WP 03-6

Empirical Investigations of Inflation Targeting

Yifan Hu

- July 2003 -

EMPIRICAL INVESTIGATIONS OF INFLATION TARGETING

Yifan Hu

PhD, Department of Economics, Georgetown University
Former Research Assistant, Institute for International Economics

Abstract

A growing number of countries have anchored their monetary policy to an explicit numerical rate or range of inflation since such an inflation targeting framework was first adopted by New Zealand in 1989. This paper empirically investigates issues associated with inflation targeting using a dataset of 66 countries for the 1980–2000 period.

The paper focuses on two issues. First, which factors are systematically associated with a country's decision to adopt inflation targeting as its monetary framework? Second, does inflation targeting improve the performance of inflation and output? Does the trade-off between inflation and output variability change under such a framework?

The empirical results are informative and encouraging. A number of economic conditions, structure, and institution variables are significantly associated with the choice of inflation targeting. Both descriptive statistics and regression results suggest that inflation targeting does play a beneficial role in improving the performance of inflation and output. This paper explores an evident and positive relationship between inflation and output variability, which is different from the view based on the Taylor Curve. But the author finds limited support for the proposition that the adoption of inflation targeting improves the trade-off between inflation and output variability.

Author's note: This paper is the third chapter of my PhD dissertation.
I greatly appreciate the advice and support of Edwin Truman, senior fellow at the Institute for International Economics. All remaining errors are mine.
I may be contacted at *huy2@georgetown.edu*.

I. INTRODUCTION

Economists and policymakers have long sought the holy grail of monetary policy. Since New Zealand first adopted an inflation targeting framework in 1989, a growing number of countries have anchored their monetary policies to an explicit numerical rate or range of inflation. According to my count, by the end of 2002, there were 22 inflation targeting countries;[1] two countries (Argentina and Turkey) are possibly on their way, and G3 and other emerging economies could join this club in the future.

Inflation targeting has been increasingly viewed as a good monetary policy framework and widely applauded by economists and policymakers. In the literature, the benefits of inflation targeting on inflation and output can be summarized in two strands. First, inflation targeting improves the performance of inflation and output. In other words, an inflation targeting framework could lower the level and variability of inflation, increase output growth but decrease its variability, and diminish the persistence of inflation. For example, Neumann and von Hagen (2002) compare statistics for inflation targeters and nontargeters across different periods and find that inflation targeting reduces the volatility of inflation, output, and interest rates. Second, inflation targeting improves inflation forecasting by lowering the level of expected inflation and/or increasing its predictability (Corbo, Landerretche, and Schmidt-Hebbel 2001; Johnson 2002; and Mishkin and Schmidt-Hebbel 2001).

On the other hand, an almost equal number of studies claim not to find clear evidence supporting the benefits of inflation targeting, though their results do not provide arguments against it either. For example, Ball and Sheridan (2003) examine changes in the level and variability of inflation and output as well as the persistence of inflation for seven inflation targeters and 13 nontargeters among industrial countries. They conclude that countries on average improved their performance in the 1990s, but there is no significant evidence that inflation targeters performed better than nontargeters. Cecchetti and Ehrmann (1999) argue? based on a study of 23 countries (including nine inflation targeters) over the 1984–97 period? that inflation aversion increased, but inflation targeting made little difference in the 1990s.

The resulting empirical difference in the inflation targeting literature is partly because of the small number of inflation targeting countries and the short history of this new monetary framework. It will perhaps take more than a decade for inflation targeting to become fully credible and to be fully studied. At this point, empirical investigations of inflation targeting can

[1] The number of inflation targeting countries might vary depending on the definition of inflation targeting. This issue is further discussed in section 2.

provide a reasonable evaluation of what has been done and a sensible suggestion about what might happen under an inflation targeting framework.

This paper investigates issues associated with inflation targeting using a dataset of 66 countries for the 1980–2000 period. It focuses on two issues: (1) factors systematically associated with a country's choice of inflation targeting and (2) the effects of inflation targeting on the performance of inflation and output and on the trade-off between inflation and output variability.

This paper goes beyond previous work in two respects. First, most of the existing literature examines the effects of inflation targeting after countries adopt it as their monetary framework but rarely asks whether there are prominent factors that systematically lead a country to choose inflation targeting. Second, the dataset in this paper is comprehensive, covering 66 countries over a 20-year period from 1980 to 2000. It comprises OECD, Eastern Europe, Latin America, Asia, and Africa, of which 22 countries are inflation targeters based on the definition used in this paper. The wide coverage of the dataset permits a better assessment of the performance of inflation targeters compared with nontargeters.

This paper is organized as follows. Section 2 introduces the data and variables and reports on preliminary statistical analysis. Section 3 describes the research methodologies employed and presents the empirical results. The results are encouraging and informative, in spite of the small number of inflation targeting countries and the short history these countries have had to implement the inflation targeting framework. Section 4 concludes.

II. DATA AND PRELIMINARY RESULTS

The sample in this paper covers annual observations for 66 countries for the 1980–2000 period? 22 are inflation targeting countries and the remaining 44 are taken as potential inflation targeting countries (see appendix 1). Sample periods for a few emerging countries are shorter depending on their data availability. For example, data on Eastern European economies including Bulgaria, the Czech Republic, Hungary, Romania, Slovakia, Slovenia, Ukraine, and Russia are available only after their transition was completed in the 1990s.

Data were collected on the 21 variables listed in appendix 2, of which nine are for economic conditions/performance (*C*), eight are for economic structure (*E*), and three are for economic institutions (*I*).[2] A variable for nonfuel commodity price is also included, which is measured as the annual change of world nonfuel commodity price. The variables for economic conditions, structure, and institutions are discussed in detail below.

[2] The classification of some variables is arbitrary because they could be placed in more than one category. The categories are useful for us in thinking about the expected signs of coefficients.

Economic Conditions Variables

The nine variables representing a country's economic performance are real GDP growth and its variability, real GDP gap, nominal and real interest rates, inflation rate and its variability, foreign exchange pressure, and M2 growth.

GDP growth variability is measured in two ways: one measures GDP growth variability by the standard deviation of the average GDP growth of the whole study period, which is used in the regressions of the choice of inflation targeting and the other measures GDP growth variability by the standard deviation of a five-year rolling average of GDP growth, which is used in the regressions of the effects of inflation targeting. And the inflation variability is measured by the standard deviation of a five-year rolling average of the inflation rate.

The variable for foreign exchange pressure is worth special discussion. A number of countries adopted the inflation targeting framework during or in the aftermath of financial crises. These countries include Finland, Spain, Sweden, and the United Kingdom in Western Europe; Brazil and Mexico in Latin America, Korea and Thailand in Asia; and the Czech Republic in Eastern Europe. Thus, it is reasonable to question whether foreign exchange pressure is systematically associated with the choice of inflation targeting.

The foreign exchange pressure variable to identify periods of financial stress is created following the methodology of Kamin, Schindler, and Samuel (KSS 2001), using in part their results but also extending their dataset to a larger group of countries. In KSS, the foreign exchange pressure variable is constructed as "the weighted average of two-month percentage changes in the real bilateral exchange rate against dollar and in international reserves, with the weights being proportional to the inverse of the standard deviation of these series. Declines in these weighted averages in excess of 1.75 standard deviations indicate a crisis month." Generally, any year in which a crisis month occurs is considered to be a crisis year. The additional crisis months should be identified in the subsequent year, but it is not considered a new crisis when one of three conditions is met (KSS 2001).[3]

The KSS paper assembles the foreign exchange pressure variable for 26 emerging-market economies, of which 25 are listed in my sample. The KSS calculations are then extended to the remaining 41 countries but used the real bilateral exchange rate against the deutsche mark instead of the US dollar for the European Union countries.

[3] KSS (2001) identify three exception rules as: 1) the exchange rate pressure variable recovers to its prior level before falling significantly again, 2) there is a lapse of more than four months in which no monthly crisis is signaled, or 3) a monthly crisis is signaled after June in the second year.

My results show by construction that all sample countries had experienced foreign exchange pressure at least once during the 1980–2000 period, and the identified crisis years appeared to be consistent with historical descriptions.

Economic Structure Variables

Eight variables are chosen to describe a country's structure characteristics? nominal and real effective exchange rate variability, fiscal position, current account position, trade openness, terms of trade (TOT) variability, external debt, and financial depth.

Similar to the measurement of inflation variability, nominal and real effective exchange rate variability is calculated by the standard deviation of their five-year rolling average.

Fiscal position and current account position are measured as their surplus (+)/deficit (–) percentages of nominal GDP, thus these two variables are positive if in surplus and negative if in deficit. Trade openness is proxied by the ratio of exports plus imports of goods and services to nominal GDP.

External debt is measured as the ratio of each country's external debt position to GDP. The data for developing countries are drawn from the database of *World Development Indicators*; the data for industrial countries are constructed from the sum of stocks of portfolio investment debt securities and other investment liabilities under the international investment position accounts in the IMF's *International Financial Statistics.* However, four countries (Greece, Ireland, Singapore, and Saudi Arabia) do not have international investment position data. Lane and Milesi-Ferretti (1999) provide a method to estimate the external debt for countries where stock data are not available. Following Lane and Milesi-Ferretti, the external debt positions of these four countries are estimated by accumulating flows of portfolio investment debt securities and other investment liabilities under their balance of payment accounts in the IMF's *International Financial Statistics*, assuming their initial values of external debt are negligible.[4]

Financial depth is proxied by the ratio of M2 to nominal GDP, which represents the degree to which the economy is monetarized.[5] Accordingly, the larger the ratio, the greater the capacity monetary authorities have to implement monetary policy effectively.

