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Economic Inequality in the New European Union: Are Monetary Policies in the European Union Unfair for Certain Countries?

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ECONOMIC INEQUALITY IN THE NEW EUROPEAN UNION: ARE MONETARY POLICIES IN THE EUROPEAN UNION UNFAIR FOR CERTAIN COUNTRIES?

by

Gregory Eric Banach

A Dissertation
Submitted to the Graduate Studies Office
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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ABSTRACT

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This research is focused on the affect one uniform monetary policy will have on the less developed countries that entered the European Union (EU) in 2004. One of the challenges facing the new entrants involves the required implementation of monetary policy goals, even though these new entrants do not have a vote on how the monetary policy is determined. Monetary policy in the EU is the responsibility of the European Central Bank (ECB) who has a stated goal price stability. It is possible to use the Taylor Rule to test whether the ECB focuses on price stability for both old and new member countries. If the Taylor rule indicates that ECB monetary policy movements addressed price stability for old members but not new members then this might be used as evidence that the ECB is not achieving its stated goals. The research seeks to answer the following question. During the period of March 2004 through March 2007, did the Taylor Rule apply to old and new member countries in the Euro-Area? If the results of the study point to a substantial discrepancy in applicability of the Taylor Rule for the old members but not the new members then there might be evidence that the ECB is not acting in the best interests of the Euro-area community as whole.

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CHAPTER I

INTRODUCTION

On January 1, 1999, eleven countries in Europe converged to the Euro currency – Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain. Greece converged shortly after on January 1, 2001. In 2004, 10 new countries joined the European Union (EU). Seven of these new entrants - Cyprus, Estonia, Latvia, Lithuania, Malta, Slovakia and Slovenia - started taking the necessary steps to get on the Euro currency. The remaining 3 new entrants - Czech Republic, Hungary and Poland - are expected to follow eventually. Upon entry in 2004, the majority of these 7 new entrants were less developed than the 12 original members of the EU and faced many challenges as they became part of the European Monetary System. One of the challenges facing the new entrants involved the required implementation of monetary policies, even though these new entrants did not have a vote on how monetary policy was set.

During the period of March of 2004 through March of 2007, monetary policy for these 19 European countries was the responsibility of the European Central Bank (ECB) who had a stated goal of maintaining price stability for Euro-area countries. Monetary policy goals for the EU were specifically stated in the Treaty Establishing the European Community, Article 105 (1) which states that monetary policies will be set "without prejudice to the objective of price stability." The treaty also stated that the ECB will "support the general economic policies in the

Community with a view to contributing to the achievement of the objectives of the Community." However, with all voting power limited to the original 12 Euro-area members, it is possible that ECB monetary policies were not addressing price stability for all 25 Euro-area countries. Greenberg (2005) identified the potential challenge for the ECB when he stated that there was a "potential conflict between the Executive Board, which is supposed to take a comprehensive Euro-area view of policy objectives, and the governors, who are typically suspected of having more narrow national interests in mind" (Bruess, 2005 p. 78).

According to the official website for the ECB, the responsibility for formulating monetary policy for the Euro-area resides with the ECB Governing Council. This includes as appropriate, decisions relating to intermediate monetary objectives, key interest rates and the supply of reserves in the Eurosystem. The Governing Council is comprised of the governors of all National Central Banks for countries that have adopted the Euro and an Executive Board. During the period of March of 2004 through March of 2007 there were 12 countries who had adopted the Euro in addition to 6 members that made up the Executive Board, meaning a total 18 votes were cast when deciding monetary policy movements for the entire Euro-area. The Executive Board consisted of a President, a Vice-President and four other members, all chosen from among persons of recognized standing and professional experience in monetary or banking matters. It should be noted that all 6 members of the Executive Board were citizens of the 12 Euro-area countries. Of the 18 votes that were cast for monetary policy, France, Greece, Italy, Spain,

Germany, and Austria each had 2 votes; Finland, Portugal, Ireland, the Netherlands, Luxembourg, and Belgium each had 1 vote; and the new entrants had zero votes.

As stated earlier, the makeup of the ECB decision making body leaves open the possibility of setting monetary policies that are not focused on price stability for all countries in the Euro-area community. If it is true that individuals casting votes "have national interests in mind" (Bruess, 2005 p. 78), then the potential exists for the ECB to set policies that address inflation for certain individual countries and not the Euro-area community as a whole. This is in direct contrast with the intentions of the ECB who has a stated goal of setting monetary policy "without prejudice to the objective of price stability" which contributes to "the achievement of the objectives of the Community."

The present study will explore whether the ECB had proper focus on inflation for all countries in the Euro-area community. Using economic indicators for each country and the funds rate of the ECB, it is possible to use the Taylor Rule to test whether the ECB focuses on price stability for both old and new member countries. If the Taylor rule indicates that ECB monetary policy movements addressed price stability for old members but not new members then this might be used as evidence that the ECB is not achieving its stated goals. The research seeks to answer the following question. During the period of March 2004 through March 2007, did the Taylor Rule apply to old and new member countries in the

Euro-Area? If the results of the study point to a substantial discrepancy in applicability of the Taylor Rule for the old members but not the new members then there might be evidence that the ECB is not acting in the best interests of the Euro-area community as whole.

