

UKRAINE AND INFLATION
TARGETING: ESTABLISHING
INITIAL CONDITIONS

by

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Abstract

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A growing number of transition and developed economies are practicing inflation targeting in their monetary framework. The Ukraine is among many countries that may consider implementation of an inflation targeting framework in its monetary policy. This thesis provides the analysis of the initial conditions that support the successful implementation of an inflation targeting framework. Ukraine is compared to its peer economies and to other emerging and developed countries. Economic structure and economic condition variables are implemented in the analysis. The policy implications arise from the empirical research of the selection of significant factors that are consistent with the economic theory.

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LIST OF ABBREVIATIONS

IT Inflation targeting

ITR Inflation targeting regime

FFIT Full-fledged Inflation Targeting regime

ITL Inflation Targeting Lite regime

EIT Eclectic Inflation Targeting regime

FFITEM Full-fledged Inflation Targeting regime: emerging economies

Chapter 1

INTRODUCTION

*“There is no such thing in practice
as an absolute rule for monetary policy”*

Ben S. Bernanke

The policy framework of inflation targeting was first adopted by New Zealand in 1989. Since then this type of monetary policy has gained in popularity and recognition. Certain developed transition economies on their way to the European Union have adopted an inflation targeting framework. Among these are Poland (September 1998), Czech Republic (December 1997), and Hungary (June 2001). To be successful, such an economic policy requires the following: the announcement of the inflation goal for a certain period, the subordination of other goals of monetary policy to this objective, the analysis of different economic parameters for setting grounded targets and a high level of transparency relating to the activities of the monetary authority (Mishkin (2000)). The inflation targeting framework is associated with many advantages that help countries to achieve monetary convergence. At the same time, the high level of accountability the policy requires of the central bank is a hard obligation to sustain.

The main concern of this paper is to analyze the prospects for the Ukraine in implementing inflation targeting. This task is achieved by distinguishing the basic conditions for successful inflation targeting. A small glance into the world experience reveals that some conditions appear to be more supportive of inflation targeting policy than others.

The important question for Ukraine is whether inflation targeting adds to the development of the country's economic activity. The practice adopted in the developed economies proposes the introduction of an inflation target as an instrument of more efficient control (Ball and Sheridan (2003)). Implementing an inflation targeting framework in the volatile emerging economies is a special problem discussed by Amato and Gerlach (2001), Carare et al. (2002), Mishkin (2000), Orłowski (2000 and 2001), Schmidt-Hebbel and Tapia (2002) and others. Indeed, there is no clear consensus on the advantages of the inflation targeting framework. However, inflation targeting countries generally manage to keep the inflation at low levels. This result holds both for developed and emerging economies, and thus is appealing for Ukraine.

As stated in *The Law on National Bank of Ukraine* the main policy mission of the National Bank of Ukraine is to maintain a stable national currency, and the subordinated task is to preserve stable prices within its level of authority. Hence, Ukraine isn't practicing strict inflation targeting, but assigns some inflation ranges for macroeconomic variables (for example, budget revenues, inflation bands etc.). The empirical investigation of this thesis is undertaken by comparing the Ukrainian economy with its peers and other appropriate groups of countries. We used the classification of the countries with floating exchange rate undertaken by Carare and Stone (2003). It involves sorting the economies into 3 inflation targeting regimes based on the levels of clarity of commitments to inflation targeting and the credibility of the monetary authority. These regimes are denoted by: Fully-fledged Inflation Targeting (FFIT), Eclectic inflation Targeting (EIT), and Inflation Targeting Lite (ITL). The maintained hypothesis is that the level of credibility to the monetary authorities increases from the ITL to the EIT via the FFIT regimes.

Macroeconomic variables such as GDP per capita, government debt to GDP, central bank financing to GDP together with the financial indicators (such as the real interest rate, broad money to GDP, stock market capitalization etc.) are used to explain the level of credibility in the country. They are based on the group of factors described by Stone (2003) and Carare, et al. (2002) and others. Among these factors are an increased level of transparency, a stable financial system, an increased level of GDP per capita, a lower amount of government debt to GDP and others. We consider the significant factors to be those that help to increase credibility of the monetary authorities. Clarity combined with credibility satisfies the conditions for practicing a successful inflation targeting framework. Therefore, certain relevant policy actions for Ukraine when implementing inflation targeting are presented.

Chapter 2

REVIEW OF STUDIES ON INFLATION TARGETING FRAMEWORK

*“New economic consensus: low and stable inflation
is important for market-driven growth”*

Frederic S. Mishkin

The inflation targeting framework has been gaining in its popularity during the past decade among economic policymakers. Many developed and emerging countries, with differing levels of economic development, have considered or adopted this framework for their monetary policy. The issue as to whether this policy is beneficial for economy, and whether it adds to economic stabilization and growth is heavily debated in the literature. Many distinguished authors presented their research in the field and the results obtained are rather diverse. For many countries that consider implementing an inflation targeting framework in their monetary policy, the understanding of the conditions for its success is very important. However, it should be clear that the policy objectives of the emerging economies are different to those of the developed economies. Thus, any analysis should explicitly separate the basic conditions faced by these types of countries. In addition, the investigation will clearly indicate the level of credibility which the monetary authorities should possess for their actions, in order to be able to successfully implement inflation targeting.

The first question to address is the definition of inflation targeting. According to Bernanke, et al. (1999) inflation targeting “... is a framework for monetary policy characterized by the public announcement of official quantitative targets (or target ranges) for the inflation rate over one or more time horizons, and by

explicit acknowledgement that low, stable inflation is monetary policy's primary long-run goal".

It is of great importance to recognize that inflation targeting is a framework of monetary policy, not a rule. This framework combines in itself both rules and discretion that were distinguished by the so-called Chicago School in the 1930s (Bernanke, et al. (1999)). As the authors suggest, rules can be regarded as monetary policies that are performed without a high degree of involvement of monetary authorities, in other words they are rather mechanical. One example would be the gold standard. On the contrary, discretion can be described as the intended actions of the monetary authorities in order to achieve some goals. They are more flexible and can be suited both to short and medium-run goals. Thus, the inflation targeting framework exhibits a kind of "constrained discretion" (Bernanke, et al. (1999)). Countries that are practicing this framework adjust their monetary policy transmission mechanism to best serve the inflation target (Corbo, et al.(2002), Bardsen, et al.(2003)).

New Zealand was among the first countries that adopted explicit inflation targeting (Ball and Sheridan (2003)). Among the emerging countries Chile was the earliest to pursue such inflation target objectives (Mishkin (2000)). Today 20 emerging as well as developed countries, have adopted inflation targeting in their monetary frameworks (see Appendix A). As a result, they experience many advantages as well as corresponding disadvantages of that policy.

i) Revealed advantages and drawbacks of inflation targeting countries

According to Mishkin (2000), Schmidt-Hebbel and Tapia (2002) the following advantages can be selected in relation to a medium term inflation targeting strategy: concentration on domestic objectives and shocks to the economy (unlike

exchange rate targeting); the ease with which policy is understood by the public, and in this way obtain a great degree of transparency. Unlike monetary aggregate targeting, an inflation targeting framework does not require a stable relationship between money and inflation as long as all the available information is taken into account in setting targets. For example, the framework does not require daily control over money aggregates, as it uses all available information from monetary and fiscal actions to determine the most suitable setting of monetary instruments. The same article describes the major disadvantages of an inflation targeting framework which appear mainly from the “constrained discretion” property: the rigidity of the framework (less responsiveness to downward inflation movements); the possible impact on output stability (lower economic growth); the production of weak central bank accountability (if weak regulation is imposed on the central bank) and the impossibility of averting fiscal goals supremacy (if the government follows a clear fiscal policy that dominates the economy); the requirement of setting a floating exchange rate, which if improperly controlled, might lead to financial instability. The later is particularly important for emerging economies.