[4] Flows of portfolio investment debt securities and other investment liabilities are accumulated for these four countries since the year when their data are first available. Specifically, 1976 is the initial year for Greece, 1974 for Ireland, 1976 for Singapore, and 1971 for Saudi Arabia.

[5] Willamson and Mahar (1998) suggest that financial depth, measured by M2/GDP, is a helpful indicator to determine a financial system's efficiency in mobilizing funds to foster economic growth.

TOT variability is calculated as the standard deviation of terms of trade index over the 1980–2000 period.[6] Saudi Arabia is the only country that has no TOT data; thus its average oil export price variability is used instead, considering that oil is its major export commodity.

It is worth noting that four economic structure variables, including trade openness, external debt, financial depth, and TOT variability, are fairly stable over the period. Given my interest in the underlying structure characteristics proxied by these four variables rather than in their small changes over time, I use the period average for 1980–2000 of each variable in the regression analysis. In this way, for a given country, any of the four variables only has one value over the period and functions like a pseudo-dummy variable.

Economic Institution Variables

Three institution indicators are most relevant to this inflation targeting study: whether inflation targeting is adopted, whether the central bank has autonomy, and whether a country has a floating exchange rate regime.

Given this paper's focus on inflation targeting, it is important to properly identify the inflation targeting countries and the dates of their adoption of inflation targeting. The literature provides us a variety of lists on these two variables, depending on the researchers' different perspectives and interpretations of the inflation targeting framework. For example, Peru considered adopting inflation targeting in January 1993 as pointed out in Kuttner and Posen (2001), in January 1994 as observed in Mishkin and Schmidt-Hebbel (2001), but it was not regarded as an inflation targeter by the end of 2001 (IMF's *International Financial Statistics 2001*).

Truman (2003) summarizes four principal elements that characterize an inflation targeting country: 1) adopting price stability as the formal goal of monetary policy, 2) articulating a numerical target or sequence of targets, 3) establishing a time horizon to reach the target, and 4) creating an evaluation system to review whether the target has been met. Based on these four elements and after extensive contacts with the relevant central banks, Truman identifies 22 inflation targeting countries. Table 1 lists these countries as well as the dates when they adopted inflation targeting.

Three countries? Chile, Mexico, and Israel? have two initiation dates for adopting inflation targeting because these countries started with a monetary framework of mixed targets at

[6] Terms of trade index is calculated by the ratio of export prices to import prices (goods and services). It measures a nation's welfare position, which improves when export prices rise faster or fall slower than import prices.

the earlier date then abandoned the mixed targets, and switched to full-fledged inflation targeting.[7] Specifically, Chile announced a mixed framework of inflation targeting and a crawling exchange rate regime in September 1990 then moved to a sole target of inflation in September 1999. Israel implemented inflation targeting together with a widening exchange rate band in December 1991 then abandoned the exchange rate target in June 1997. Mexico started with a mixed regime of inflation and monetary targeting in January 1995 but completely implemented inflation targeting in January 2001. It took some years for these three countries to move from a mixed regime toward a sole inflation targeting framework. Thus, it is interesting to examine whether the results in the analysis are different when using alternative dates of adoption for these three countries.

In summary, table 1 shows 22 inflation targeting countries by 2002, of which nine are industrial countries and 13 are emerging-market economies. New Zealand was the first country to adopt inflation targeting as its monetary framework in December 1989. Following New Zealand, six industrial countries became inflation targeters in the early 1990s. Finland and Spain gave up inflation targeting after they joined the European Monetary Union in January 1999. Most emerging-market economies have a fairly short history of full implementation of inflation targeting since the late 1990s.

Central bank autonomy is thought to be associated with the capacity to implement anti-inflation policies.[8] Many indicators can be issued to measure central bank autonomy, but the multi-faceted measures could cause severe problems of interpretation.[9] Thus I follow Kuttner and Posen (2001) to narrow down the focus to two aspects of the legal structure: 1) whether there are barriers to firing the central bank governor, and 2) whether the central bank is prevented from

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[7] Spain actually operated under a de facto mixed regime from January 1995 to December 1998. Spain adopted inflation targeting in January 1995 in the context of an increase in VAT and a concern about the passthrough to inflation. That passthrough was much less than expected, nevertheless the peseta came under downward pressure in March 1995 and was devalued within the widened bands of the exchange rate mechanism of the European Monetary System. In the same formal sense, Finland operated under a de facto mixed regime from January 1995 onward, but it did not experience any conflict situation.

[8] Note that the variable for central bank "autonomy" is used, not a variable for central bank "independence," either instrument or goal independence. See the debate on the role of these two variables in the choice of a monetary framework in Mishkin and Schmidt-Hebbel (2001).

[9] There are a large number of indicators to measure central bank autonomy or independence. However, the reliability and usefulness of these indicators have been questioned, since the existing indicators differ substantially from each other, in terms of the criteria contained in the index, the interpretation and evaluation to these criteria, and the way in which the criteria are aggregated. Thus the choice of indicators could lead to very different results. (Berger, de Haan, and Eijffinger 2001; Posen 1998; and Cukierman 1992). However, it does not mean these indicators are uninformative; it implies that the application of indicators is needed to be supplemented by judgment. Cukierman (1992) argues that some indices are more proper for some purpose than for others. For example, the turnover rate for governors or members of the policy board is a good indicator for central bank autonomy.

purchasing government debt directly. The central bank is identified as in full autonomy if answers to both questions are yes and in partial autonomy if there is only one positive answer.[10] This variable is established using data provided in Cukierman (1992), Cukierman, Miller, and Neyapti (2002), Kuttner and Posen (2001) and an examination of other information on the mandates of central banks.[11]

Two standards are often used in classifying exchange rate regimes in the literature. A de jure classification is based on the country's publicly stated policy as summarized in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions.* A de facto classification is normally based on the observed behavior of exchange rates. Either classification has its advantages and disadvantages. The de jure classification captures central banks' formal commitment but fails to control for any actual policy inconsistency; the de facto classification documents the actual movement of exchange rates but misses the structural features.

In practice, data of both de facto and de jure exchange rate regimes are employed in the regression analysis in order to examine whether these two classifications are associated with differences in my results. Data on the de jure exchange rate regime are collected from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions.* Exchange rate regimes from nine categories found in the IMF's report are then reclassified into three categories: a floating exchange rate regime includes free floating and managed floating; an intermediate floating exchange rate regime includes basket pegging, crawling pegging, and band arrangements (ERM); and a fixed exchange rate regime includes hard pegging and a currency board.[12]

In terms of the de facto exchange rate regime, the classification by Levy-Yeyati and Sturzenegger (2002) is applied. Levy-Yeyati and Sturzenegger categorize exchange rate regimes based on changes in a country's nominal exchange rate, the volatility of these changes, and the volatility of international reserves. Their three-way classification divides observations into floating, intermediate floating, and fixed regimes, which are consistent with this paper's de jure classification.

Comparing the de jure and de facto exchange rate regimes, it seems developed countries often announce their flexible exchange rate regimes and are identified as such in de facto classification. Emerging-market economies tend to have different de jure and de facto exchange

[10] This paper focuses on the effects of central bank autonomy on the choice of inflation targeting rather than whether the degree of autonomy causes differences in the results. Accordingly, the value 1 is assigned to the dummy for central bank autonomy if the central bank is in full autonomy, and 0 otherwise.
[11] For countries without previously codified central bank autonomy data, Truman used these sources such as mandates to make a judgment, applying his intuition and expertise.
[12] Applying the similar reason used for the variable for central bank autonomy, the value 1 is assigned to the dummy for floating exchange rate regime if it is free or managed floating, and 0 otherwise.

rate regimes, particularly in the face of pressure. As a whole, the two classifications are quite different with a low correlation of 0.38.[13]

In regressions in this paper, these three institution variables—inflation targeting, full central bank autonomy, and a floating exchange rate regime—take the value 1 in the year in which these regimes are adopted, and the value 0 otherwise. This paper follows the "half-year-rule" to decide the policy regime of the year, if the data are monthly. When a regime is adopted in the first half of a year, that year is taken as the year of adoption; when a regime is adopted in the second half of a year, the year after is taken as the adoption year.

III. METHODOLOGIES AND RESULTS

This section investigates two issues about inflation targeting. First, it examines factors associated with a country's decision to adopt inflation targeting as its monetary framework. Second, it studies whether inflation targeting makes a difference to inflation, output, and the trade-off between inflation and output variability.

In each case, the section describes the methodology employed, reports empirical results, and ends with a short summary. Given that we do not have a long time series for a large number of inflation targeting countries, it is unreasonable to expect robust results.

Factors Associated with a Country's Choice of Inflation Targeting

The three principal questions are: (1) Which factors are systematically associated with a country's choice of inflation targeting as its monetary framework? (2) Are there particularly significant factors? (3) What is the direction of any prominent influence? These questions are examined using my 66-country sample over the 1980–2000 period.

Methodology

In the absence of a compelling theory that models the choice of inflation targeting thus far, I choose, based on my intuition and the literature on this issue, 17 variables as potentially the most relevant factors associated with a country's decision on inflation targeting.[14] I use logit regressions, in which the dependent variable takes the value 1 in one year before the inflation targeting adoption year decided by the "half-year-rule."[15] Once a country adopts inflation

[13] See Reinhart and Rogoff (2002) for a similar discussion.
[14] Inflation variability is not included in the regression, since it is highly correlated with inflation rate.
[15] This rule was set because the economic conditions in the year before adoption were thought to be the most relevant for the authority in making the choice of inflation targeting. Under the rule, when inflation targeting was adopted in the second half of a year, the dependent variable of that year was assigned the

targeting, it is dropped out of the sample, since I am interested in the preconditions for adopting inflation targeting rather than the features of inflation targeters.