As stated on the ECB official website, The Treaty Establishing the European Community, Article 105 (1), reflects the broad consensus that:

- The benefits of price stability are substantial. Maintaining stable prices on a sustained basis is a crucial pre-condition for increasing economic welfare and the growth potential of an economy.
- The natural role of monetary policy in the economy is to maintain price stability.

As stated by the European Central Bank, price stability contributes to achieving high levels of economic activity and employment by:

1. Improving the transparency of the price mechanism. Under price stability people can recognize changes in relative prices (i.e. prices between different goods), without being confused by changes in the overall price level. This allows them to make well-informed consumption and investment decisions and to allocate resources more efficiently.
2. Reducing inflation risk premium in interest rates (i.e. compensation creditors ask for the risks associated with holding nominal assets). This reduces nominal interest rates and increases incentives to invest.

3. Avoiding unproductive activities to hedge against the negative impact of inflation or deflation.

4. Reducing distortions of inflation or deflation, which can exacerbate the impact on economic behavior of tax and social security systems.

5. Preventing an arbitrary redistribution of wealth and income as a result of unexpected inflation or deflation.

In summary, a proper monetary system will foster financial stability for a country. If monetary policies are biased toward certain countries in the EU, then countries without proper focus on price stability could possibly experience instability.

History of the ECB

The foundations of the ECB can be found in the Delors report of 1989 (Abu-Rashed et al, 1995). In June of 1988, the European Council mandated a committee, chaired by Jacques Delors, President of the European Commission at that time, to study and propose concrete stages leading to the Monetary Union. The committee was comprised of the governors of the national central banks in Europe, the general manager for the Bank for International Settlements, a member of the European Commission and a hand full of economic scholars. The European Central Bank was first conceived in the "Delors" report as part of the Maastricht Treaty. There were three phases to the creation and implementation of the ECB. The first phase began in July of 1990, and it set a 1994 deadline to remove capital controls within the countries of the European Union. Once the capital controls were removed, the second phase was established. At first, it

meant to create a unified monetary policy for all of the EU countries. Unfortunately, it was believed this quick transition would cause a great deal of confusion and bring about a deterioration of authority for the central banks currently in power. Instead, central banks within the EU attempted to coordinate monetary policies in Europe while they remained in full control of their respective national policies. At the same time, the European Monetary Institute (EMI) was developed in order to assist in the process of unification. The EMI would later become the ECB. Individual central banks gained a great deal of power at this point. They became politically independent institutions as the second phase proceeded forward. Phase three was the point at which monetary policy fell under full control of the ECB prior to the issue of a common currency. It was first hoped that a common currency could begin to be implemented by 1997, however, this date proved to be too aggressive and it did not allow enough time for monetary and fiscal convergence in all the European countries. Therefore, currency unification and the ECB were both officially launched in 1999 (information obtained from the official web site of the European Central Bank, www.ecb.int)

Structure and Role of the ECB

As stated earlier, the ECB is governed by a board of directors headed by a Governing Council and Executive Board. The Governing Council is comprised of the governors of all National Central Banks for countries that have adopted the Euro and an Executive Board. The Executive Board includes the President, a

Vice-President and four other members, all chosen from among persons of recognized standing and professional experience in monetary or banking matters.

The current members of the Executive Board are listed below:

- Jean-Claude Trinchet, President - France
- Lucas D. Papademos, Vice President – Greece
- Lorenzo Bini Smaghi – Italy
- Jose Manual Gonzalez-Paramo – Spain
- Jurgen Stark – Germany
- Gertrude Tumpel – Gugerell – Austria

Monetary Policy Theory

The theory of monetary policy has evolved significantly over the past 50 years. Monetary policy theory first became popular in literature with Milton Friedman's 1967 Presidential address to the American Economic Association titled "The Role of Monetary Policy" (Friedman 1967.) Friedman is one of the first influential economists known as a monetarist. His research was a contrast to Keynesian economics from the 1960s. Keynes advocated a laissez-faire approach which seeks little government intervention. Keynesian economics became synonymous with free market economics. In contrast, Friedman and the monetarists that followed believed that a government sponsored central bank could implement tools that help guide the price stability of an economy. One of these tools involves the raising or lowering of overnight interest rates to member banks. By implementing this monetary policy tool, a central bank can be 1) accommodative

if the interest rate set by the central bank was intended to spur economic growth 2) neutral if it was intended to keep growth flat 3) or tight if intended to reduce inflation. Monetary policy theory calls for a central bank to raise rates if inflation is higher than desired and lower rates if inflation is lower than desired.

The European Central Bank is the authority charged with implementing monetary policies for the European Union. They face many challenges as they try to integrate monetary policies in the European Union. The main challenge involves the implementation of monetary policies that meet the needs of 25 countries all with diverse economic conditions. Certain countries may need a tight monetary policy to meet their economic needs while at the same time another country may need an accommodative or loose monetary policy. With a single central bank exercising one rate movement, it becomes challenging to meet the needs of all European countries.