A very important question to address is whether the adoption of inflation targeting is beneficial for the specific country concerned. This issue is heavily discussed in the literature and numerous models are presented. However, none of the models can be either supported or rejected, mainly due to the small body of evidence available for analyzing this policy framework (the earliest practice started at 1989 while many transition countries adopted this framework only at the end of the 1990's). In most cases, the authors regard transition countries only in the respect that they implemented this policy framework, in practice, in the late 1990's - early 2000. However, the lack of years over which one can identify the inflation targeting in place rules out any empirical investigation which can definitely reveal the policies advantages or disadvantages.

Bernanke and Mishkin (1997) discuss how this policy framework was implemented in practice in many developed countries. The main conclusion from their work is that no grounded final judgment can be made. However, if inflation targeting is established as a framework and not as a rigid rule, and more transparent and sound monetary policy is implemented, accountability increases and more attention is devoted to longer run objectives than in the usual policy debates.

Another article (Ball and Sheridan (2003)) conducts empirical research on the question as to whether inflation targeting improves economic performance. The countries discussed are those with developed economies, as more applicable and relevant data can be obtained for them. The authors present a comparison of the economic performance of targeting versus non-targeting countries. The paper considers some major indicators of the economic situation in the country, such as: inflation (hence, stable prices), output and interest rates which should also exhibit less volatility. Therefore, these are the indicators that it is claimed should benefit from new policy framework. The effect of the inflation targeting framework arises due to the higher level of certainty in the future actions of the economy. The main conclusions from the paper are the following: that countries practicing inflation targeting, experience lower levels of inflation than the non-targeters. The weakness of their methodology was the fact that targeting countries experienced much more volatility in inflation before implementing the strict policy framework and no accommodation in the tests was done to accommodate this feature. Overall, there is no clear difference in general economic performance, as economic indicators improve in both types of countries. Thus, the paper concludes that no clear advantages or disadvantage emerge from the empirical investigation.

Amato and Gerlach (2001), Horská (2001), Fraga, et al.(2003) Schmidt-Hebbel and Tapia (2002), Blejer, et al (2000), Corbo, et al.(2002) provide the main research for transition economies that have adopted inflation targeting as their monetary policy framework. Amato and Gerlach (2001) specify some major results that appear to be significant for emerging economies after adopting inflation targeting. The authors suggest that for emerging economies in the periods of disinflation, inflation targets coexist with exchange-rate targets. However, when the two overlap, then supremacy is given to inflation goals. In this way, low-single digit inflation is achieved and at the same time inflation bounds are increased to allow for more variability in the economy. The importance of controlling exchange rates when adopting inflation targeting policies in emerging economies has been emphasized by many authors. Mishkin (2000) states the peculiar feature of the developing economies – vulnerability to external shocks due to large dollarization of the domestic economy (heavy use of some foreign currency as a mean of exchange and a store of value). This issue has huge importance for the Ukrainian economy and thus its importance shouldn't be underestimated when considering adoption of inflation targeting and its further implementation.

Horská (2001) analyzed the Polish experience of inflation targeting. The major monetary reforms in Poland are compared to those in the Czech Republic. The author's analysis finds that lack of the development of the money market imposes significant constraints on inflation targeting as fewer instruments of inflation control are available to the authorities. Hence, from this paper, the need to have well-developed money market arises as a necessary condition for having inflation targeting framework successfully implemented.

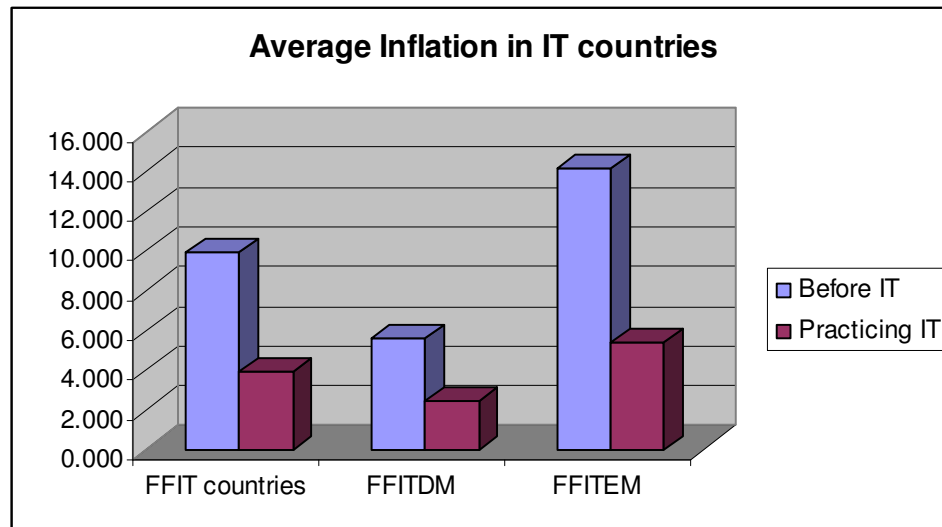
Another paper on inflation targeting in CEE countries is that by Orłowski (2000). In the model the inflation targeting framework is considered as a good choice for

countries that will have to converge to the European Union, initially as trading members, and thereafter as full Monetary Union members. Inflation targeting will thus help to bring inflation down and hence to facilitate compliance with the requirements of the European Union. The model in the article presents a quadratic loss function associated with the central bank that has to face trade-off between variability in inflation versus output gap variability. The central policy results of the paper are the following. First, in order to achieve the most efficient path to convergence to a monetary union (to meet the convergence requirements), an economy has to implement inflation targeting, as it will enable it to achieve low levels of inflation and to obtain a mechanism of inflation control. Second, a high level of credibility in the central bank policy should be accomplished in the economy, which will help to maintain long-run price stability and promote sound economic policies.

One can summarize the revealed advantages and disadvantages of the inflation targeting framework in the literature as follows. Many papers argue in favor of inflation targeting as a feasible mechanism to obtain low inflation. If the papers do not demonstrate clear evidence of the success of this framework in practice, no disadvantages from adopting this policy framework have been revealed. It is mainly appropriate for developed economies that are already experiencing price stability and implementing this policy for maintaining this stable price level. In contrast, the inflation targeting framework is also presented as a good framework for emerging countries that must stabilize their economies in order to meet the requirements of, for example, a monetary union.

The success of the IT framework as a monetary policy, viewed in terms of obtaining and maintaining low inflation, can be seen from the following graph. We can observe that on average adopting countries significantly decreased their

inflation rates. This result holds both for the emerging and developed economies. This evidence is also supported by Seyfried and Bremmer (2003).