Both annual and three-year moving average data for nondummy variables are used in the regression to find out whether the authorities likely make their policy decision taking into account the accumulation of economic experience over several years.

The regression exercises start with a "full" regression with a large set of independent variables covering seven economic conditions variables, eight economic structure variables, and two economic institution variables. The full regression is expected to give an overview of the influence of all relevant variables on the choice of inflation targeting. In most cases, those independent variables are then eliminated if they are not significant or do not have the "correct" signs as expected, and only significant variables in the "final" regressions are finally left.[16] The final regression catches the prominent factors systematically associated with a country's choice of inflation targeting.

Results

The regression results are shown in table 2.[17] The results using the three-year moving average data generate a slightly better overall fit than those using the annual data, based on the value of pseudo R-squared. It implies that the authorities are more likely to make a decision to adopt inflation targeting taking into account the accumulation of economic experience over several years. In the full regression, nine out of 14 variables have the expected signs using the moving average data, while 10 out of 14 variables have the expected signs using the annual data. When the larger dataset is reduced in the final regression, five factors stand out using the moving average data, while four remain significant using the annual data. The coefficients are discussed in table 2.

Real GDP growth and the GDP gap were expected to be negatively associated with the choice of inflation targeting, since high GDP growth and a positive GDP gap reflect a success in current macroeconomic policies, thus there is little incentive for the authority to introduce a new inflation targeting framework. On the other hand, larger GDP variability would be associated with dissatisfaction with policy; this should contribute positively to the inflation targeting choice. As shown in the regression, real GDP growth and the GDP gap have the expected negative sign,

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value 1; when inflation targeting was adopted in the first half of a year, the dependent variable of the year before was assigned the value 1.

[16] The rule is not applied to two variables? real GDP growth and inflation rate? which are established to capture main economic performance. That is, these two variables will be kept in the final regressions no matter what their significance and signs are.

[17] The number in parentheses in all tables is the standard error of the coefficient.

but the coefficient on real GDP variability does not have the expected positive sign. None of the coefficients is significant in the full regression; however, the coefficient on real GDP growth becomes significant at the 5 percent level in the final regression.

I expected that the higher the inflation rate, the more likely that the authority would adopt an inflation targeting framework to bring inflation down. The coefficient on the inflation rate has the expected positive sign in the full regression using the annual data; however, its sign is negative when using the moving average data. Further, this coefficient becomes significantly negative in the final regressions using both the annual and the moving average data.

Although it is quite an unexpected result, it does tell us something. It implies that the monetary authorities generally choose inflation targeting to maintain their already low inflation rates or to converge to a lower rate, rather than to squeeze very high inflation rates down. Truman (2003) identifies these three types of inflation targeting countries as "maintainers," "convergers," and "squeezers," respectively.[18] As presented in the third column in table 1, 19 out of 22 inflation targeting countries are either "maintainers" or "convergers" at the time of full–fledged inflation targeting. Even the inflation rates of the remaining three "squeezers" (Colombia, Israel, and Poland) were very close to 10 percent at the time of adoption.

The reason for adopting inflation targeting at a low inflation rate comes, perhaps, from a concern about central bank credibility. In fear of losing public credibility, the central banks might be inclined to adopt inflation targeting only when inflation rates are low, which makes their targeted inflation easier to reach or maintain.

I anticipated that high nominal and real short–term interest rates might contribute positively to the choice of inflation targeting. On the one hand, high interest rates reflect dissatisfaction with the current economic performance, which motivates the authority to adopt a new inflation targeting framework. On the other hand, high interest rates raise the level of expected inflation, which might jeopardize public confidence on the central bank's ability to control inflation. Therefore, the central bank is inclined toward adopting inflation targeting to achieve a low inflation rate and restore public credibility. As shown in the regression, this is not the case for the nominal interest rate; the real interest rate has the significant positive signs as expected.

Foreign exchange pressure was expected to be positively associated with the choice of inflation targeting, as a number of countries adopted inflation targeting during or in the aftermath

[18] According to Truman's (2003) classification, maintainers' inflation rates are less than 5 percent but above zero, convergers' inflation rates are more than 5 percent but less than 10 percent, and squeezers' inflation rates are 10 percent or higher.

of financial crises. The regression result supports my prior: the coefficient on foreign exchange pressure is significantly positive in all regressions.[19]

The influence of nominal and real effective exchange rate variability on the choice of inflation targeting is unclear. On the one hand, high exchange rate variability might be associated with dissatisfaction with current economic performance and a high level of expected inflation, thus contributing positively to the choice of inflation targeting; on the other hand, it might reflect a tough position for the authority to control inflation, therefore contributing negatively to the choice of inflation targeting. In the regressions, the coefficients of these two variables are not significant, and signs vary with different specifications. Accordingly, these two variables are dropped from the final regressions.

A strong fiscal position was expected to be helpful for the monetary authority in adopting the inflation targeting framework. If a country is not fiscally sound, it is very likely the government might pressure the central bank to finance a large deficit by encouraging expansionary monetary policy, which could lead to a failure to meet the targeted inflation. This prior is confirmed by the regression using the moving average data: the coefficient on fiscal position is significantly positive.[20] However, it is not a strong case when using the annual data. Overall, it is reasonable to argue that a country needs to ensure its control of the fiscal situation, if not be in a very sound position, before adopting inflation targeting as its monetary framework.

The current account position variable was expected to have a positive sign, applying a similar argument as used for the fiscal position variable. However, its coefficient has the wrong sign and is not significant in the full regressions. Thus it was taken out after the first-round experiment.

A negative sign was expected on the trade openness variable, since it becomes more difficult for the authority to have an effective monetary policy with a higher degree of openness. However, its sign was the opposite of what was expected, and it is insignificant in the regressions.

A negative sign was also anticipated on terms of trade variability, derived from the same argument for trade openness. The results show a correct sign on this variable, but the coefficient is insignificant.

External debt could have mixed effects on the choice of inflation targeting. On the one hand, it proxies a country's financial openness. The more open a country is, the harder it is for the central bank to implement monetary policy effectively, and thus external debt contributes

[19] The coefficient of foreign exchange pressure turns out to be insignificant when the later dates for inflation targeting are applied. This result is discussed in detail later.
[20] This result is consistent with the finding by Mishkin and Schmidt-Hebbel (2001) based on a much smaller sample of countries.

negatively to the choice of inflation targeting. On the other hand, a high level of external debt might be associated with dissatisfaction with economic policy and therefore leads to an incentive to adopt inflation targeting. Taken together, it is hard to anticipate the direction of the combined effects. According to the empirical results, the sign of external debt is negative and significant in the full regressions but turns out to be insignificant in later regressions, so it is dropped in the final regressions.

Financial depth represents the degree to which the economy is monetarized. Greater financial depth gives the authority more capacity to implement monetary policy effectively. As shown in regressions, the sign of financial depth is positive, as expected, but not significant.

There are two economic institution variables in the regressions: central bank autonomy and floating exchange rate regime. Both variables were expected to be positively associated with the choice of inflation targeting.

The central bank should have the institutional capacity to implement its monetary policy with little outside intervention, which requires a substantial degree of autonomy if not full independence. The central bank variable is positive but insignificant in the full regressions.

A need for flexibility was expected when adopting inflation targeting, though not necessarily all the way to a free floating exchange rate regime.[21] A country's exchange rate target should be subordinated to its inflation target because inflation targeting is incompatible with a rigid exchange rate regime. The de facto floating exchange rate regime was used in the full regressions and its coefficient was positive, as expected, but insignificant.

The variable for the de jure floating exchange rate regime was then tried, and the regression was re-run using the moving average data. As shown in the last column in table 2, the result in the final regression indicates that the variable for the de jure floating exchange rate regime has the wrong sign and is insignificant. Other coefficients are unaffected.

As discussed in section 2, the de facto and de jure exchange rate regimes match poorly with each other. The difference between the two classifications might cause the sign of the coefficient on the floating exchange rate regime to flip from positive using de facto floating to negative using de jure floating. Neither coefficient was expected to be persuasive, since both classifications are insignificant in the regressions.

The later dates for inflation targeting were then used, and the regression was re-run using the moving average and de facto data (table 3).[22] In this new regression, the effect of the foreign

[21] See a similar argument in Amato and Gerlach (2002).
[22] To compare the new result applying later dates for inflation targeting with the previous ones, the variable for fiscal position was included in the final regression, though it was not significant in the full regression.

exchange pressure variable is no longer evident but that of the de facto floating exchange rate regime variable becomes significant. This is because all three countries having two adoption dates relieved the foreign exchange pressure and adopted the floating exchange rate regimes at later dates. All other variables are unaffected.

In comparison with the significant coefficient for a de facto exchange rate regime, the variable for a de jure exchange rate regime remains negative and insignificant when using the later date in the regression (table 3). Based on the regression results, it seems that the variable for the de facto floating exchange rate regime is a better indicator for describing the choice of inflation targeting, notably using the later dates of adoption.

The robustness of the coefficients was further tested by eliminating observations in the year with inflation rates of more than 50 percent (table 4). The results are similar to those presented in table 2.

No country adopted inflation targeting in the early and mid-1980s. It is reasonable to question whether the regression results are different when a shorter period of 1985–2000 is used. These experiments suggested that the results remained unaffected, except that it eliminated the significance of the coefficient for the fiscal position variable (table 4).

The last two sets of regressions were also rerun—deleting observations with high inflation rates or using a shorter sample period, but using the later dates for inflation targeting. Significance was again found in the de facto floating exchange rate regime and insignificance in foreign exchange pressure. All other coefficients are unaffected.