Formulating Monetary Policy Rules

The responsibility of formulating monetary policy for the Euro-area resides with the ECB Governing Council. The Governing Council meets twice a month and at its first meeting, as a rule, the Governing Council assesses the economic situation and the stance of the monetary policy. Decisions on the key interest rates are normally taken during this meeting. This includes as appropriate, decisions relating to intermediate monetary objectives, key interest rates and the supply of reserves in the Eurosystem. At its second meeting, the Governing Council

focuses mainly on issues related to other tasks and responsibilities of the ECB and the Eurosystem. The "Eurosystem" is the term used to refer to the ECB and the National Central Banks of the Member States which have adopted the Euro (also known as Euro-area). The Euro-area countries during the period of March of 2004 through March of 2007 are listed below along with the countries that were not on the Euro currency.

Euro-area Members

- Austria: Österreichische Nationalbank
- Belgium: Nationale Bank van België/Banque nationale de Belgique
- Finland: Bank of Finland
- France: Banque de France
- Germany: Deutsche Bundesbank
- Greece: Bank of Greece
- Ireland: Banc Ceannais na hÉireann / Central Bank of Ireland
- Italy: Banca d'Italia
- Luexembourg: Banque Centrale du Luxembourg
- Netherlands: De Nederlandsche Bank
- Portugal: Banco de Portugal
- Spain: Banco de Espana

Non-Euro-area

- Cyprus: Kentrike Trapeza tis Kyprou
- Czech Republic: Ceska Narodni Banka
- Denmark: Danmarks Nationalbank
- Estonia: Eest Pank
- Hungary: Magyar Nemzeti Bank
- Latvia: Latvijas Banka
- Lithuania: Lietuvos Bankas
- Malta: Central Bank of Malta
- Poland: Narodwy Bank Polski
- Slovakia: Narodna banka Slovenska
- Slovenia: Bank of Slovenia Banka Slovenije
- Sweden: Sverges Riksbank
- United Kingdom: Bank of England

The following map illustrates EU members and candidate countries.

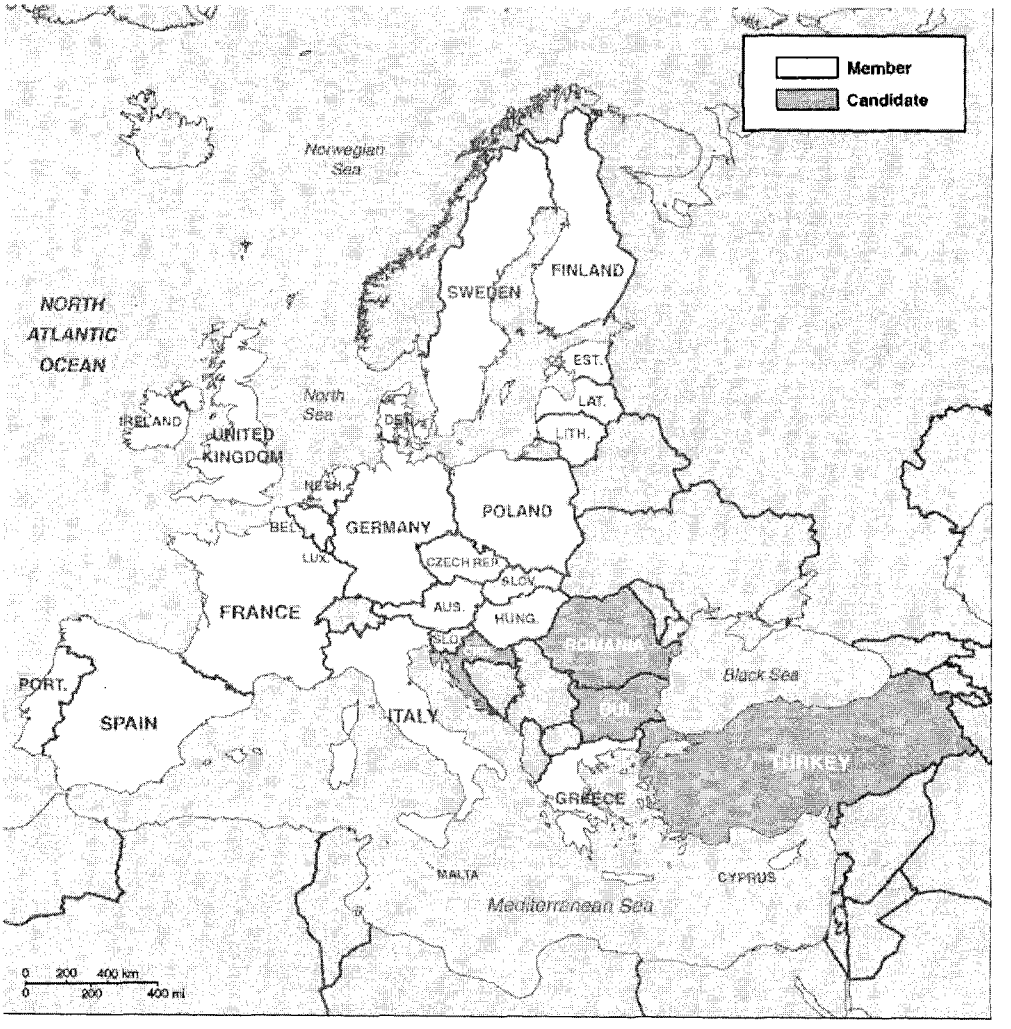

Figure 1. Map of Euro-Area Countries and Candidate Countries. Map from online *World Fact Book*, US Central Intelligence Agency (https://www.cia.gov).