Source: Author's own calculations

Previous discussion of the papers which analyze the practice of inflation targeting is intended to show the advantages of inflation targeting for those transition countries that implement this framework in their monetary policies. These results are very important for the Ukraine, as shortly it may consider adoption of this framework in its policies. Thus, of great importance to my research are the papers that allow for the comparison of a transition economy that does not currently perform explicit inflation targeting with those that have already considered this framework in practice. In this way I hope to determine the basic characteristics necessary for successful inflation targeting. It is worth mentioning that the experience of transition in CEE countries is similar to those in the NIS countries, in the way that all these economies have a similar starting point and ultimate policy objective (which can be to join the European Union). Thus, for comparison with the Ukraine we can consider the examples of Poland, Hungary and others when implementing this framework in the future.

ii) The Ukraine within an inflation targeting framework

It is important to highlight that Ukraine has not yet implemented strict inflation targeting. *The Law on National Bank of Ukraine* describes the main mission of the National Bank of Ukraine as supporting a stable national currency. The requirement to maintain stable prices within its level of authority is set as a subordinated task. The Government and National bank of Ukraine set an inflation range in order to make economic agents aware of the expected inflation rate. But nobody is kept responsible and accountable for keeping these variables in their ranges. However, as stated above, the Ukraine may soon consider implementing an inflation targeting framework. To date, there is no theoretical or empirical estimate available of the effects of the economic implementation of an inflation targeting framework in Ukraine. Thus, the analysis for the Ukraine, together with other countries (both targeters and non-targeters), of the conditions necessary to successfully implement this policy framework comprises my central research question.

Mishkin (2000), Blejer, et al (2000), and Amato and Gerlach (2001) propose that the following criteria are selected for an inflation targeting framework:

- public declaration of a numerical target for inflation;
- commitment to price stability as the imperative goal of monetary policy;
- an information inclusive strategy (not only monetary aggregates and exchange rate are considered when setting the inflation target);
- a high level of accountability and transparency of the central bank in achieving inflation objectives.

Carare, et al. (2002), and Blejer, et al. (2000) elaborate on the set of conditions that lead to the success of an inflation targeting framework. They emphasize four groups of factors. The first group of factors is assumed to have the highest importance. These are: (i) clearly defined right of the central bank to pursue the inflation targeting objective (central bank independence); (ii) autonomy of the central bank in its monetary discretions; (iii) public awareness of the monetary authorities' actions. The second group of conditions comprises of the following: dominance of the inflation targeting objective over fiscal priority, government financing through the financial market (limited access to central bank credits). A strong external position, low inflation, and fiscal budget balance are thus also desirable factors for the second group of conditions. The third group of factors shapes the stability of the financial system in order to be able to provide monetary control and achieve the country's goal. A healthy financial system does not distract the authorities from the primary goal, and at the same time it helps to use monetary instruments to maintain the objective. The final group of conditions includes the clear understanding of the monetary policy transmission mechanism. The inflation targeting framework is one of "constrained discretion". Thus, the monetary authorities should clearly understand the policy links that will lead to the achievement of the goal. In addition, the subordination of all other objectives to inflation targeting should be unambiguously defined (Carare et al. (2002), Amato and Gerlach (2001), and Bernanke and Mishkin (1997)). It is crucial to understand that the monetary authority actions should be supported by a perceived high level of credibility from the public; otherwise, the inflation targeting framework is senseless and should not be implemented.

Another interesting characteristic of the countries that have adopted an IT framework is the fact that, on average, countries have reduced inflation by 5.3 percent in the years $t-2$ and $t+1$, where t is the year of the declared inflation targeting. Inflation has decreased even more by 8.2 percent on average if the $t-3$

and $t+1$ years are considered (Corbo et al. (2002)). Hence, the country should consider lowering its inflation or at least keeping it at a reasonable and controlled level in order to consider that it has successfully implemented the IT framework.

To provide an analysis of the potential implementation of inflation targeting in the Ukraine, specifically the conditions for establishing the framework, the thesis analyses papers by Carare and Stone (2003), Stone (2003) and Carare, et al (2002), Fraga, et al (2003). Countries that experience some type of inflation setting can be assessed according to the determinants of the inflation control schemes. The main idea is to select the countries which have adopted a variant of the floating exchange rate regime (it could be managed floating or crawling bands) and split them into 3 categories on the basis of (i) clarity of the commitment to the inflation targeting policy, and (ii) credibility that the monetary authorities experience in the country. We consider this classification to be more complete, in contrast to the classification provided by Hu (2003) which analyzes only targeters against non-targeters. The separation of non-targeters for two other regimes brings more insight into the basics of inflation targeting. Also, this categorization allows detached concentration on the issue of developed stable economies versus emerging economies, the latter of which are volatile and more vulnerable to shocks. Appendix B indicates the classification of countries into 3 specified regimes.

To pursue both exchange rate and inflation targeting in practice implies pursuing none of the goals, as the actions required to support one objective are often in contradiction to supporting the other (Kuttner and Posen (2001)). Hence, the emphasis is on choosing countries that do not have a stated commitment to a fixed exchange rate and at the same time are implementing actions towards inflation control. Meantime, the importance of paying attention to exchange rates, even with inflation targeting, is very important for emerging economies as stated

earlier. The third alternative to the previous two goals, monetary aggregates targeting, appeared to be inefficient in a market economy (Mishkin (2000)).

The following regimes are created on the basis of the clarity they provide to the inflation targeting and credibility to the monetary authorities (Stone (2003) and Carare and Stone (2003), Fraga, et al (2003)):

- Full-fledged Inflation Targeting (FFIT) – medium to high level of credibility, and a clear commitment to inflation targets through transparent monetary policy and increased accountability of the central bank;
- Eclectic Inflation Targeting (EIT) – very high level of credibility, can set other goals besides inflation and are successful in maintaining low-single digit inflation;
- Inflation Targeting Lite (ITL) – low level of credibility that does not allow the setting of inflation targeting in practice and hence, a broad inflation objective, vulnerability to economic shocks and inherent financial system weakness.

Carare and Stone (2003) do not analyze the Ukraine, or many other transition countries. One possible reason for this is that the authors didn't consider countries either with a small GDP per capita (following the belief that those countries experience heavy dependence on large neighbored economies) or those with a lack of reliable data. Ukraine could fall into the class of countries with small GDP per capita for the year 2000, but the significant growth rates of the country's GDP can give one grounds to include Ukraine into this model (besides, Ukraine practices a managed floating regime with respect to its in exchange rates). According to this country specification, it is possible to relate the Ukraine to the sample of ITL countries. The first argument in favor of this is that according to the Law On the National Bank of Ukraine, the central bank has the primary goal

of maintaining a stable national currency. However, the idea that the Ukraine experiences some level of inflation targeting is entrenched in other paragraphs of this Law, which obliges the central bank to keep prices stable within their level of authority. Further, the Cabinet of Ministers every year sets margins for expected inflation and devotes efforts to keep it within those bands. Thus, the country does exhibit some inflation control in its policies; however, none of the authorities is held responsible. To complete the classification, I should state that the Ukraine cannot be characterized as a country with high or even medium levels of credibility to the monetary authorities. This is because the National Bank of Ukraine does not have high independence in its actions of conducting monetary policy, and the Ukrainian banking system is not sound enough to maintain such stability, nor to quickly respond to monetary actions of the central bank. Thus, we maintain the IIL group criteria are the best fit for Ukrainian conditions.

Carare and Stone (2003) maintain that clarity in the inflation targets can be seen as institutionalizing the commitment to set inflation targets and to provide the requisite policy in order keep them at the designated level. Another component of clarity in the institutional framework is transparency. In contrast, credibility of the monetary authorities' actions is considered to be ascertained by the combined measures of the actual inflation rate in the economy and the rating of long-term government bonds. These parameters can give a clear picture of how well the monetary authorities are perceived in the country and accordingly are assigned a higher level of credibility.