Summary

The empirical investigations of the choice of inflation targeting are informative and encouraging. Most variables in regressions have the expected signs. Furthermore, a number of economic conditions, structure, and institution variables are found to be systematically associated with the choice of inflation targeting.

GDP growth and real interest rates are strongly associated with a country's choice of inflation targeting. The negative sign of GDP growth and the positive sign of real interest rates are consistent with the view that one motivation for adopting inflation targeting is to improve overall economic performance.

The evidently negative impact of high inflation on the choice of inflation targeting was unexpected. The reason for the authority to adopt inflation targeting at the low rate might come from the concern about credibility. In fear of losing public credibility, the central bank is likely to

adopt inflation targeting when inflation rates are low, which makes its targeted inflation easier to fulfill.

Foreign exchange pressure is positively associated with the choice of inflation targeting. But this coefficient is no longer significant when using later dates for the adoption of inflation targeting. In contrast, a de facto floating exchange rate regime is positive but insignificant in the regressions using early dates, but it turns out to be evident when using later dates. This is because all three countries, having two adoption dates, have relieved the foreign exchange pressure and adopted the floating exchange rate regime by the later dates.

A de facto floating exchange rate regime seems a better indicator in describing the choice of inflation targeting than a de jure floating exchange rate regime. The variable for the de facto floating exchange rate regime has the "correct" signs in all regressions, and its coefficient is significant when using later dates for inflation targeting, while the variable of the de jure floating exchange rate regime has the wrong sign and is insignificant in all regressions.

A sound fiscal position benefits the authority when adopting the inflation targeting framework. Its effect on the choice of inflation targeting is significant using the moving average data.

Does Inflation Targeting Matter?

A large literature has found that inflation targeting improves the performance of inflation and output and improves inflation forecasting by lowering the expected level of inflation and/or increasing its predictability. On the other hand, an almost equal number of studies claim not to find clear evidence to support the benefits of inflation targeting, though their results do not provide arguments against inflation targeting either.

This section discusses the effects of inflation targeting by comparing the performance of inflation targeters and nontargeters in this paper's sample. It first analyzes the changes in inflation and output in two descriptive tables and examines the trade-off between inflation and output variability in a set of simple regressions, then further explores the effects of inflation targeting by a set of regressions.

Changes in Inflation and Output

The averages of inflation and its variability and the averages of output and its variability are calculated for the inflation targeter and nontargeter groups across different sample periods, and then the two group means are analyzed in descriptive tables.

The effects of inflation targeting are further examined by applying the independent sampling method for small-sample inferences about the difference between two population means since descriptive statistics show improvements in inflation and output in both targeter and nontargeter groups.

Methodology

To better study the effects of inflation targeting, the dataset should be further processed in two steps. First, it is difficult to distinguish the performance of inflation and output in the pre- and post-targeting periods if a country has too short a time period after implementing its inflation targeting framework. Thus only those inflation targeters with more than four years of experience by the end of 2000 are kept. The rest of the inflation targeters are excluded from the sample to avoid its "contamination." As a result, 14 inflation targeting countries are excluded from the sample after the first step of data processing. Second, "outliers" with very high inflation rates could distort the empirical results. Thus those countries with average inflation above 50 percent during 1985–2000 are eliminated. Countries with inflation above 50 percent in any year from 1989 to 1994 are also excluded. Consequently, another 15 noninflation targeting countries are dropped out of the sample.

In sum, the paper's sample is left with 37 countries, of which eight are inflation targeters and 29 are nontargeters. The eight inflation targeting countries are Australia, Canada, Chile, Finland, New Zealand, Spain, Sweden, and the United Kingdom? seven of them are industrialized countries, according to the classification of industrial countries found in the IMF's *International Financial Statistics,* and 13 industrial countries are in the nontargeter group.

For these eight inflation-targeting countries, I compute the standard deviation of inflation and output and the average of inflation and output growth from 1985 until the year before they adopt inflation targeting and from the year they become inflation targeters until 2000. For the 29 nontargeters? the control group? the same four variables are calculated for two averages: the average between 1985 and 1994 and the average between 1995 and 2000.[23] Descriptive statistics show improvement on inflation and output in both inflation targeter and nontargeter groups.

The effects of inflation targeting are further examined applying the independent sampling method for small–sample inferences about the difference between two population means.[24] It is reasonable to expect that inflation reduction for the inflation targeter group will be larger than

[23] The rationale is that all inflation targeters left in the sample had adopted inflation targeting by 1995.
[24] This test requires to assume both sample populations are approximately normal distributed with equal population variance.

that for the nontargeter group, if inflation targeting plays a role in driving inflation rates down. Taking the level of inflation as an example, I first calculate the difference between post- and pre-target periods for inflation targeting countries and the difference between the 1995–2000 and the 1985–94 periods for nontargeting countries. Assuming normality and equal variance for the series of inflation difference in this sampling project,[25] a pooled sample estimator is constructed. Thus, if s_1^2 and s_2^2 are the variances for the series of inflation difference in the inflation-targeter and nontargeter groups, respectively, the pooled sample estimator of the variance s_p^2 is

$$s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

or

$$s_p^2 = \frac{\sum (x_1 - \bar{x}_1)^2 + \sum (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}$$

where n_1, n_2 are two sample sizes, x_1, x_2 and $\bar{x}_1$, $\bar{x}_2$ are the sample observations and mean. To obtain small-sample test statistic for testing $H_0 : (m_1 - m_2) = 0$, I substitute s_p^2 into the formula for the two-sample z statistic and get

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{s_p^2 (\frac{1}{n_1} + \frac{1}{n_2})}}$$

The rejection region of this t-test is two-tailed with ($n_1 + n_2 - 2$) degree of freedom.

Two caveats of this method should be kept in mind. First, the t-test is based on two strong assumptions (normality and equal variance). It is hard to examine these assumptions, making my results less convincing. Second, it cannot solve the "regression-to-the mean" problem put forward by Ball and Sheridan (2003). They argue that compared with the nontargeters, the inflation targeters generally move from a higher level of inflation rates to a lower level, which makes their inflation reduction more significant.

[25] The t-test is invalid if either assumption is not satisfied.

Results

Descriptive results for eight inflation targeting countries and the average statistics of control groups are displayed in tables 5 and 6. Let us first take a look at inflation and its variability in table 5.

Each inflation targeter lowers its inflation rate as well as variability from the pre– to the post–targeting periods. Their average inflation rate declines from 8.3 to 3.1 percent, and inflation variability declines from 3.5 to 2.1 percent. A similar trend is found in the control groups. Taking the 29 nontargeters as a whole, their inflation rate and variability decrease from 7.5 to 4.7 percent and from 2.7 to 1.8 percent, respectively.

Inflation and variability for industrial countries are further compared in the sample. In this exercise, the level of inflation drops from 6.4 to 2.1 percent for inflation targeters, and from 4.7 to 2.2 percent for nontargeters; while the variability of inflation falls from 2.3 to 1.5 percent for inflation targeters, and from 1.9 to 1.1 percent for nontargeters.

It is hard to single out the effects of inflation targeting because inflation and its variability in both the inflation targeter and the nontargeter groups move downward. However, the inflation rate of the inflation targeters moves from a level higher than that of nontargeters to a level lower than that of nontargeters, for both the 37-country and industrial-country-only cases.[26] This suggests that the inflation targeting framework might promote weakly performing countries to "converge" to those countries performing better already.[27]

Output performance of the inflation targeting countries is then compared with those of the control groups (table 6). For the inflation targeter group, the average output growth increases from 2.9 to 3.6 percent while variability decreases from 2 to 1.6 percent. On the other hand, for the noninflation targeting countries, output growth remains nearly unchanged but is still higher than that of inflation targeters, and the variability drops from 2 to 1.7 percent. Similar results are observed in the sub-sample of industrial countries. The output growth rises from 2.4 to 3.1 percent for inflation targeters and from 2.7 to 3.2 percent for nontargeters, while the variability falls from 2 to 1.4 percent for inflation targeters and from 1.5 to 1.3 percent for nontargeters.

[26] Ball and Sheridan (2003) have similar findings on performance inflation and output comparing inflation targeters and nontargeters based on 20 industrial countries. However, they argue these results are biased by regression to the mean. The beneficial effects of inflation targeting are no longer significant when they control for the initial value of the variables.

[27] As Neumann and von Hagen (2002) suggested, inflation targeting promotes poorly performing countries to converge to those already doing well.

Based on descriptive statistics, one cannot tell whether inflation targeting plays a role beneficial to higher output growth and lower output variability,[28] since output performance improves in both groups.

Next, the small-sample method is used for the difference between two population means to further examine the effects of inflation targeting. As presented in table 7, using the 37-country sample, the magnitude of inflation reduction and real GDP growth rise in the inflation targeter group is significantly larger than that in the nontargeter group, while the nontargeter group brings down inflation variability further than the inflation targeter group does. Results are similar when using the industrial-country-only sample, except for some changes in the significance of the t-test. It shows that inflation targeters perform significantly better in reducing inflation rates and GDP variability. Taken together, the inflation targeter group lowers inflation rates much more than the nontargeter group does in both samples.

In summary, the performance of inflation and output improves for both inflation targeters and nontargeters. Inflation targeting countries function notably well in lowering inflation rates, which might imply that the inflation targeting framework promotes weakly performing countries to "converge" to those countries performing better already. However, more careful studies are required to make a generalized argument that inflation targeting is beneficial to inflation and output. This issue is further discussed using a regression framework in the latter part of this section.