The Euro-area Members are highlighted in blue.

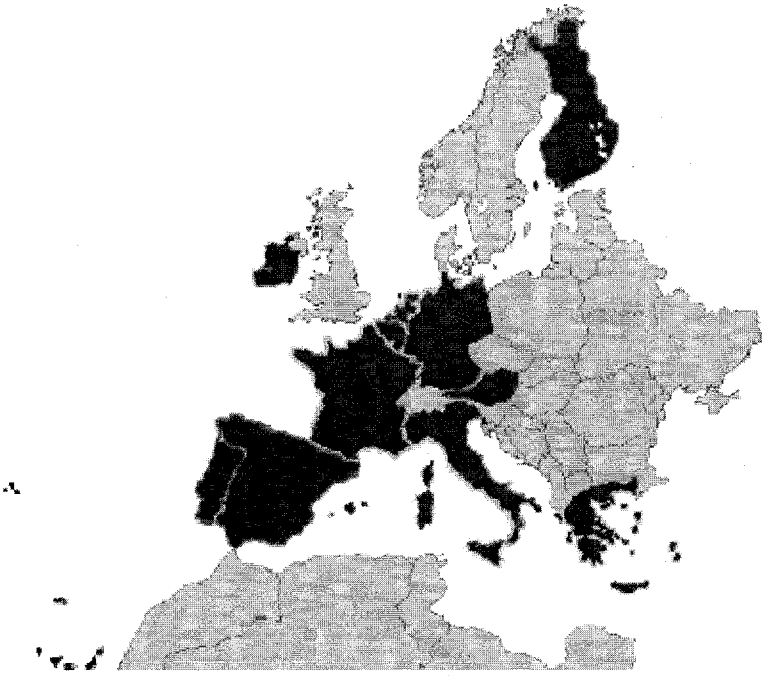

Figure 2. Map of Countries on the Euro Currency. Taken from the official website of the European Central Bank (www.ecb.int).

New Entrants and the Exchange Rate Mechanism

Before a new country can adopt the Euro, they have to go through the Exchange Rate Mechanism II (ERM II) as described by the ECB. Participation in ERM II for at least two years is required before adopting the Euro. Participation in the ERM II includes shadowing monetary policy movements of the ECB. Participation also means meeting financial and economic convergence criteria which includes pegging the national currency to the Euro. As of May 1, 2004, the ten NCBs of the new member countries became party to the ERM II Central Bank Agreement. The national currencies themselves will be part of the ERM II at

different dates as mutually agreed. The Estonian kroon, Lithuanian litas and Slovenian tolar were included in the ERM II on June 28, 2004. The Cypriot pound, the Latvian lats and the Maltese lira were included on May 2, 2005. The Slovak koruna was included on November 2005. The currencies of the three largest countries which joined the EU in 2004 (Polish zloty, Czech koruna and Hungarian forint) are expected to follow eventually. As part of the ERM II, not only are the new entrants not allowed to conduct their respective national monetary policies, they also do not take part in the decision-making with regard to the single monetary policy for the Euro-area and the implementation of such decisions.

All required financial and economic policies for the European Union are set forth in the *Treaty on European Union* which went into effect on November 1, 1993. This also marked the starting point of preparations for the Economic and Monetary Union (EMU).

Financial and economic convergence criteria are presented in Article 121(1) of the Treaty establishing the European Community Treaty (EC Treaty). According to the EC Treaty, each EU Member State is required to satisfy four convergence criteria in order to participate in the EMU. The four criteria are detailed below.

Price Stability

The Treaty stipulates: "The achievement of a high degree of price stability... will be apparent from a rate of inflation which is close to that of, at most, the three best-performing Member States in terms of price stability."

In practice, the inflation rate of a given Member State must not exceed by more than 1½ percentage points of the three best-performing Member States in terms of price stability during the year preceding the examination of the situation in that Member State.

Government Finances

The Treaty stipulates: "The sustainability of the government financial position... will be apparent from having achieved a government budgetary position without a deficit that is excessive."

In practice, the Commission, when drawing up its annual recommendation to the Council of Finance Ministers, examines compliance with budgetary discipline on the basis of the following two criteria:

- The annual government deficit: the ratio of the annual government deficit to gross domestic product (GDP) must not exceed 3% at the end of the preceding financial year. If this is not the case, the ratio must have declined substantially and continuously and reached a level close to 3%. This figure is interpreted in

trend terms according to Article 104(2) or, alternatively, must remain close to 3% while representing only an exceptional and temporary excess;

- Government debt: the ratio of gross government debt to GDP must not exceed 60% at the end of the preceding financial year. If this is not the case, the ratio must have sufficiently diminished and must be approaching the reference value at a satisfactory pace. This figure is interpreted in trend terms according to Article 104(2).

Exchange Rates

The Treaty stipulates: "the observance of the normal fluctuation margins provided for by the exchange-rate mechanism of the European Monetary System, for at least two years, without devaluing against the currency of any other Member State."