EIT (Flexible Inflation Targeting by Orłowski (2000)) countries are composed of the developed economies; FFIT (Strict Inflation Targeting by Orłowski (2000)) countries include both developed and emerging economies, while IIL consists solely of emerging economies. The last regime can be seen as the transitional

stage towards more explicit inflation targeting if the country chooses to adopt it (Carare and Stone (2003)).

To create the macroeconomic comparison of the countries in those 3 regimes, the analysis considers such macroeconomic variables as: per capita GDP, government budget balance, and restrictions on central bank financing of government, together with such financial indicators as: broad money to GDP, stock market capitalization, and the real interest rate. In most cases developed countries (both in EIT and FFIT) have much stronger indicators of macroeconomic and financial stability than developed countries practicing FFIT and IITL regimes. To test whether the level of credibility increases from IITL to FFIT and then to EIT countries the following empirical model is used: ordered logit (probit) maximum likelihood estimation. The dependent variable is the assigned level of credibility and the regressors are the above-mentioned indicator. Carare and Stone (2003) presented this kind of analysis in the paper. However, I believe, the following issues should be addressed:

- the justification for using the ordered outcomes;
- many factors should be analyzed in terms of potential endogeneity and multicollinearity they might have in the model;
- many countries (including the Ukraine) are excluded from the analysis on the basis of very small GDP per capita or due to the lack of comparable or sufficient data;
- the analysis is a cross-country specification and was completed based on end-2000 data. As transition economies are changing very rapidly, new research is demanded in this area.

For the analysis I will add Ukrainian data and other countries' data and the whole analysis will be presented to incorporate end-2002 statistics. Also the analysis of possible endogeneity problems of some factors will be addressed.

Both the articles by Carare and Stone (2003) and Stone (2003) deal with the issue of the required conditions for a transition economy to be able to effectively use an inflation targeting framework in their monetary policy. Among these issues are the increased level of transparency, a stable financial system, an increased level of GDP per capita, a lower amount of government debt to GDP and others. According to the empirical results, these variables are shown to be significant in the maintenance of sound policy. The establishment of the initial conditions in the light of the revealed experience of inflation targeters is also discussed in Carare, et al. (2002).

To summarize, there are many papers that analyze the benefits and drawbacks of the inflation targeting. So far, there is no consensus of the clear advantage of this policy framework in the practicing countries when they are compared to the non-targeters. However, an IT framework is found to support the maintenance of low levels of inflation and is a good practice for understanding a country's monetary policy and its links. The main question of this research is to provide an analysis of the conditions that a country like the Ukraine should have in place while it is considering implementing an inflation targeting framework in their monetary policy.

Chapter 3

METHODOLOGY OF EMPIRICAL ESTIMATION

For the empirical estimation of the conditions that are revealed by the countries with different inflation targeting regimes, an ordered logit (probit) maximum likelihood analysis as well as binary probit analysis will be conducted (Carare and Stone (2003), Hu(2003)). These regressions are based on cross-sectional data. The use of panel data is not required, as our interest lies in the differences between countries and not in the variation of variables though time. That is, the analysis explains the current states of the inflation targeting regimes with the previous data. For numerous variables, the measured variable is based on an average across 3 years. In addition, some explanatory variables are to large degree constant over time (for example, legal restrictions from central bank on government financing), and therefore, the estimation of the panel data with fixed effects will not capture their impact on the dependent variable. Moreover, the use of the panel data is constrained by the fact that many countries adopted a FFIT regime only recently and thus, not much data exists measuring them.

The first set of regressions involves using a measure of the type of inflation targeting regime as the dependent variable, with different sets of independent variables (macroeconomic and financial ones). Clearly, the factors should be chosen with the regard to the existing economic evidence of conducting monetary policies in different countries. The fear of obtaining the spurious regression results forces us to rely on the published papers that depict the influence of different measures of economic structure and policy conduct that are important for countries with a FFIT regime. Hence, the dependent variables are

taken from the four groups of factors that were earlier mentioned for an IT framework. In the analysis we are particularly interested in the signs with which each factor enters into the regression. In addition, the significant variables serve as indicators of the conditions for establishing an IT framework.

Macroeconomic variables:

- per capita GDP (gdppc);
- government balance to GDP (bdgbalgdp);
- current account balance as percent of GDP (cabalgdp);
- legal restrictions of central bank financing to government (rstrfin).

Financial variables:

- broad money to GDP (bdmngdp);
- market capitalization of existing companies to GDP (mktcapgdp);
- real interest rate (rintr).

The fiscal position is represented in the government balance to GDP factor. A country with a high imbalance of government spending should enjoy a lower level of credibility. The current account balance as a per cent of GDP serves to characterize the external position of the country and we expect to obtain a negative coefficient on this factor. The limitation on the government is the ability to receive loans from the central bank which is represented by the variable: legal restrictions of central bank to government financing. Clearly, the countries that enjoy high levels of credibility to the monetary authorities should not allow unlimited possibilities for the government to be financed by the national bank.

The financial variables (economic structure variables) indicate the state of the financial market as well as the external influences that are experienced by the economies we analyze. Hence, the ratio of capital market capitalization to GDP

indicates the development of the stock market. Clearly, the need to service government debt requires the existence of strong financial markets to market and value securities. Hence, the market capitalization variable should have a positive effect on the explanatory variable. The values of broad money to GDP (financial depth) serve as a monetary policy instrument that can be and is influenced by the central bank in order to maintain the target (or target ranges).

The interesting feature of this analysis is the Heritage index on monetary policy. It is a good proxy for inflation, but doesn't cause endogeneity problems in the data analysis. Besides, this index is calculated for all the countries discussed and no ambiguity arises from using it as an explanatory variables.

The dependent variable is modeled based on the assumption that the level of credibility increases from the IITL to the FFIT and then finally to the EIT regimes (Carare and Stone (2003)). Hence, IITL is accredited with a level 1, FFIT with 2, and EIT with 3. See Appendix B for the full country classification.

The model with a quantitative dependent variable should not be estimated by OLS as the estimates are biased and inconsistent. The problem with the usual estimation method such as OLS when dealing with the quantitative data is the need to assign an arbitrary quantitative value to each category. The use of ordered logit/probit models does not require this. The emphasis is in the maximization of the likelihood function of observing the actual variables in each category. Hence, there is no need to assign a specific value to the categories. Therefore, we employ an ordered logit(probit) maximum likelihood analysis (Long (1997)). The observed variables inflation targeting regime (ITR) is related to the unobserved latent variable y^* according to the model:

$$ITR_i = \begin{cases} 0 \Rightarrow ITL & \text{if } \tau_0 = -\infty \leq y_i^* < \tau_1 \\ 1 \Rightarrow FFIT & \text{if } \tau_1 \leq y_i^* < \tau_2 \\ 2 \Rightarrow EIT & \text{if } \tau_2 \leq y_i^* < \tau_3 = \infty \end{cases}$$

The structural model is:

$$y_i^* = x_i \beta + \varepsilon_i,$$

where x_i is a row vector, with the first column being 1's (intercepts) and in each column there are I observation for x_k . In our model, the matrix of x 's will differ from one regression to the other. We analyze different combinations of explanatory variables and will try to indicate the best set that explains the inflation targeting regimes of the countries. The probability of outcomes can be expressed:

$$\Pr(y_i = m \mid x_i, \beta, \tau) = F(\tau_m - x_i \beta) - F(\tau_{m-1} - x_i \beta)$$

Maximum likelihood methods estimate the following function (in which we assume that $\beta_0=0$ for the model identification):

$$\ln L(\beta, \tau \mid y, X) = \sum_{j=1}^J \sum_{y_i=j} \ln(F(\tau_m - x_i \beta) - F(\tau_{m-1} - x_i \beta))$$

Hence, if we assume that errors are normally distributed with variance 1 and mean 0, we can apply Φ (the cumulative normal distribution function) as function F . In addition, we can apply the logistical distribution, assuming that errors are distributed with zero mean and variance $\pi^2/3$.