The Trade-off Between Inflation and Output Variability

Both inflation and output variability are reduced for the sample countries shown in tables 5 and 6. This result is different from the view of the Taylor Curve (Taylor 1979). Taylor points out that there exists a trade-off between inflation and output variability, thus policymakers have to face the choice of lowering the inflation variability at the expense of higher output variability or lowering the output variability at the cost of higher inflation variability. In other words, a low inflation policy implies the choice of a different point along the trade-off frontier between inflation and output variability.

However, this paper's descriptive statistics suggest that a reduction in inflation and its variability could enhance output performance by increasing the growth while decreasing its variability. It might suggest that the frontier presenting the trade-off between inflation and output

[28] Empirical findings are mixed. Some economists suggest that inflation targeting stabilizes inflation and output. Others, such as Cecchetti and Ehrmann (1999), argue that inflation targeting increases output variability.

variability along the Taylor Curve shifts toward the origin, which consequently lowers both inflation and output variability.

Thus one might wonder what happens to the trade-off between inflation and output variability in practice. Does inflation targeting improve the performance of inflation as well as output? This section attempts to investigate these questions by applying this paper's sample of 37 countries.[29] Dependent variables are output variability, inflation variability, or the ratio of output variability to inflation variability. Because of the limited number of observations, it is not possible to include a large number of control variables in the regression, thus only inflation rates and growth rates are used. Regressions are run in logarithms for all nondummy variables, since they provide slightly better, but similar, results to those using a level regression.

Results

The regression results are presented in table 8. In the first three columns of the top table, dependent and independent variables are in the form of a ratio of the observations during the post- and pre-targeting periods. In the fourth column, regressions are run separately for the pre- and post-targeting periods, and thus the sample size is doubled.

The coefficient on inflation targeting is significantly positive in the regression with inflation variability as the dependent variable. This result is the opposite of my expectation that inflation targeting would lower inflation variability. And inflation targeting has negative effects on output variability, but they are not significant. With regard to control variables, only the negative association between output growth and inflation variability is significant.

In the bottom table, regressions are run between inflation and output variability. The results show a significant positive relationship between inflation and output variability, which is different from the view of the Taylor Curve. Thus there might be an improved trade-off between two kinds of variability, but more data and a longer time series are needed to confirm this argument. On the other hand, inflation targeting lowers both the inflation and output variability in these two regressions, but neither effect is significant.

Summary

The empirical exercises convey three messages. First, there is an evident and positive relationship between inflation and output variability, which is inconsistent with the Taylor Curve. Thus there

[29] Mishkin and Schmidt-Hebbel (2001) study this issue by comparing the average of output and inflation variability for inflation targeting countries in the pre- and post-targeting periods. They find a reduction in both variability, but at the same time, they point out that results need to be improved by using a control group of countries.

might be an improved trade-off between two kinds of variability, but more data and a longer time series are needed to make a strong argument. Second, I find limited support for the proposition that the adoption of inflation targeting improves the trade-off between inflation and output variability. The improvement on both inflation and output variability reflects that the1990s was a low inflation and stable output growth period for most countries. Third, the adoption of inflation targeting evidently lowers the inflation rate, and its effect on inflation variability is mixed.[30]

The Influence of Inflation Targeting on the Level of Inflation and Output

To further detect the influence of inflation targeting, the level and variability of inflation and output are used as the dependent variables respectively and four sets of regressions are run on factors associated with the dependent variables including whether the country is an inflation targeter.[31]

I again start with a "full" regression with a large set of independent variables,[32] then gradually drop those independent variables if they are not significant or do not have "correct" signs as expected, until only prominent factors are contained in the "final" regression.

I first try the regression using data of 66 sample countries initially for the 1980-2000 period, but find that "outliers" with a very high inflation rate distort the regression results to some extent.[33] In order to eliminate the influence of these "outliers," those countries with an average inflation rate above 25 percent during 1980-2000 are dropped from the sample. Fifteen countries are thus eliminated. They are five inflation targeters (Brazil, Israel, Mexico, Peru, and Poland) and 10 potential inflation targeters (Argentina, Bolivia, Bulgaria, Ecuador, Nigeria, Romania, Turkey, Ukraine, Uruguay, and Venezuela). Regressions are then run for the remaining 51 countries, and the results are as follows.

[30] Nadal De-Simone (2001) studied a similar question and obtained similar results as well.
[31] There may not be firm priors for a few variables in the regressions, since this paper's principal interest is the dummy for inflation targeting.
[32] The list of independent variables is refined in tables 2 to 4, since some variables, such as lagged money growth, belong in these regressions but are to appropriate to a country's decision to adopt inflation targeting; and some variables are interpreted in a different way in these regressions.
[33] For example, in the regression with the level of inflation as dependent variable, the value of R-squared improves and more coefficients become significant when deleting these "outliers."

Results

I first examine the effect of inflation targeting on inflation and its variability controlling effect of any trend in the data.[34] Both "full" and "final" regression results are presented in table 9.

With respect to the level of inflation, the results shown in the three left-hand-side columns are gratifying in terms of overall fit and the number of coefficients that are significant.

I first look at the six independent variables listed at the top of table 9, which are used to capture the traditional macroeconomic determinants of inflation. As expected, lagged money growth has a significant positive effect on inflation. On the other hand, it is surprising to find that the influence of the real GDP gap is not only negative but also marginally significant, which is inconsistent with the positive correlation between output and inflation along the short-run Phillips Curve. One possible explanation is that, even though money growth with a one-period lag is included, the regressions pick up a "classical" relationship: faster money growth that does not show up in faster growth shows up with a lag in higher inflation.

The coefficients for real GDP variability and the percentage change in nonfuel commodity prices have the expected sign with respect to real GDP variability but not with respect to commodity prices, but in both cases they are insignificant.[35] Nevertheless, I retained these two variables in the final regression to be sure to capture the basic inflation process.

Fiscal position has the expected negative sign but the effect is not significant, so this variable is excluded in the final regression.[36] On the other hand, financial depth is significantly and negatively associated with inflation as expected, which again supports the view that greater financial depth provides the economy more capacity to bring down inflation.[37]

Turning to the two economic institution variables, it is most impressive to find the significantly negative coefficient of inflation targeting.[38] The beneficial effect of inflation

[34] Annual dummies help to control for any bias in the regression to the mean. Although the year dummies in general are not significant, their inclusion improved the overall fit of the regressions and affected the significance of some of coefficients.

[35] Contrary to the measurement of real GDP growth variability in the regressions exploring the choice of inflation targeting, this variable is estimated for these regressions by the standard deviation of five-year rolling average of real GDP growth. The percentage change in petroleum prices were also tried in the regressions, and the coefficients were found to be less precise than those for nonfuel commodity prices.

[36] This finding is broadly consistent with that in Catão and Terrones (2003). They find that fiscal deficit is significantly and positively associated with high inflation in high inflation countries and countries with underdeveloped financial markets.

[37] Khan and Senhadji (2001) also find a negative correlation between inflation and financial depth.

[38] Ball and Sheridan (2003) examine the effect of inflation targeting for industrial countries comparing pre- and post-targeting data. They find a significant and negative association between inflation targeting and inflation rates. However, they argue that the result reflects regression to the mean, since the beneficial effect of inflation targeting is no longer significant when they control for the inflation rate in the pre-targeting period. Regressions in this paper include annual dummies in order to control for this possible bias but still find the negative impact of inflation targeting on inflation is robust.

targeting is quite large: it can reduce the inflation rate by 2.5 percent on average. The negative influence on the level of inflation remains significant when the regression is run using the de jure exchange rate regime or/and the later date of inflation targeting for Chile.[39] This supports the paper's findings in the descriptive statistics that inflation targeting is associated with a reduction in inflation rates.

The coefficient on the central bank autonomy is significant and negative, with an impact on inflation rate of almost two percentage points on average. The negative effect also remains robust when the dummy variable is used for a de jure exchange rate regime or/and the later date for inflation targeting.

Turning to the final eight variables listed at the bottom of the table, they can be viewed as summarizing the external environment for a country. The results do not offer too much support for the view that external factors have strong adverse influence on inflation performance, and thus countries should avoid inflation targeting if they face a hostile external environment.

The variable for trade openness has a significantly negative impact on inflation, which is contrary to my expectation that the more open an economy is, the more vulnerable it is to the external shocks, thus the higher inflation is. An alternative view by Romer (1993) and Lane (1995) may explain this result—monetary policy is more constrained to follow a time-consistent framework with a resulting lower inflation rate in a more open economy. On the other hand, terms of trade variability has the expected and significant positive effect in the full regression, but the sign turns to negative but insignificant in the final regression.

The coefficient on a de facto exchange rate regime is positive as expected, and it is significant at the 10 percent level.[40] Foreign exchange pressure is positive but insignificant, so it was dropped in the final regression.

Real and nominal effective exchange rate variability, reflecting fluctuations in the policies and performance of the internal as well as the external economy, might bring instability to prices and push up inflation and its variability. Therefore, as expected, both variables are positively and significantly associated with inflation in the full regression, but only the variability of nominal exchange rate shows up as significant in the final regression.

[39] Israel and Mexico, two other countries with early and later dates for the adoption of inflation targeting, were eliminated from the regression since their average inflation rates during the 1980–2000 period were more than 25 percent.

[40] When regressions are run using the dummy variable for a de jure exchange rate regime, the coefficient is negative in the full regression and positive in the final regression but neither is significant. This illustrates the sensitivity of results from this type of exercise to the specification of this variable.

The variable for a country's current account position is negative and the variable for external debt is positive in their influence on inflation, but both variables are insignificant, thus they were dropped in the final regression.