The Member State must have participated in the exchange-rate mechanism of the European monetary system without any break during the two years preceding the examination of the situation and without severe tensions.

In addition, it must not have devalued its currency (i.e. the bilateral central rate for its currency against any other Member State's currency) on its own initiative during the same period. After transition to stage three of EMU, the European Monetary System was replaced by the new exchange rate mechanism (ERM II).

Long Term Interest Rates

The Treaty stipulates: "the durability of convergence achieved by the Member State... being reflected in the long-term interest-rate levels."

Accordingly, the nominal long-term interest rate must not exceed by more than 2 percentage points of the three best-performing Member States in terms of price stability. The period taken into consideration is the year preceding the examination of the situation in the concerned Member State.

Once the new entrants meet all requirements of the ERM II including the aforementioned financial and economic convergence criteria, they will be eligible to be a full active member of the ECB which includes voting rights. Until that time, they are subject to monetary policies set by the current decision making body at the ECB. Does the ECB have proper focus on price stability for all countries in the Euro-area community? The current study explores the answer by testing the applicability of the Taylor Rule.

CHAPTER II

LITERATURE REVIEW

The advent of the Euro and the ever-evolving European Central Bank has spawned a great deal of literature on how to evaluate and anticipate monetary policy movements. Monetary policy tools have evolved significantly over the past 50 years. Initially, monetary policy consisted of increasing the money supply to coincide with increases in populations and economic activity. Now, there are many economic factors to consider including short term interest rates, long term interest rates, currency valuations, international inflows and outflows and credit quality. Generally, all monetary governing agencies actively modify the amount of national currency in circulation through the sale and purchase of US Treasury and federal agency securities. These active market transactions conducted by the monetary governing agencies change the supply of national currency and this impacts the interest rate environment. As a result of these derivative changes, central banks employ different types of monetary policies in an effort to maintain stable economic conditions. The goals and methods of central banks vary. Here are some of the key monetary policies discussed in economic literature:

- Price Level Targeting – managed by movements in the Fed Funds Rate with a long term goal of price stability as measured by inflation
- Inflation Targeting – managed by movements in the Fed Funds Rate with a short term goal of meeting a specific, quantifiable CPI number.

- Monetary Aggregates – managed by the growth in money supply with a long term goal of price stability.

A detailed review of these popular monetary policy tools is shown below.

Price Level Targeting

While no Central Bank claims to use price level targeting (Haldane 1995, and Leiderman and Svensson 1995), many of the top central banks claim that their goal is price stability. According to Svensson (1999), stability means that inflation is kept at low levels without rapid swings. In an effort to maintain this price stability, central banks will evaluate certain key economic variables and try to decipher how these variables contribute to the swing in price movements. Estimating the economic variables and respective price movements becomes an important element when implementing price level targeting. In order to estimate movements in key economic indicators that affect price levels, certain instrument rules are often used by economic scholars. There are several "instrument rules" discussed in current literature. One of the most prevalent instrument rules in economic literature is known as the Taylor rule.

The Taylor Rule

The Taylor Rule is an algebraic equation created by John Taylor, an economic scholar from Stanford University. Taylor developed the rule to provide guidance on how a central bank should set short-term interest rates when the economic

conditions change. Specifically, the rule gives guidance on how to keep the economy stable in the short term and keep inflation at acceptable levels for the long term (Taylor, 1993). The rule sets parameters for interest rates (adjusted for real inflation) based on three factors: (1) the variance between the actual inflation rate and the target rate of the Fed (2) the variance between current employment and full employment, and (3) the level at which short term interest rates are consistent with full employment. The rule indicates a tighter monetary policy (raising rates) when inflation is higher that it's optimal rate or when the economy is above its full employment level; and an easing policy (lowering rates) when inflation is lower than the optimal rate or the economy is below the full employment level.

Although the United States Federal Reserve does not claim to use the Taylor rule, research shows that the rule does an accurate job of describing how monetary policy actually has been conducted by the United States Federal Reserve. This fact has been cited by many economic scholars and central bank practitioners (Clarida, Gali and Gertler, 1997; Judd and Rudebusch, 1998). Gerlach and Schnabel demonstrate that average interest rates in the European Monetary Union moved very closely with average output gaps and inflation as suggested by the Taylor Rule during the period of 1990-1998 (Gerlach and Schnabel 1999).

Taylor's original rule is an equation defined as follows (Taylor, 1993, P 202):

$$r = p + .5\,y + .5\,(p-2) + 2 \qquad (1)$$

Where

r is the federal funds rate

p is the rate of inflation over the previous four quarters

y is the percent deviation of real GDP from a target

The Taylor rule also has taken the following form in literature:

$$i_t = \pi_t + r_t + .5(\pi_t - \pi_t^*) + .5\,(y_t) \qquad (2)$$

Where i_t is the targeted policy interest rate, π_t is the rate of inflation, r_t is the real rate of interest, π_t^* is the desired rate of inflation, and y_t is the output gap.

Since the initial presentation of the Taylor Rule in 1993, a number of modified versions have been presented in economic literature. Taylor's original rule is considered backward looking meaning that it calls for monetary policy movements to be based on past changes in inflation and output gap. In contrast, many studies show that central banks also respond to *expected* inflation and output. This has spawned forward looking versions of the Taylor rule.