The model will be tested for the parallel regression assumption (to assure the use of ordered logit/probit methodology and not multinomial logit/probit methodology) and analyzed with tests to ensure the consistency of the estimates and applicability of results.

Another regression will concentrate on the emerging countries group of the FFIT (FFITEM) and ITL. Therefore, binary regression modeling will be used with the same sets of explanatory variables. Specifically:

Dependent variable:

$$EM_i = \begin{cases} 0 \Rightarrow ITL & \text{if } \tau_0 = -\infty \leq y_i^* < \tau_1 \\ 1 \Rightarrow FFITEM & \text{if } \tau_1 \leq y_i^* < \tau_2 \end{cases}$$

The set of explanatory variables is the same that is specified for the 3 inflation targeting regimes.

These regressions present a clearer picture for the countries that we consider may switch from an ITL to the FFIT regime (Ukraine is among these countries).

The software that is used for analysis is Stata 8.0.

Chapter 4

DATA DESCRIPTION

The data for the analysis was collected from numerous sources. Most of the macroeconomic variables are taken from the World Bank Development Indicators Database (www.worldbank.org/data) and from the International Monetary Fund (International Financial Statistics) (www.imfstatistics.org). Some specific variables like legal restrictions on central bank financing are received from the authors of the articles (Carare and Stone) or through further investigation of the internet resources (official sites of the countries' national banks and other monetary authorities). Data for the long-term government debt rating is obtained from www.standardandpoors.com and Dr. Edilberto Segura (SigmaBleyzer Foundation).

The countries analyzed are those that experience some kind of inflation setting and control. There are 19 FFIT countries: Australia, Brazil, Chile, Canada, Colombia, the Czech Republic, Hungary, Iceland, Israel, Mexico, New Zealand, Norway, Peru, Philippines, Poland, South Africa, Sweden, Switzerland, Thailand, and the United Kingdom; 14 are classified as EIT (Singapore, Switzerland, France, Germany, Austria, Luxembourg, United States, Spain, Netherlands, Japan, Belgium, Finland, Italy, Ireland). IITL countries are the following: Albania, Algeria, Armenia, Azerbaijan, Croatia, Dominican Republic, Georgia, Guatemala, Honduras, India, Indonesia, Jamaica, Kazakhstan, Mauritania, Mauritius, Moldova, Pakistan, Paraguay, Romania, Russia, Slovak Republic, Slovenia, Sri Lanka, Tunisia, Turkey, Ukraine, Uruguay, Uzbekistan, and Venezuela. The selection of countries is undertaken based on the World Economic and Financial

Surveys (2003). The chosen countries do not state that the exchange rate is the nominal anchor. The ambiguity about the de-facto and de-jure fixed exchange rate is not analyzed in this paper, and countries are selected based on the de-facto absence of commitment to exchange rate control.

A country is classified as practicing FFIT (Truman (2003)) if:

1. Price stability is claimed to be the primary goal
2. The announcement of a numerical inflation target or target bands
3. Time horizons for the target are established
4. An evaluation system of the target achievement is in action.

The separation of the other countries into EIT and IITL regimes is presented in Appendix B.

To sum up, there are 62 countries to be analyzed. The increased sample compared to that of Carare and Stone (2003) and Hu (2003) should give one more insight into the significant factors under each regime choice.

The analysis is constructed on a cross-country database, as our interest lies in explaining the current regime choices (beginning of 2003) with the data that prevailed prior to inflation targeting implementation. Therefore, averages among the years are used, which allows us to combine the effects across years. None of the papers written on the similar themes analyze this recent time horizon (e. g. the latest years for which the data is available) nor include all the above countries.

The descriptive statistics of the economic and financial variables are presented in the following tables.

Economic variables (economic condition variables):

	GPP per capita, 2001	Market capitalization to GDP, 1999-2001	Real interest rate, 1999-2001	Capital account balance to GDP, 1999-2001	Heritage Index on monetary policy, 2002
ITL					
Mean	2261	18.04	13.49	-1.48	2.83
Minimum	494	0.0873	-8.92	-13.56	1
Maximum	12325	108	44.84	14.01	5
Std Dev	2359	23.172	10.98	5.819	1.22
FFIT					
Mean	13276	63.6	9.31	-0.898	1.74
Minimum	1195	13.7	0.02	-7.07	1
Maximum	38842	179.03	54.07	12.47	3
Std Dev	12338	49.33	11.71	4.917	0.87
EIT					
Mean	33438	116.79	4.077	3.55	1.21
Minimum	17884	7.52	-0.277	-3.76	1
Maximum	56512	269.92	8.99	19.59	2
Std Dev	9963	77.43	2.50	6.587	0.42

Financial variables (economic structure variables):

	Broad money to GDP, 1999-2001	Budget balance to GDP, 1999-2001	Restriction on central bank financing, 1999-2000
ITL			
Mean	36.08	-2.87	1.16
Minimum	8.78	-10.95	0.689
Maximum	79.64	3.45	0
Std Dev	18.324	3.13	2
FFIT			
Mean	55.32	-1.83	0.7894
Minimum	22.18	-7.75	0
Maximum	103.93	2.34	2
Std Dev	24.522	2.9	0.7873

EIT			
Mean	110.68	0.62	1.14
Minimum	61.63	-2.34	1
Maximum	142.84	6.95	2
Std Dev	34.677	3.14	0.36

As we can see from the table the GDP per capita already shows a huge discrepancy among different inflation targeting regimes. It may be assumed that GDP per capita will by itself explain the differences of regime choices. Following Walsh (2002) we state that the level of GDP per capita can be a proxy for structural rigidities in the economy. Other variables also present a clear picture of discrepancies among the 3 targeting regimes.

Chapter 5

EMPIRICAL RESULTS

The first set of regressions estimates the impact of the economic structure and economic conduct variables on the level of credibility assigned to each regime.

The full estimation of the inflation targeting regimes FFTT, EIT and ITL incorporates a large set of explanatory factors that are associated with the inflation targeting factor groups. The variable broad money to GDP is analyzed separately due to the high correlation with the other factors. In general, the regression presents the informative results. All the coefficients have the expected sign, although not all of them are significant. The regression output together with the corresponding statistic can be found in Appendix C.

The following table summarizes the obtained results:

	Initial regression	Final regression 1	Final regression 2
GDP per capita	0.0001574 (.0000685)***	0.0002065 (.0000564)***	0.0002294 (.0000919)***
Heritage Index	-0.806177 (.5516675)		
Market Capitalization to GDP	0.0182794 (.0097143)*	0.0129779 (.0073873)*	
Real Interest Rate	-0.0013237 (.0380903)		
Budget Balance to GDP	-0.162777 (.1697342)		
Broad money to GDP			0.355935 (.0180316)**
Current account balance to GDP	0.0047478 (0.0725838)		

Restrictions on Central Bank Financing	-0.4619748 (.6132703)		
Count R ²	0.763	0.746	0.776
*** - significant at 1% level, ** - significant at 5% level, * - significant at 10% level			

The final regressions indicate the most relevant explanatory variables that enlighten the differences among the regimes. The coefficients in the ordered logit analysis do not represent the marginal values and thus cannot be directly interpreted. Positive and significant coefficients indicate greater probability of enjoying higher level of credibility.