The results for the variability of inflation, shown in the three right-hand-side columns of table 9, are arguably more relevant than the results for the level of inflation to the issue of whether inflation targeting as a monetary policy framework suits a country's economic characteristics. It is because people might argue for a wider target range with a higher midpoint, or perhaps against inflation targeting, if inflation is very volatile or hard to predict or control.[41]

Compared with the regressions with the level of inflation as the dependent variable, the regressions for the variability of inflation have much lower overall fits and fewer variables with significance.

With respect to macroeconomic determinants of inflation variability, only lagged money growth and financial depth have the expected signs and are significant in both the full and final regressions. On the other hand, the real GDP growth gap again has the unexpected negative sign and is marginally significant in the final regression. GDP growth variability is positively associated with inflation variability, which is inconsistent with the presumption of a trade-off along the Taylor Curve but is similar to my findings in examining the trade-off between inflation and output variability. And nonfuel commodity prices have an unexpected negative sign and are significant in the full regression but lose significance in the final regression.

The coefficients of inflation targeting are negative as expected, but not significant in this case. The results for central bank autonomy are similar.

With respect to eight variables representing the external environment, the variability of nominal exchange rates stands out as having expected and significant effects on inflation variability. On the other hand, the variable for de facto floating is significant but negative in both regressions.[42] Trade openness is associated with lower inflation variability, and the effect is significant in the final regression. The rest of the variables contribute little to the overall story.

A parallel set of regressions is then run for the level and variability of output (real GDP). I did not have firm priors for many of the variables and was somewhat less systematic in moving from the full to final regressions, since my principal interest is the dummy variable for inflation targeting. The results are shown in table 10.

[41] See the arguments found in Ito and Hayashi (2003) and Erceg (2002).
[42] The dummy variable for de jure floating was also tried, and it has the right sign (positive) but is insignificant.

With respect to the regressions for GDP growth, inflation targeting has a significant positive effect on output, adding more than half a percentage point to growth.[43] The impact of inflation targeting on output remains significant when employing the dummy variable for a de jure exchange rate regime. Output variability is significantly associated with growth in both regressions; while inflation variability has a negative association with growth, it is significant only in the full regression. The only external factor that has significant influence on growth is external debt in the full regression, but it loses its significance in the final regression.

In the regressions for the variability of growth, inflation targeting is significantly associated with lower growth variability, contrary to my expectation and the prediction of some critics of inflation targeting that greater attention to inflation should show up in an increase in the variability of growth. The results suggest that an inflation targeting framework can not only help lower inflation but also improve the GDP performance. Central bank autonomy has a large and significant negative influence on growth variability as well.

Summary

The most impressive findings are that inflation targeting does play a significant role in lowering inflation, and the size of the effect is large. There is a similar favorable influence on inflation variability, but it is not significant. Inflation targeting also significantly improves GDP growth and lowers GDP growth variability.

The influence of external environment variables on inflation and growth is limited, which differs from the view that countries vulnerable to the external environment should be wary about adopting inflation targeting.

IV. CONCLUSION

This paper first studied factors that might be systematically associated with a country's choice of inflation targeting as its monetary framework. It found that a number of economic condition, structure, and institution variables are systematically associated with a country's decision to adopt inflation targeting.

Low GDP growth and high real interest rates are significantly associated with the choice of inflation targeting, consistent with the view that one motivation for adopting inflation targeting is to improve overall economic performance.

[43] Ball and Sheridan (2003) find a positive but insignificant result for industrial countries, but the beneficial effect of inflation targeting is washed out when they control for regression to the mean, as I do using annual dummies.

The evidently negative impact of inflation on the choice of inflation targeting was unexpected. The reason for the authorities' reluctance to adopt inflation targeting at a high inflation rate might come from the concern about their credibility. In fear of losing public credibility, the central bank is more likely to adopt inflation targeting when inflation rates are low, which makes the targeted inflation rate easier to achieve.

Several economic structure and institution variables? sound fiscal position, central bank autonomy, and a floating exchange rate regime? are found to be associated with the choice of inflation targeting under various regression specifications. They are desirable but not essential preconditions for inflation targeting.

The paper then examines the effects of inflation targeting on the performance of inflation and output. The descriptive statistics indicate that the performance of inflation and output is improved for both inflation targeters and nontargeters. Inflation targeting countries function notably well in lowering inflation rates and raising output growth, which might weakly imply that the inflation targeting framework promotes performing countries to "converge" to those countries performing better already. The regression results reinforce the findings that inflation targeting does play a role in improving the level and variability of inflation and output; notably, it significantly improves the level of inflation and both the level and variability of output. However, more careful studies are required to make a strong argument that inflation targeting is beneficial to inflation and output compared with noninflation targeter frameworks, given that we have a fairly short history of inflation targeting and a limited number of inflation targeters on which to base my results to date.

The paper also investigates the trade-off between inflation and output variability. There is an evident and positive relationship between inflation and output variability, which is different from the view based on the Taylor Curve. I do, however, find limited support for the proposition that the adoption of inflation targeting improves the trade-off between inflation and output variability.

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Appendix 1 List of Sample Countries (66 countries)

Inflation targeters (22 countries)	**Potential inflation targeters** (44 countries)
Australia	Argentina
Brazil	Austria
Canada	Bangladesh
Chile	Belgium
Colombia	Bolivia
Czech Republic	Bulgaria
Finland	China
Hungary	Costa Rica
Iceland	Denmark
Israel	Dominican Republic
Korea	Ecuador
Mexico	Egypt
New Zealand	France
Norway	Germany
Peru	Greece
Philippines	Guatemala
Poland	Honduras
South Africa	India
Spain	Indonesia
Sweden	Ireland
Thailand	Italy
United Kingdom	Japan
	Malaysia
	Morocco
	Netherlands
	Nigeria
	Pakistan
	Panama
	Paraguay
	Portugal
	Romania
	Russia
	Saudi Arabia
	Singapore
	Slovak Republic
	Slovenia
	Sri Lanka
	Switzerland
	Turkey
	Ukraine
	United States
	Uruguay
	Venezuela
	Vietnam

Appendix 2 List of Variables

Variables	Variable type	Definition	Source
Economic conditions variables			
Real GDP growth	C	Real GDP growth (percent)	IFS
Real GDP growth variability	C	Standard deviation of the average GDP growth for the period of 1980–2000 (used in the regressions examining the choice of inflation targeting)	Constructed based on IFS data
		Standard deviation of 5-year rolling average of real GDP growth (used in the regressions examing the impact of inflation targeting on the performance of inflation and growth)	
Real GDP gap	C	Real GDP gap: [(actual real GDP–potential real GDP)/potential real GDP] (percent)	Constructed based on IFS data
Inflation	C	CPI (percent)	IFS
Inflation variability	C	Standard deviation of 5-year rolling average of inflation	IFS
Nominal interest rate	C	Money market rate (percent)	IFS
Real interest rate	C	[(1 + nominal interest rate)/(1 + inflation rate)] –1] (percent)	Constructed based on IFS data
Foreign exchange pressure	C	Weighted average of changes in foreign exchange rate and reserves	Constructed based on KSS (2001), FRB, IFS data
M2 growth (lagged)	C	One-period lagged M2 growth (percent)	GDF & WDI, IFS
Economic structure variables			
Variability of REER	E	Standard deviation of 5-year rolling average of real effective exchange rate	IFS
Variability of NEER	E	Standard deviation of 5-year rolling average of nominal effective exchange rate	IFS
Fiscal position	E	Government fiscal surplus/deficit as a percentage of nominal GDP	IFS
Current account	E	Current account position as a percentage of nominal GDP	GDF & WDI, IFS
Trade openness	E	The average ratio of the sum of imports and exports of goods and services to GDP (1980–2000)	GDF & WDI, IFS
Terms of trade variability	E	The average of the standard deviation of terms of trade index (1980–2000)	GDF & WDI
External debt	E	The average ratio of external debt to nominal GDP (1980–2000)	GDF & WDI
Financial depth	E	The average ratio of M2 to nominal GDP (1980–2000)	IFS
Economic institution variables			
Inflation targeting	I	Adoption of inflation targeting	Truman (2003)
Central bank autonomy	I	Central bank autonomy	Cukierman (1992, 2002), K&P (2001)
Floating exchange rate regime	I	De facto exchange rate regime	LYS (2002)
		De jure exchange rate regime	IFS
Other variables			
Non-fuel commodity prices	C	Annual change of world non-fuel commodity price index (percent)	Constructed based on IFS data

K&P = Kuttner and Posen
LYS = Levy-Yeyati and Sturzenegger
IFS = IMF's *International Financial Statistics*
WDI = World Bank's *World Development Indicators*
GDF = World Bank's *Global Development Finance*

Table 1 The fact sheet of inflation targeting countries

Inflation targeting countries	Date of adopting inflation targeting	Economic variables			
		Inflation rate	Real GDP growth	Exchange rate regime (1 floating, otherwise 0)	
				De facto floating	De jure floating
Australia	June 1993	0.99	2.09	1	1
Brazil	June 1999	3.2	0.79	0	0
Canada	Feb. 1991	4.77	-0.23	1	1
Chile	Early date: Sept. 1990	26.04	3.7	1	0
	Late date: Sept. 1999	3.33	-0.98	1	0
Colombia	Oct. 1999	11.22	-4.2	1	0
Czech Republic	Dec. 1997	8.55	-0.76	1	1
Finland	Feb. 1993	2.6	-3.32	0	0
Hungary	June 2001	9.78	5.19	0	0
Iceland	March 2001	5.16	5.47	0	0
Israel	Early date: Dec. 1991	19.02	6.24	0	0
	Late date: June 1997	11.28	4.51	1	0
Korea	April 1998	4.43	5.01	0	0
Mexico	Early date: Jan. 1995	6.96	4.41	0	0
	Late date: Jan. 2001	9.49	6.64	1	1
New Zealand	Dec. 1989	7.49	0.23	0	1
Norway	March 2001	3.09	2.7	0	0
Peru	Jan. 2002	1.98	0.2	n.a	n.a
Philippines	Jan. 2002	6.12	3.4	n.a	n.a
Poland	Sept. 1998	11.73	4.84	1	0
South Africa	Feb. 2000	5.18	2.12	1	1
Spain	Jan. 1995	4.71	2.26	0	0
Sweden	Jan. 1993	2.29	-1.43	0	0
Thailand	May 2000	0.32	4.43	1	1
United Kingdom	Oct. 1992	3.73	0.23	1	0

* The value of economic variables are for one year before the inflation targeting adoption year decided by "half-year-rule". According to the "half-year-rule", when a regime is adpoted in the first half of a year, that year is taken as the year of adpotion; when a regime is adpoted in the second half of a year, the year after is taken as the adption year.