In addition to being a backward looking model, the original Taylor rule also suggests that central banks make immediate adjustments to targeted interest rate levels. Several studies have shown that central banks actually take a more gradual approach to raising interest rates by making a series of interest rate adjustments in

small increments. To account for discrepancies in the original Taylor rule, several studies make minor variations to the original rule. These variations to Taylor's original rule have become known as Taylor type rules. A Taylor type rules often keeps the basic framework of Taylor's original work however, they display an alternative assumption. Kozicki (1999) categorized some of these alternative assumptions as follows:

- Interest rate smoothing
- Timing
- Measurement

Interest Rate Smoothing

Several Taylor type rules have been presented in literature that allow for interest rate smoothing. Interest rate smoothing refers to the central bank's common practice of setting a smooth path of interest rates over time, changing gradually and not reversing the trend in a quick fashion. Many economists suggest that the United States Federal Reserve uses smoothing when conducting interest rate adjustments (Clarida, Gali and Gertler, 1997; Mehra, 2001; and Woodford, 2001). In order to account for interest rate smoothing, versions of the Taylor rule have been presented in literature. For example, Kozicki (1999) discussed the following Taylor type rule estimation without smoothing:

funds rate (t) = ρ x (*funds rate (t-1)*) + (1 –ρ) x (*unsmoothed target (t)*)

unsmoothed target (t=) *constant* + (1+α) x *inflation* (t-1) + β x

(*output gap (t-1)*) (3)

Where ρ represents the degree of smoothness in monetary policy, α represents the weight in the output gap adjustment factor, and β is the weight given to the output gap adjustment factor. The inflation target and equilibrium real interest rate are incorporated in *constant*.

With this equation, as the smoothness factors increase from 1 to 0, a more gradual series of Fed fund movements is recommended (Kozicki, 1999).

Timing

Taylor's original rule called for current levels of inflation and output gap, however, real time data for inflation and the output gap are not readily available. These statistics are often reported with a monthly or quarterly lag. To account for this lag, Stuart (1996) presented a Taylor type rule where quarterly inflation and output gap data are included with a quarterly lag. Stuart's specification is shown below:

$$I = p_{t-1} + w1\,((Y\_Y^*)/Y^*)_{t-1} + w2(p-p^*)_{t-1} + r^* \qquad (4)$$

Were p is the annual rate of inflation as reported by the RPIX index instead of the GDP deflator (RPIX mirrors the Retail Price Index excluding mortgage interest payments), p* is targeted inflation, r* is the equilibrium real rate of interest and $(Y\_Y^*)/Y^*$ is the output gap, $w1$ represents the weight given to the deviation of

output from its trend, $w2$ represents the weight given to the deviation of output from its target.

With this specification, inflation and the output gap are accounted for with a quarterly lag. Adding a lag term to account for delayed data reporting has become common practice when using the Taylor rule.

Measurements

One of the hotly debated issues in literature regarding the Taylor rule is the proper measurement of inflation and the real interest rate. Judd and Rudebusch state that "there is much uncertainty in choosing values for r^* and π_t^*" (Judd and Rudebusch, 1998, p.8).

The measurement of inflation varies between central banking systems. The original Taylor rule used the percent change in the GDP price deflator. The GDP price deflator is an economic metric that accounts for inflation by converting output measured at the current price level into a constant GDP dollar level. The GDP deflator shows how much of the change in the base year's GDP is attributed to changes in the price level. It is still common practice in economic literature to use the GDP deflator when analyzing the United States Federal Reserve monetary policy movements. In contrast, when analyzing monetary policy conducted by the ECB, many economic scholars use the Harmonized Index of Consumer Prices (Sauer and Sturm 2003, Ullrich 2003). The Harmonized Index of Consumer

Prices, or HICPs, is a set of EU Consumer Price Indices calculated with a single set of definitions. The Harmonized methodology is coordinated and led by Eurostat and reported on a monthly basis. The current study will be focused on monetary policy in the EU and will use the HICP as the measure of inflation.

Not only are there variations in economic literature when measuring inflation, there are also variations in measuring the real rate of interest . The real interest rate is the effective interest rate minus the rate of inflation. In general terms, the real interest rate is often the rate of return on a risk free investment minus an index for inflation such as the CPI, GDP deflator or HICP. In the Euro-area, the long term average for German short term real rates is often used for the Taylor formula since the ECB has been constructed after the model of the Bundesbank (Bofinger, 2002). The 40 year average as reported by the Bundesbank is 2.8% (Bofinger, 2002). However, the near term average since 1999 is closer to 1.6%. Taylor's original rule used a 2% rate (Taylor, 1993) and Sauer and Sturm (2003) argue that the original 2% rate as used by Taylor should do reasonably well for the Euro-area. In contrast to Sauer and Sturm, this study will be doing a comparative analysis for several different countries in the EU. As a result, a short term interest rate as suggested by Bofinger will be most appropriate. Specifically, this study will use the short term overnight rate specific to each country as report by each country's national bank.

