.24	0.65 *
	(0.11)	(1.64)	(0.24)
Average	**0.44 ***	**1.45**	**0.39 ***
	(0.07)	**(0.77)**	**(0.08)**

TABLE 7: (cont'd)

Non-inflation targeting countries

	1984-1992:Q1			1992:Q2 - End		
	ρ	β	α	ρ	β	α
Belgium	-0.23	0.60	0.14	-0.11	-3.79	-0.04
	(0.24)	(0.58)	(0.14)	(0.37)	(16.78)	(0.15)
France	-0.01	96.83	-0.30	-0.53	1.22 *	-0.47
	(0.24)	(2504.15)	(0.11)	(0.22)	(0.5)	(0.17)
Japan	-0.23	-1.29	-0.30	-0.10	-5.01	0.46 *
	(0.17)	(1.67)	(0.11)	(0.14)	(8.57)	(0.07)
US	-0.31	1.36 *	0.35 *	-0.22	-1.34	-0.10
	(0.41)	(0.64)	(0.14)	(0.32)	(2.73)	(0.18)
Ireland						
Average	**-0.19**	**24.38**	**0.15 ***	**-0.24**	**-2.23**	**-0.04**
	(0.15)	**(626.02)**	**(0.07)**	**(0.14)**	**(4.73)**	**(0.08)**

Inflation targeting countries

	Pre-IT			Post-IT		
	ρ	β	α	ρ	β	α
Canada	0.00	-199.15	0.18	0.94 *	1.36 *	0.50 *
	(0.28)	(16987.22)	(0.1)	(0.38)	(0.22)	(0.17)
Spain	0.50 *	0.57	0.09	1.51 *	0.82 *	0.81 *
	(0.18)	(0.39)	(0.12)	(0.22)	(0.16)	(0.21)
UK	-0.25	-0.51	1.12 *	0.16	0.99	0.48
	(0.14)	(0.64)	(0.1)	(0.17)	(1.1)	(0.55)
Australia	0.61 *	2.48 *	0.92 *	0.78 *	1.16 *	-0.02
	(0.2)	(0.49)	(0.22)	(0.16)	(0.24)	(0.38)
New Zealand	-0.24	-2.12	1.15 *	0.42 *	1.42 *	0.12
	(0.17)	(2.77)	(0.47)	(0.11)	(0.34)	(0.13)
Average	**0.12**	**-39.75**	**0.69 ***	**0.76 ***	**1.15 ***	**0.38 ***
	(0.09)	**(3397.46)**	**(0.11)**	**(0.1)**	**(0.24)**	**(0.14)**

TABLE 8: Conditional Results (Industrial Production)

Non-inflation targeting countries

	Pre-79			Post-84		
	ρ	β	α	ρ	β	α
Belgium				0.02	-2.08	0.06
				(0.16)	(23.53)	(0.03)
France	1.14 *	1.23 *	0.79 *	0.08	-6.38	0.03
	(0.08)	(0.33)	(0.07)	(0.16)	(15.33)	(0.05)
Japan	0.80 *	0.01	0.55 *	-0.13	-3.05	0.24
	(0.07)	(0.21)	(0.09)	(0.12)	(3.7)	(0.04)
US	1.00 *	0.34	0.55 *	0.49 *	0.92 *	0.15
	(0.06)	(0.2)	(0.06)	(0.19)	(0.22)	(0.08)
Ireland				0.29 *	0.95 *	0.03
				(0.09)	(0.37)	(0.03)
Average	**0.98 ***	**0.53 ***	**0.63 ***	**0.15 ***	**-1.93**	**0.10 ***
	(0.05)	**(0.14)**	**(0.05)**	**(0.07)**	**(5.62)**	**(0.03)**

Inflation targeting countries

	Post-84		
	ρ	β	α
Canada	0.31	2.52	0.13 *
	(0.26)	(1.4)	(0.06)
Spain	0.80 *	0.83 *	0.17 *
	(0.1)	(0.17)	(0.04)
UK	0.31 *	1.09 *	0.78 *
	(0.08)	(0.31)	(0.09)
Australia	0.95 *	1.29 *	-0.03
	(0.12)	(0.15)	(0.14)
New Zealand	0.14	0.35	0.43 *
	(0.11)	(2.14)	(0.16)
Average	**0.50 ***	**1.22 ***	**0.29 ***
	(0.07)	**(0.52)**	**(0.05)**

TABLE 8: (cont'd)

Non-inflation targeting countries

	1984-1992:Q1			1992:Q2 - End		
	ρ	β	α	ρ	β	α
Belgium	0.06	-4.67	0.08	-0.22	-1.63	-0.05
	(0.23)	(20.97)	(0.1)	(0.41)	(5.27)	(0.1)
France	0.05	-21.16	-0.27	-0.53 *	1.27 *	-0.32
	(0.23)	(112.34)	(0.11)	(0.22)	(0.56)	(0.12)
Japan	-0.20	-2.33	0.34 *	-0.12	-4.14	0.09
	(0.15)	(2.46)	(0.08)	(0.18)	(8.01)	(0.06)
US	0.12	0.52	0.30 *	-0.28	-0.03	-0.24
	(0.37)	(1.99)	(0.11)	(0.33)	(1.02)	(0.16)
Ireland	0.45 *	1.48 *	0.07 *	-0.53 *	0.28	-0.07
	(0.05)	(0.22)	(0.02)	(0.18)	(0.39)	(0.05)
Average	**0.10**	**-5.23**	**0.11 ***	**-0.34 ***	**-0.85**	**-0.12 ***
	(0.11)	**(23.86)**	**(0.05)**	**(0.13)**	**(1.94)**	**(0.05)**

Inflation targeting countries

	Pre-IT			Post-IT		
	ρ	β	α	ρ	β	α
Canada	0.67 *	1.85 *	0.09	0.06	4.32	-0.12
	(0.29)	(0.5)	(0.07)	(0.62)	(35.55)	(0.22)
Spain	0.73 *	1.15 *	0.29 *	1.57 *	1.01 *	0.41 *
	(0.09)	(0.23)	(0.05)	(0.11)	(0.07)	(0.05)
UK	0.30 *	0.92 *	1.08 *	-0.29	-0.05	0.55 *
	(0.07)	(0.25)	(0.17)	(0.16)	(0.44)	(0.18)
Australia	0.76 *	2.23 *	0.48 *	0.81 *	1.15 *	-0.12
	(0.22)	(0.36)	(0.14)	(0.18)	(0.22)	(0.21)
New Zealand	-0.28	-1.18	1.34 *	0.60 *	1.31 *	0.33 *
	(0.13)	(1.67)	(0.26)	(0.1)	(0.3)	(0.11)
Average	**0.43 ***	**0.99 ***	**0.66 ***	**0.55 ***	**1.55**	**0.21 ***
	(0.08)	**(0.36)**	**(0.07)**	**(0.14)**	**(7.11)**	**(0.08)**