Table 2 Factors associated with countries' choice of inflation targeting

Dependent variable: Inflation targeting (1 = IT; 0 = non-IT)						
		De facto ERR				**De jure ERR**
		Annual data		**Moving average data**		**Moving average data**
Independent variables	**Expected sign**	**Full regression**	**Final regression**	**Full regression**	**Final regression**	**Full**
Real GDP growth	-	-0.0988	-0.0987**	-0.1882	-0.1978**	-0.1826
		(0.09)	(0.042)	(0.129)	(0.089)	(0.124)
GDP growth variability	+	-0.1411		-0.0967		-0.0943
		(0.124)		(0.075)		(0.074)
Real GDP gap	-	-0.0584		-0.0705		-0.0757
		(0.07)		(0.065)		(0.065)
Inflation rate	+	0.0136**	-0.0634**	-0.0269	-0.0482***	-0.0159
		(0.007)	(0.031)	(0.033)	(0.018)	(0.035)
Nominal interest rate	+	-0.0501		-0.0100		-0.0121
		(0.041)		(0.007)		(0.007)
Real interest rate	+	0.1777***	0.0011**	0.1609***	0.0009**	0.1662***
		(0.061)	(0.001)	(0.059)	(0.0004)	(0.057)
Foreign exchange pressure	+	0.8382	0.9138*	1.0283*	0.9077*	0.9346*
		(0.549)	(0.49)	(0.573)	(0.492)	(0.564)
REER variability	?	0.0046		-0.0028		-0.0029
		(0.016)		(0.015)		(0.015)
NEER variability	?	-0.0123		-0.0132		-0.0092
		(0.012)		(0.014)		(0.014)
Fiscal position	+	0.0232		0.185**	0.0987**	0.1916**
		(0.075)		(0.091)	(0.042)	(0.096)
Current account	+	-0.0383		-0.1271		-0.1178
		(0.095)		(0.079)		(0.081)
Trade openness	-	0.0017		0.0020		0.0017
		(0.005)		(0.005)		(0.006)
Terms of trade variability	-	-0.0393		-0.0171		-0.0283
		(0.073)		(0.063)		(0.068)
External debt	?	-0.0156**		-0.0235*		-0.0274**
		(0.008)		(0.012)		(0.012)
Financial depth	+	0.0052		0.0087		0.0111
		(0.008)		(0.009)		(0.008)
Central bank full autonomy	+	0.2770		0.4811		0.8065
		(0.85)		(0.886)		(0.982)
Floating exchange rate regime (de facto)	+	0.4498 (0.569)		0.2497 (0.538)		
Floating exchange rate regime (de jure)						-0.9066 (0.684)
Constant		-3.0927	-3.2248	-2.5533	-2.7046	-2.1139
Number of observations		994	1022	1008	1017	1009
Pseudo R-squared		0.15	0.07	0.19	0.09	0.20

*, ** and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent and 1 percent respectively.

Table 3 Factors associated with countries' choice of inflation targeting (using later dates of inflation targeting)

(Using moving average data in regressions)

Dependent variable: Inflation targeting (1 = IT; 0 = non-IT)					
		Using later dates of inflation targeting			
		De facto ERR		**De jure ERR**	
Independent variables	**Expected sign**	**Full regression**	**Final regression**	**Full regression**	**Final regression**
Real GDP growth	-	-0.2865***	-0.2889***	-0.2744***	-0.2593***
		(0.097)	(0.097)	(0.104)	(0.085)
GDP growth variability	+	0.0719		0.0712	
		(0.079)		(0.085)	
Real GDP gap	-	0.0219		-0.0001	
		(0.058)		(0.061)	
Inflation rate	+	-0.0316	-0.0724***	-0.0427	-0.0643***
		(0.026)	(0.024)	(0.053)	(0.019)
Nominal interest rate	+	-0.0564		-0.0216	
		(0.047)		(0.069)	
Real interest rate	+	0.2415**	0.0014***	0.1887	0.0012***
		(0.098)	(0)	(0.117)	(0.0003)
Foreign exchange pressure	+	0.1101	0.2732	0.1239	0.3743
		(0.583)	(0.517)	(0.587)	(0.524)
REER variability	?	-0.0193		-0.0178	
		(0.02)		(0.02)	
NEER variability	?	-0.000000183		-0.0228	
		(-1.83e-07)		(0.018)	
Fiscal position	+	0.0965	0.0985**	0.0990	0.0904**
		(0.073)	(0.043)	(0.074)	(0.044)
Current account	+	-0.0997		-0.1138	
		(0.069)		(0.079)	
Trade openness	-	0.0042		0.0024	
		(0.005)		(0.006)	
Terms of trade variability	-	-0.0082		-0.0186	
		(0.063)		(0.074)	
External debt	?	-0.0198*		-0.0286***	
		(0.011)		(0.011)	
Financial depth	+	0.0062		0.0106	
		(0.008)		(0.009)	
Central bank autonomy	+	-0.0446	-0.2566	0.1977	
		(0.737)	(0.636)	(0.85)	
Floating exchange rate regime (de facto)	+	1.0637*	1.1908**		
		(0.577)	(0.473)		
Floating exchange rate regime (de jure)				-0.3314	
				(0.636)	
Constant		-2.9322**	-2.5748***	-1.8995	-2.3164***
Number of observations		1029	1036	1030	1038
Pseudo R-Squared		0.21	0.13	0.2	0.1

*, ** and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent and 1 percent, respectively.

Table 4 Factors associated with countries' choice of inflation targeting (deleting years with inflation more than 50 percent)

(Using moving average data in regressions)

Dependent variable: Inflation targeting (1 = IT; 0 = non-IT)							
		Deleting years with high inflation (>50 percent)			**Using data for the 1985–2000 period**		
	Expected sign	**De facto ERR**		**De jure ERR**	**De facto ERR**		**De jure ERR**
Independent variables		**Full regression**	**Final regression**	**Full regression**	**Full regression**	**Final regression**	**Full regression**
Real GDP growth	-	-0.1909	-0.2001**	-0.1846	-0.365**	-0.2196***	-0.3473**
		(0.131)	(0.09)	(0.125)	(0.148)	(0.085)	(0.139)
GDP growth variability	+	-0.1039		-0.101	-0.1232		-0.1231
		(0.077)		(0.076)	(0.102)		(0.11)
Real GDP gap	-	-0.072		-0.076	-0.0169		-0.0161
		(0.065)		(0.065)	(0.074)		(0.074)
Inflation rate	+	-0.021	-0.0431**	-0.014	-0.0185	-0.0392***	-0.0076
		(0.034)	(0.021)	(0.033)	(0.021)	(0.015)	(0.02)
Nominal interest rate	+	-0.0011***		-0.0011***	-0.0173**		-0.0195***
		(0.0003)		(0.0003)	(0.008)		(0.008)
Real interest rate	+	0.0611***	0.0042**	0.1646***	0.2053***	0.0007**	0.2113***
		(0.055)	(0.002)	(0.054)	(0.077)	(0.002)	(0.078)
Foreign exchange pressure	+	1.0732*	0.9137*	0.974*	1.0991*	1.0046**	1.0147*
		(0.571)	(0.49)	(0.555)	(0.582)	(0.493)	(0.591)
REER variability	?	-0.0048		-0.0052	0.0341**		0.0389**
		(0.152)		(0.15)	(0.017)		(0.018)
NEER variability	?	-0.0117		-0.0078	-0.0053		-0.0014
		(0.013)		(0.013)	(0.012)		(0.006)
Fiscal position	+	0.1862**	0.0996**	0.194**	0.1981*	0.0760	0.2089*
		(0.091)	(0.042)	(0.091)	(0.105)	(0.048)	(0.111)
Current account	+	-0.1178		-0.1082	-0.1735**		-0.1656**
		(0.079)		(0.082)	(0.077)		(0.082)
Trade openness	-	0.0021		0.0018	0.0058		0.0049
		(0.005)		(0.006)	(0.004)		(0.006)
Terms of trade variability	-	-0.0220		-0.033	-0.0316		-0.0448
		(0.064)		(0.069)	(0.07)		(0.072)
External debt	?	-0.0249**		-0.0285**	-0.0259**		-0.0293**
		(0.012)		(0.012)	(0.011)		(0.012)
Financial depth	+	0.0096		0.0117	0.0092		0.0114
		(0.008)		(0.008)	(0.007)		(0.007)
Central bank autonomy	+	0.524		0.836	0.4542		0.7588
		(0.89)		(0.98)	(0.812)		(0.887)
Floating exchange rate regime (de facto)	+	0.1971 (0.537)			0.3915 (0.559)		
Floating exchange rate regime (de jure)				-0.8868 (0.670)			-0.9466 (0.687)
Constant		-2.617*	-2.7395***	-2.1934**	-2.4769**	-2.5506***	-1.9730
Number of observations		899	907	900	786	794	786
Pseudo R-squared		0.17	0.07	0.18	0.22	0.09	0.24

*, ** and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent, and 1 percent respectively.