Arguments Against the Taylor Rule

The Taylor rule is often referred to as an "instrument rule" (Svennson, 2002) where numbers are simply plugged into a formula. Svennson (2002) argues that using an instrument rule leaves a void for judgment when trying to define optimal target interest rate. If an instrument like the Taylor Rule is used to solve for an optimal interest rate, then there is no ability to make necessary judgmental adjustments for the extra-model information. Svennson (2002) gave possible examples of "extra-model" information, which include stock market crashes, an "Asian Crisis" or the floating of the Brazilian Real. McCallum (2000) made a similar argument when he stated that no actual central bank would ever be literally bound by any simple formula. If this were true McCallum (2000) stated that policy decision could be turned over to clerk with a calculator.

Svennson successfully argued that a simple instrument rule provides method challenges especially due to extra model information. As a result, the current study will take into account any "extra model" events that may have occurred in the host economies. If an isolated event occurred in an economy, then an adjustment will be made to offset the affect the event had on the results of the current study.

Inflation Targeting

During the 1990s, monetary authorities in many countries placed increasing importance on price stability. However, some central banks found that traditional

monetary policies were not very successful. To address this problem, several industrialized countries adopted monetary policies that targeted inflation directly. Inflation targeting was first introduced in New Zealand in 1990. It spread to Canada in 1991, the United Kingdom in 1992 and Sweden, Finland and Australia in 1993. Brazil was the first developing country to use inflation targeting and the Czech Republic was the first transitional economy to incorporate it. Recent additions include Iceland, Switzerland and Norway (Svennson, 2002).

These central bank regimes are said to be more credible because they publicly state a specific interest rate (target rate) for a specific time period (Croce and Kahn, 2000). Implementation of inflation targeting begins with setting a specific price inflation goal. The consumer price index (CPI) is one of the most common measures for inflation targeting. However, sometimes the central bank excludes certain components of the CPI index that may skew the numbers. A popular example is housing costs. While the CPI index should go down when the central bank executes a tightening policy, the housing numbers actually go up due to a rise in mortgage interest rates. As a result, many of the countries engaged in targeting inflation use the CPI minus mortgage payments or a cost of housing component. Similarly, other countries like Canada and New Zealand disregard commodity prices when calculating the targeted price index on the grounds that increases or decreases in the price of commodities (like oil) cannot be controlled by monetary policies of the central bank.

Once a price index is chosen, a target rate is set to fluctuate in a range and a timetable for achieving the goal is announced. The specified target rate provides a center point for central banks, and it also sets expectations for the private market. Whether or not they hit the target is the measure of central bank effectiveness (Huh, 1997).

Mishkin (2004) makes the argument that inflation targeting decreases uncertainty about future monetary policies, which ultimately decreases market volatility. He also claims that the transparent nature of inflation targeting (through pre-announced, well defined inflation targets) is more consistent with democratic principles and he argues that the United States Federal Reserve should adopt this policy.

Croce and Kahn (2000) argue that the inflation performance of countries using inflation targeting has shown success. They state that the focus on price stability has resulted in a large convergence of inflation rates among countries that have implemented interest rate targeting rules. However, they do point out that it is unclear whether inflation targeting will continue to ensure a low inflation trend, as inflation targeting needs to show its relevance in a full business cycle.

Inflation targeting has gained recent praise in literature as an effective way of measuring central bank efficiency. It is very simple - if the central bank met the target then their policies were efficient; if they did not meet the target then the policies were not efficient. The downside for this method is that it can only be tested by countries that have officially engaged in inflation targeting. The only

European countries using inflation targeting are the UK, Sweden and the Czech Republic (Svensson, 2002). Since very few EU countries are using inflation targeting it is not possible for me to use this method to test central bank efficiency.

Monetary Aggregates

Monetary aggregates, also known as the money supply, represent the quantity of currency in consumer bank accounts available to purchase goods, services and securities. Central banks are able to control this by buying or selling government obligations. The ECB and United States Federal Reserve both have a primary goal of price stability. Galina and Jorda (2007) state that the ECB and the Fed agree on most monetary policy tools to achieve price stability with the exception of one notable difference. The ECB put some emphasis on money supply as a means to achieve price stability. In contrast, the United States Federal Reserve does not put an emphasis on monetary aggregates.

To take a closer look at this difference, the ECB held a conference in 2006 entitled "The Role of Money: Money and Monetary Policy in the Twenty First Century." At this conference Fischer, Lenza, Pill, and Reichlin, (2006) claimed that inflation forecasts can be improved if the forecasts included analysis of the money supply. Gali (2006) argued the paper submitted by Fischer, Lenza, Pill and Reichlin (2006), claiming that their results were not consistent with recent research in the United States on the same subject matter. Woodford (2006) also argued the findings of Fishcer, Lenza, Pill and Reichlin (2006) by claiming that

the goals of monetary policy could be reached without focusing on monetary aggregates. Further validation for the argument against monetary aggregates came when the OECD issued their 2007 Economic Survey of the Euro Area. As pointed out by Galina and Jorda (2007), the OECD report stated that the predictive power of monetary aggregates diminished significantly since the year 2000.

In addition to monetary policies, current literature also discusses ways to test whether a central bank displays biased tendencies (Havrilesky 1993) or whether they are efficient (McKinley and Banaian, 2003).