The final regressions together with the full ones incorporate no unexpected signs. The increase in GDP per capita implies the increase in credibility level holding everything else constant. At the same time, the more deeply the financial market is developed (in this case proxied by market capitalization to GDP), the more credibility is assigned to the regime. The need to utilize broad money (money aggregate M2) is also found to be significant. Hence, money aggregates should be clearly used by the authorities in the transmission mechanism of the monetary policy.

The use of an ordered logit methodology for analysis is justified by the checks provided by the parallel regression assumption. The result holds for all regressions. We cannot reject the hypothesis that the outcomes are ordered with 10% level of significance. Otherwise, another model specification should be used (perhaps multinomial logit/probit) and no clear idea of the increased level of credibility from one regime to another can be tested. However, the parallel

regression assumption gives us grounds for using ordered outcomes and thus for comparing the levels of credibility.

The goodness of fit of the explanatory factors, notwithstanding the lower than 10% levels of significance of the corresponding coefficients, can be seen from the predicted probabilities of achieving the regime with given GDP per capita and market capitalization to GDP. With a probability greater than 0.5 the model assigns 15 countries to EIT, 16 to FFTT and 28 countries to the low credibility regime – IITL. The total number of countries corresponds closely to the number of available actual observations on these factors. The goodness of fit presented by the money aggregate also shows good predictive power for the existing data. As it was previously noted, there are 14 countries classified as EIT, 19 as FFTT and 29 as IITL.

The variance-covariance matrix indicates very low correlation among GDP per capita and market capitalization to GDP. This result is pleasing and indicates that those factors separately explain the credibility level that is entrenched in the regime. We note that the broad money to GDP ratio does not exhibit significant correlation with the GDP per capita, though it is highly correlated with other factors in the model.

According to Long and Freeze (1997), count R^2 and adjusted count R^2 respectively are the most appropriate measures of fit for the ordered outcomes. The first final regression shows that the regime choices explain around 75% of variation according to count R^2 and 52% if the adjusted count R^2 is considered (77% and 42% respectively for the second regression).

The model with GDP per capita and market capitalization to GDP is nested in the full regression model. The better goodness-of-fit of the explanatory variables

of the final regression is supported by the two information criteria, namely AIC and BIC. These values are lower for the final regression, and that is a positive result (See Appendix C). We can also state that these criteria can also be used for the comparison of non-nested models with the same dependent variable. Hence, the final regression with GDP per capita and broad money to GDP as the explanatory variables is also found to be better fit for the regime choice than the full regression model.

To sum up, the structural rigidities that are presented by GDP per capita (Walsh (2002)) together with the developed system of financial markets and utilized financial depth are the main variables which explain the level of credibility that is entrenched in the 3 regimes: EIT, FFIT and ITL.

As we mentioned before, the Ukraine has a low level of reliance on the monetary authority and unclear inflation coordination, so is classified as a country with an ITL regime. With such parameters the country can consider switching only to the FFIT regime, and cannot switch directly to the EIT regime. Hence, in order to obtain deeper insight into the factors important for emerging economies, the EIT regime is dropped (as it consists of data solely from the industrial countries) and the countries in the FFIT are split into the industrial (FFITIM) and the emerging economies (FFITEM). An independent analysis is then conducted using the binary regression model based upon the reasonable assumption that the level of credibility is higher in the FFITEM countries than in the ITL economies. Hence, there are 12 FFITEM countries which are assigned a value of 1 for the dependent variable (regime) and 29 ITL countries that given a value of 0 for the level of credibility of the regime. It should perhaps be stated that the numbers by themselves do not make any difference, only their ordering matters.

The full regression includes all the variables under consideration. Again, the coefficients obtained all have the expected signs, however they are mainly insignificant. The final regression represents 2 significant explanatory factors: GDP per capita, market capitalization to GDP and restrictions on central bank financing to the government. Budget balance, as a proxy for a strong fiscal position, is expected to appear in the final regression output (Carare and Stone (2003)). That is, it is assumed that the fiscal dominance should be suppressed in the FFIT countries and thus any decrease in the budget balance should be related to greater credibility. However, this expectation isn't supported by the empirical estimation with the customary adequate level of significance.

	Initial regression	Final regression
GDP per capita	0.0002459 (.0002432)	
Heritage Index	-0.6167241 (.7348178)	
Market Capitalization to GDP	0.0832717 (.0678652)	0.0696333 (.0367812)*
Real Interest Rate	-0.0569451 (.0722983)	
Budget Balance to GDP	-0.3642788 (.2803246)	
Restrictions on Central Bank Financing	-1.612524 (1.167694)	-1.50728 (.0.7660701)**
Current account balance to GDP	-0.1273866 (0.1555224)	
Count R ²	0.875	0.786
*** - significant at 1% level, ** - significant at 5% level, * - significant at 10% level		

Following a deeper look at the final explanatory variables, it can be stated that the development of the financial system is also very important for the emerging economies as it is for all countries in the 3 regimes. What emerges as an

interesting empirical result is the negative influence that restrictions from the central bank play, in terms of government financing. Hence, for the emerging economies in the ITL regime to reach higher levels of credibility with respect to the monetary authorities, strict limitations should be imposed on the way the government seeks financing of its debt. This result is not surprising, but its significance stresses its importance.

The final regression presents a better fit than the full model for explaining the dependent variable. This result is unambiguously confirmed by the AIC and BIC information criteria (See Appendix D).

CONCLUSION AND IMPLICATIONS

Due to the small number of years of existence of inflations targeting framework, there is no theoretical model developed for the initial conditions that support the successful implementation of this type of monetary policy. Therefore, the presented analysis is empirical investigation of the significant macroeconomic and financial variables that allow the country to reach higher levels of credibility and in this way to successfully implement an IT framework.

From the empirical estimations it is observed that the level of credibility for countries in different inflation targeting regimes depends significantly on the development of the financial market. The use of financial depth should also be considered. In addition, structural rigidities in terms of GDP per capita help to explain much of the difference between low and high credibility countries.

The level of financial development, together with restrictions on the central bank financing of the government debt, increases the credibility of the monetary authorities and thus helps to successfully implement an inflation targeting framework in practice. This result was found significant for emerging economies. Hence, it is of great concern for the Ukraine.

The inflation targeting countries before implementing this policy framework on average decreased inflation by 5.3% (Corbo, et al.(2002)). Even though our proxy for the inflation is found insignificant, the reality of having adequately low levels of inflation before setting the FFTT regime is desirable.

The Ukraine can consider jumping only from the IIL to the FFTT regime as it does not possess the requirements of the ETL economies. Jumping from the IIL to the FFTT should be supported by significant reforms in the financial market, together with limitations on government debt financing.