Table 5 Inflation performance in pre- and post-targeting periods

	Inflation rate			Inflation variability		
Inflation targeters	**Pre-targeting**	**Post-targeting**	**Difference between post- and pre-targeting**	**Pre-targeting**	**Post-targeting**	**Difference between post- and pre-targeting**
Australia	6.33	2.25	-4.08	1.80	1.71	-0.09
Canada	4.38	2.00	-2.38	1.16	1.16	0.00
Chile	21.33	9.58	-11.75	6.16	3.88	-2.28
Finland	4.68	1.23	-3.45	1.92	1.28	-0.63
New Zealand	11.32	2.25	-9.07	4.74	2.00	-2.74
Spain	6.24	3.01	-3.23	1.68	1.30	-0.38
Sweden	6.27	1.46	-4.81	2.52	1.71	-0.81
United Kingdom	5.68	2.62	-3.06	2.00	1.23	-0.77
Data summary: All 37 countries						
Average (8 inflation targeters)	8.28	3.05	-5.23	3.52	2.12	-1.41
Average (29 nontargeters)*	7.48	4.68	-2.79	2.75	1.78	-0.96
Industrial countries only						
Average (7 inflation targeters)	6.41	2.12	-4.30	2.26	1.49	-0.78
Average (13 nontargeters)*	4.65	2.15	-2.51	1.91	1.05	-0.86

* = For nontargeters, the average between 1985 and 1994 and the average between 1995 and 2000 are compared.

Table 6 Output performance in pre- and post-targeting periods

	Output growth			Output variability		
Inflation targeters	**Pre-targeting**	**Post-targeting**	**Difference between post- and pre-targeting**	**Pre-targeting**	**Post-targeting**	**Difference between post- and Pre-targeting**
Australia	3.03	4.46	1.43	1.70	1.04	-0.66
Canada	3.24	2.70	-0.54	1.59	1.55	-0.03
Chile	6.21	6.65	0.45	2.11	3.03	0.92
Finland	1.27	3.71	2.44	3.03	2.22	-0.81
New Zealand	2.72	2.39	-0.32	2.50	1.89	-0.61
Spain	2.91	3.11	0.20	1.58	0.56	-1.03
Sweden	1.33	2.40	1.07	1.30	1.76	0.46
United Kingdom	2.38	3.01	0.63	1.93	0.78	-1.15
Data summary: All 37 countries						
Average (8 inflation targeters)	2.89	3.56	0.67	1.97	1.61	-0.36
Average (29 nontargeters)*	3.81	3.83	0.02	2.03	1.69	-0.34
Industrial countries only						
Average (7 inflation targeters)	2.41	3.11	0.70	1.95	1.40	-0.55
Average (13 nontargeters)*	2.65	3.17	0.52	1.46	1.34	-0.12

* = For nontargeters, the average between 1985 and 1994 and the average between 1995 and 2000 are compared.

Table 7 t-test value applying the small-sample method for the difference between two population means

37-country sample

	Decrease in inflation rates	Decrease in inflation variability	Increase in real GDP growth	Decrease in real GDP variability
t-test value	-6.54***	2.68**	5.09***	-0.23

20- industrial-country sample

	Decrease in inflation rates	Decrease in inflation variability	Increase in real GDP growth	Decrease in real GDP variability
t-test value	-4.28***	0.66	0.78	-3.50***

*, ** and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent, and 1 percent, respectively.

Table 8 Trade-off between inflation and output variabilities

Dependent variable	**Inflation variability** (post-/pre-)	**Output variability** (post-/pre-)	**Output variability/inflation variability** (post-/pre-)	**Output variability/inflation variability**
Indpendent variables:				
Output growth (post-/pre-)	-0.29***	0.001	0.29	0.20
	(0.14)	(0.18)	(0.23)	(0.14)
Inflation rate (post-/pre-)	0.20	-0.09	-0.30	-0.61***
	(0.13)	(0.17)	(0.22)	(0.08)
Inflation targeting	0.17***	-0.04	-0.21	-0.11
	(0.09)	(0.11)	(0.14)	(0.10)
Constant	-0.20	-0.13	0.07	0.17
Number of observations	37	37	37	74
Adjusted R-squared	0.15	-0.02	0.06	0.45

Dependent variable	**Output variability**	**Inflation variability**
Independent variables:		
Inflation variability	0.17***	
	(0.08)	
Output variability		0.34***
		(0.16)
Inflation targeting	-0.04	-0.07
	(0.09)	(0.12)
Constant	0.16	0.24
Number of observations	74	74
Adjusted R-squared	0.03	0.03

Table 9 Factors affecting the level and variability of inflation

Independent variables	Inflation rate			Inflation variability		
	Expected sign	Full	Final	Expected sign	Full	Final
M2 growth (lagged)	+	.0963*** (.026)	.1029*** (.024)	+	.0692*** (.022)	.06900*** (.023)
Real GDP gap	+	-.2280* (.129)	-.2203* (.129)	+	-0.3254 (.198)	-.3120* (.185)
GDP growth variability	+	0.1019 (.165)	0.1083 (.151)	-	0.2019 (.276)	0.2109 (.244)
Non-fuel commodity prices	+	-0.0024 (.040)	-0.0098 (.038)	+	-.0903* (.054)	-0.0931 (.058)
Fiscal position	-	-0.0652 (.067)		-	0.0276 (.074)	
Financial depth	-	-.0296*** (.005)	-.0270*** (.005)	-	-.0091*** (.003)	-.0110*** (.003)
Inflation targeting	-	-2.4268*** (.569)	-2.4208*** (.611)	-	-0.6336 (.418)	-0.6132 (.508)
Central bank autonomy	-	-1.2693** (.506)	-1.9134*** (.504)	-	-0.089 (.483)	-0.3099 (.350)
Trade openness	+	-.0104*** (.004)	-.0187*** (.003)	+	-0.004 (.003)	-.0062* (.004)
Terms of trade variability	+	.1197*** (.046)	-0.016 (.038)	+	0.018 (.025)	-0.0076 (.019)
Floating exchange rate regime (de facto)	+	1.1352* (.597)	1.055* (.572)	+	-.6382* (.383)	-.5840* (.334)
Foreign exchange pressure	+	0.0739 (.800)		+	0.9566 (.851)	
REER variability	+	.0526** (.022)	0.0068 (.021)	+	0.0080 (.025)	
NEER variability	+	.1118*** (.028)	.1128*** (.028)	+	.0584*** (.016)	.0598*** (.016)
Current account	?	-0.1207 (.074)		?	-0.0645 (.045)	
External debt	?	0.0076 (.006)		?	-0.0004 (.006)	
Constant		4.4105	6.6749		2.0397	2.5341
Number of observations		884	908		879	903
Adjusted R-squared		0.45	0.43		0.27	0.26

1. *, ** and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent and 1 percent, respectively.
2. Standard errors are in parentheses.
3. Regressions are based on the entire sample, excluding 15 countries with average inflation above 25 percent over the 1980–2000 period; regressions include annual dummy variables that are not reported.

Table 10 Factors affecting the level and variability of growth

Independent variables	Real GDP growth			GDP growth variability		
	Expected sign	Full	Final	Expected sign	Full	Final
M2 growth (lagged)	-	-0.0064 (.015)		+	0.0171 (.011)	
Real GDP growth				+	.4172*** (.063)	.4278*** (.069)
GDP growth variability	+	.8085*** (.269)	.7613*** (.236)			
Inflation variability	-	-.1730*** (.067)	-0.040 (.037)	-	0.0806 (.068)	0.0189 (.031)
Fiscal position	-	-0.0208 (.057)		?	.1654*** (.023)	
Financial depth	+	0.0006 (.002)		-	-0.0003 (.002)	
Inflation targeting	-	.7460* (.423)	.6217* (.329)	+	-.9154** (.385)	-.7772* (.416)
Central bank autonomy	+	0.2584 (.489)	0.1753 (.478)	-	-1.4736*** (.276)	-1.493*** (.266)
Trade openness	-	0.0050 (.004)	0.0033 (.003)	+	-0.0001 (.003)	0.0030 (.002)
Terms of trade variability	-	0.0188 (.021)	-0.0124 (.020)	+	-0.0183 (.020)	
Floating exchange rate regime (de facto)	-	-0.2811 (.387)		+	0.0267 (.246)	-0.0723 (.218)
Foreign exchange pressure	-	-0.1955 (.620)	-0.4403 (.604)	+	-0.0216 (.303)	
REER variability	?	-0.0036 (.015)		?	.0280** (.012)	
NEER variability	?	0.0112 (.012)		?	-0.0041 (.005)	0.0032 (.004)
Current account	?	0.0059 (.066)		?	-0.0467 (.031)	
External debt	?	-.0078* (.004)		?	0.0048 (.004)	
Constant		-1.5351	0.3214		6.4459	2.9642
Number of observations		878	951		878	948
Adjusted R-squared		0.42	0.37		0.54	0.47

1. *, ** and *** represent rejecting the null hypothesis of no significance at levels of 10 percent, 5 percent, and 1 percent, respectively.
2. Standard errors are in parentheses.
3. Regressions are based on the entire sample, excluding 15 countries with average inflation above 25 percent over the 1980–2000 period; regressions include annual dummy variables that are not reported.