The Ukrainian monetary authorities arrange the discussions on the future prospects of the economy. They realize that there is no strategic planning and forecasting implemented for the Ukrainian economy, but rather reaction to the current state of the world (Patrykats and Kompanijets). Following the more advanced transition economies (e. g. Poland, Hungary), the Ukraine is considering the possibility to implement inflation targeting framework. Hence, the selected initial conditions for the IT successful implementation, namely financial market development and restrictions on central bank financing to the government, are to be properly coordinated.

Further research for the Ukraine can lie in identifying the exact transmission mechanism that best serves the Ukrainian monetary policy.

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APPENDIX A

Inflation targeting countries

	Country	Date of adoption of inflation targeting framework
1	Australia	June 1993
2	Brazil	June 1999
3	Canada	Feb. 1991
4	Chile	Sept. 1999 (early: Sept. 1990)
5	Colombia	Oct. 1999
6	Czech Republic	Dec. 1997
7	Hungary	June 2001
8	Iceland	March 2001
9	Israel	June 1997 (early: Dec. 1991)
10	Korea	April 1998
11	Mexico	Jan 2001 (early: Jan 1995)
12	New Zealand	Dec. 1989
13	Norway	March 2001
14	Peru	Jan. 2002
15	Philippines	Jan. 2002
16	Poland	Sep 1998
17	South Africa	Feb. 2000
18	Sweden	Jan. 1993
19	Thailand	May 2000
20	United Kingdom	Oct. 1992

Source: Schmidt-Hebbel and Tapia (2003)

APPENDIX B

Country classification to ITL and EIT regimes

(by Carare and Stone (2003) and Truman (2003))

FFIT regime countries (in bold – emerging economies):

Number	Country
1	Australia
2	Brazil
3	Canada
4	Chile
5	Colombia
6	Czech Rep
7	Hungary
8	Iceland
9	Israel
10	Mexico
11	New Zealand
12	Norway
13	Peru
14	Phillipines
15	Poland
16	South Africa
17	Sweden
18	Thailand
19	United Kingdom

Source: Corbo et al. (2002)

Korea wasn't considered due to the lack of any data in the IFS and WDI statistic sources

If the country has no clear commitment to the inflation target but follows some inflation indicators, and at the same time doesn't state the exchange rate as the nominal policy anchor, the level of credibility is assessed (average of inflation and debt rating).

The following table presents a country's long term government debt rating and correspondingly assigns rates (the highest AAA – rate 1, the lowest NR (no records kept) – rate 20). Another part of the table presents the average inflation rate for the years 1999-2002.

Long-Term Government Debt Rating, 2002			Inflation, 1999-2002	Average Rank
Country	Rating	Rank	Average	
1	2	3	4	$((1)+(3))/2$
Singapore	AAA	1	0.46	0.73
Switzerland	AAA	1	0.98	0.99
France	AAA	1	1.44	1.22
Germany	AAA	1	1.58	1.29

Austria	AAA	1	1.85	1.42
Luxembourg	AAA	1	2.22	1.61
United States	AAA	1	2.49	1.75
Spain	AAA	1	3.10	2.05
Netherlands	AAA	1	3.19	2.10
Japan	AA-	5	-0.66	2.17
Belgium	AA+	4	1.95	2.97
Finland	AA+	4	2.16	3.08
Italy	AA	4	2.36	3.18
Ireland	AA+	4	4.19	4.09
Azerbaijan	BB	11	-0.67	5.17
Croatia	BBB-	7	3.87	5.43
India	BBB	7	4.19	5.59
Tunisia	B	9	2.58	5.79
Pakistan	B+	9	3.74	6.37
Slovenia	A	6	7.74	6.87
Slovak Republic	BBB	7	8.31	7.66
Jamaica	B+	9	7.05	8.02
Guatemala	BB	11	6.63	8.81
Dominican Republic	BB-	13	7.69	10.35
Armenia	NR	20	1.02	10.51
Paraguay	BB-	13	8.38	10.69
Kazakhstan	BB	11	11.09	11.05
Algeria	NR	20	2.16	11.08
Albania	NR	20	2.83	11.41
Mauritania	NR	20	3.96	11.98
Mauritius	NR	20	5.80	12.90
Uruguay	CCC	19	7.19	13.09
Georgia	B-	18	8.37	13.18
Sri Lanka	NR	20	8.68	14.34
Honduras	NR	20	10.02	15.01
Indonesia	CCC+	19	12.08	15.54
Ukraine	B	18	13.50	15.75
Venezuela	CCC+	19	18.69	18.84
Moldova	CC	19	23.03	21.02
Romania	B+	9	37.12	23.06
Russia	BB	11	35.93	23.46
Uzbekistan	NR	20	45.55	32.77
Turkey	B-	18	54.79	36.39

Source: WDI database, IFS, www.standardandpoors.com, author's own calculations

The credibility level is the average of the two ratings. Lower credibility countries are classified into the ITL (Inflation Targeting Lite) regime, while countries with high credibility – to the EIT (Eclectic Inflation Targeting).

APPENDIX C

The regression output for the ITL, EIT and FFIT regimes.

Full regression:

Regression output:

Ordered logit estimates		Number of obs	=	38
		LR chi2(7)	=	37.19
		Prob > chi2	=	0.0000
Log likelihood = -20.901606		Pseudo R2	=	0.4708

itr	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
gdppc	.0001574	.0000685	2.30	0.022	.0000232 .0002916
herin	-.806177	.5516675	-1.46	0.144	-1.887425 .2750714
mktcapgdp	.0182794	.0097143	1.88	0.060	-.0007602 .0373191
rintr	-.0013237	.0380903	-0.03	0.972	-.0759794 .073332
bdgbalgdp	-.162777	.1697342	-0.96	0.338	-.4954499 .1698958
rstrfin	-.4619748	.6132703	-0.75	0.451	-1.663963 .7400129
cabalgdp	.0047478	.0725838	0.07	0.948	-.137514 .1470095

_cut1	-.3921099	1.739403	(Ancillary parameters)		
_cut2	5.187362	2.469009			

Variance-covariance matrix:

	gdppc	herin	mktcap-p	rintr	bdgbal-p	rstrfin	cabalgdp
gdppc	1.0000						
herin	0.1521	1.0000					
mktcapgdp	0.0545	0.0396	1.0000				
rintr	0.0441	-0.1072	-0.0240	1.0000			
bdgbalgdp	-0.2003	0.1025	-0.3175	0.1146	1.0000		
rstrfin	0.0368	-0.0169	-0.1585	0.1133	-0.1924	1.0000	
cabalgdp	-0.0257	0.0154	-0.1175	0.1329	0.0011	-0.2458	1.0000
_cut1	0.4049	0.7171	0.2577	0.2023	-0.3287	0.3655	-0.1024
_cut2	0.8220	0.3793	0.3879	0.1307	-0.2695	0.2127	-0.0392

Statistics:

Measures of Fit for ologit of itr

Log-Lik Intercept Only:	-39.495	Log-Lik Full Model:	-20.902
D(29):	41.803	LR(7):	37.188
		Prob > LR:	0.000
McFadden's R2:	0.471	McFadden's Adj R2:	0.243
Maximum Likelihood R2:	0.624	Cragg & Uhler's R2:	0.713
McKelvey and Zavoina's R2:	0.785		
Variance of y*:	15.324	Variance of error:	3.290
Count R2:	0.763	Adj Count R2:	0.571
AIC:	1.574	AIC*n:	59.803
BIC:	-63.687	BIC':	-11.725

Parallel regression assumption check:

Approximate likelihood-ratio test of proportionality of odds

across response categories:

chi2(7) =	11.01
Prob > chi2 =	0.1382

The assumption of parallel regression cannot be rejected at 10% level of significance.

Final regression 1:

Regression output:

Ordered logit estimates	Number of obs =	59
	LR chi2(2) =	61.56
	Prob > chi2 =	0.0000
Log likelihood = -31.383101	Pseudo R2 =	0.4951

	itr	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
	gdppc	.0002065	.0000564	3.66	0.000	.000096 .0003171
	mktcapgdp	.0129779	.0073873	1.76	0.079	-.001501 .0274568
	_cut1	2.071135	.5061211			(Ancillary parameters)
	_cut2	6.715404	1.703828			

Variance-covariance matrix:

		gdppc	mktcap-p	_cut1	_cut2
	gdppc	1.0000			
	mktcapgdp	-0.0604	1.0000		
	_cut1	0.4554	0.4325	1.0000	
	_cut2	0.8695	0.3270	0.5795	1.0000

Statistics:

Measures of Fit for ologit of itr

Log-Lik Intercept Only:	-62.162	Log-Lik Full Model:	-31.383
D(55):	62.766	LR(2):	61.557
		Prob > LR:	0.000
McFadden's R2:	0.495	McFadden's Adj R2:	0.431
Maximum Likelihood R2:	0.648	Cragg & Uhler's R2:	0.737
McKelvey and Zavoina's R2:	0.805		
Variance of y*:	16.846	Variance of error:	3.290
Count R2:	0.746	Adj Count R2:	0.516
AIC:	1.199	AIC*n:	70.766
BIC:	-161.498	BIC':	-53.402

Parallel regression assumption check:

Approximate likelihood-ratio test of proportionality of odds
across response categories:

chi2(2) =	3.51
Prob > chi2 =	0.1728

The assumption of parallel regression cannot be rejected at 10% level of significance.

Final regression 2:

Regression output:

Ordered logit estimates	Number of obs =	49
	LR chi2(2) =	40.97
	Prob > chi2 =	0.0000
Log likelihood = -22.0133	Pseudo R2 =	0.4820

	itr	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
	gdppc	.0002294	.0000919	2.50	0.013	.0000494 .0004094

bdmngdp		.0355935	.0180316	1.97	0.048	.0002523	.0709347

_cut1		3.437762	.9849855	(Ancillary parameters)			
_cut2		10.19615	3.123676				

Variance-covariance matrix:

		gdppc	bdmngdp	_cut1	_cut2

gdppc		1.0000			
bdmngdp		-0.0295	1.0000		
_cut1		0.3182	0.8395	1.0000	
_cut2		0.8600	0.3895	0.6269	1.0000

Statistics:

Measures of Fit for ologit of itr

Log-Lik Intercept Only:	-42.497	Log-Lik Full Model:	-22.013
D(45):	44.027	LR(2):	40.968
		Prob > LR:	0.000
McFadden's R2:	0.482	McFadden's Adj R2:	0.388
Maximum Likelihood R2:	0.567	Cragg & Uhler's R2:	0.688
McKelvey and Zavoina's R2:	0.799		
Variance of y*:	16.398	Variance of error:	3.290
Count R2:	0.776	Adj Count R2:	0.421
AIC:	1.062	AIC*n:	52.027
BIC:	-131.105	BIC':	-33.184

Parallel regression assumption check:

Approximate likelihood-ratio test of proportionality of odds
across response categories:

chi2(2) = 2.60
Prob > chi2 = 0.2728

The assumption of parallel regression cannot be rejected at 10% level of significance.

APPENDIX D

The regression output for the ITL and FFITEM regimes

Full regression:

Regression output:

Logit estimates		Number of obs	=	24
		LR chi2(7)	=	14.73
		Prob > chi2	=	0.0396
Log likelihood = -8.933707		Pseudo R2	=	0.4519

em	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
gdppc	.0002459	.0002432	1.01	0.312	-.0002307	.0007226
herin	-.6167241	.7348178	-0.84	0.401	-2.056941	.8234924
mktcapgdp	.0832717	.0678652	1.23	0.220	-.0497417	.2162851
rintr	-.0569451	.0722983	-0.79	0.431	-.1986471	.084757
bdgbalgdp	-.3642788	.2803246	-1.30	0.194	-.913705	.1851473
rstrfin	-1.612524	1.167694	-1.38	0.167	-3.901161	.6761131
cabalgdp	-.1273866	.1555224	-0.82	0.413	-.4322049	.1774317
_cons	-1.353502	2.431785	-0.56	0.578	-6.119713	3.412709

Variance-covariance matrix:

	gdppc	herin	mktcap-p	rintr	bdgbal-p	rstrfin	cabalgdp
gdppc	1.0000						
herin	-0.1318	1.0000					
mktcapgdp	0.3842	-0.0686	1.0000				
rintr	-0.2288	0.0609	-0.5682	1.0000			
bdgbalgdp	-0.3962	0.2616	-0.1786	0.3568	1.0000		
rstrfin	-0.3328	0.0085	-0.6430	0.5299	0.1401	1.0000	
cabalgdp	0.0135	0.1383	-0.4572	0.4307	0.2040	0.1746	1.0000
_cons	-0.5121	-0.4987	-0.4496	0.0609	0.3274	0.0705	0.1691

Statistics:

Measures of Fit for logit of em

Log-Lik Intercept Only:	-16.301	Log-Lik Full Model:	-8.934
D(16):	17.867	LR(7):	14.734
		Prob > LR:	0.040
McFadden's R2:	0.452	McFadden's Adj R2:	-0.039
Maximum Likelihood R2:	0.459	Cragg & Uhler's R2:	0.618
McKelvey and Zavoina's R2:	0.821	Efron's R2:	0.486
Variance of y*:	18.425	Variance of error:	3.290
Count R2:	0.875	Adj Count R2:	0.700
AIC:	1.411	AIC*n:	33.867
BIC:	-32.981	BIC':	7.513

Final regression:

Regression output:

```
Logit estimates                                     Number of obs =      28
                                                    LR chi2(2)      =     13.29
                                                    Prob > chi2     =     0.0013
Log likelihood = -11.605956                       Pseudo R2      =     0.3640
```

```
-----+-----
          em |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-----+-----
    rstrfin |   -1.50728   .7660701   -1.97  0.049   -3.00875   -.00581
 mktcapgdp |    .0696333   .0367812    1.89  0.058   -.0024564   .1417231
      _cons |   -1.07767   .9806411   -1.10  0.272   -2.999691   .8443511
-----+-----
```

Variance-covariance matrix:

```
          | rstrfin mktcap-p   _cons
-----+-----
    rstrfin |   1.0000
 mktcapgdp |  -0.3795   1.0000
      _cons |  -0.2677  -0.6455   1.0000
```

Statistics:

Measures of Fit for logit of em

```
Log-Lik Intercept Only:      -18.249   Log-Lik Full Model:      -11.606
D(25):                       23.212   LR(2):                  13.286
                               Prob > LR:                0.001
McFadden's R2:               0.364   McFadden's Adj R2:      0.200
Maximum Likelihood R2:       0.378   Cragg & Uhler's R2:     0.519
McKelvey and Zavoina's R2:   0.668   Efron's R2:             0.387
Variance of y*:              9.897   Variance of error:      3.290
Count R2:                    0.786   Adj Count R2:           0.400
AIC:                          1.043   AIC*n:                  29.212
BIC:                          -60.093  BIC':                   -6.622
```