The Havrilesky Approach – Testing Biased Pressure in Monetary Policy

According to Maier, Sturm and Haan (2002), testing biased pressure in monetary policy "encounters a number of methodological problems." They argue that biased pressure on a central bank may arise from politicians and special interest groups. To test the possible biased nature of a central bank, they adopted the approach developed by Havrilesky (1993).

Havrilesky assumes that conflicts between the government and central banks get reported in the newspaper. Therefore, Havrilesky counted the number of articles in the Wall Street Journal where government officials called for changes in monetary policy. Specifically, Havrilesky developed the SAFER index, which is an indicator for political pressure on the Federal Reserve based on the number of newspaper articles reporting a politician's preference of either a "tight" monetary

policy or an "easing" monetary policy. The articles in the Wall Street Journal that called for a tighter policy received a +1, and the articles that demanded an easing policy received a -1. The sum of the plusses and minuses created the SAFER index. Havrilesky (1993) argued that regression analysis on Federal Funds rates shows that the SAFER index is highly relative. Froyen, Havrilesky and Waud (1997) additionally argue that if economic control variables are included in the model for the interest rate, the SAFER index remains significant. Maier, Sturm and Haan (2002) applied this method to the central bank in Germany, however they expanded the extent of the press coverage. They chose three newspapers in Germany to conduct their study and they also took into account reports from different special interest groups.

Maier, Sturm and Haan (2002) point out some potential problems with the Havrilesky approach. First, a central bank conflict will potentially get more newspaper coverage during times of slow news than during a time when there is a large amount of alternative news to report. Secondly, the safer index makes the assumption that two articles correspond to double the amount of central bank pressure than one article which may not be correct.

One final problem for using the Havrilesky approach in the current study involves the lack of a national newspaper for the European Union. There is no comparable newspaper like the Wall Street Journal used in Havilesky's research or the 3 German newspapers used by Maier, Sturm and Haan. As a result of the

aforementioned challenges with this research, and most importantly, the lack of a reliable and respected European Union regional newspaper, it will not be feasible to use the Havrilesky approach in the current research.

McKinley and Banaian's Measurement of Central Bank Efficiency

McKinley and Banaian's method for evaluating a central bank involved "central bank efficiency" (McKinley and Banaian, 2003). They state that an activity generating a given output is "efficient" if there is no alternative method of generating the optimal output with less input. However, there is a challenge in developing a definition of central bank operating efficiency and therefore some general conclusions regarding inputs and outputs were defined. McKinely and Banaian generally conclude that the required outputs for a central bank are monetary policy, foreign exchange management and bank supervision. A central bank's inputs are labor and capital used to obtain the objective. Applying these conclusions, Mckinley and Banaian's (2003) definition of central bank operational efficiency is as follows:

"The measure of how central banks use resources or inputs (labor and capital) to implement their various granted functions in pursuit of their objective or output, as compared to peer central banks" (McKinley and Banaian 2003, p 48.) Based on this definition, there is a large amount of internal documentation on labor and capital that must be gathered in order to measure central bank operating efficiency. This information is available for a central bank to conduct an internal analysis of their own operating efficiency. However, until all this information is

made public for every subject country in the EU, the current study will not be able to employ this method.

While several methods have been mentioned as part of this literature review, the Taylor rule dominates the literature. It is often cited by many of the top scholars and economists around the world. As a result of rule's general academic acceptance, the current study's methodology will rely heavily on the Taylor rule.

CHAPTER III

THEORY AND METHODS

The chosen method for this research involves a comparison of interest rate movements using the Taylor Rule. Taylor's theoretical rule was originally presented at the 1993 Carnegie-Rochester Conference Series on Public Policy. This Conference on public policy, dating back to the early 1970's, was organized to stimulate policy relevance and empirical research in economics. At the 1993 conference, John Taylor suggested that good policy rules typically call for changes in the federal funds rate in response to changes in the level of prices or changes in real income. Specifically, the rule presented by Taylor calls for the Federal Reserve to raise the federal funds rate if inflation increases above a target of 2% or if real GDP rises above the GDP trend. Despite presenting an algebraic equation, Taylor points out that a policy rule does not need to be a mechanical formula. As he states, a policy rule can be implemented and operated more informally by policy makers who recognize the general instrument reactions that underlie the policy rule and also recognize that using such a rule requires judgment. In Taylor's multi-country model, he simulated economic performance under several different monetary policy rules for Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. Every country's economic performance was examined under different policy rules. The policy rules were then ranked according to how successful they were in achieving price stability and output stability. After conducting all the tests for the different policy rules for each country, Taylor drew the general conclusion that placing some weight on

real output works better than a simple price rule. One policy rule that carried the spirit of the research was an equation which later became known as the Taylor Rule. As shown earlier, here the original rule as presented by Taylor (Taylor, 1993, P 202).

$$r = p + .5\ y + .5\ (p-2) + 2 \qquad (1)$$

Where

r is the federal funds rate

p is the rate of inflation over the previous four quarters

y is the percent deviation of real GDP from a target

Once again, the Taylor rule often takes the following form in literature:

$$i_t = \pi_t + r_t + .5(\pi_t - \pi_t^*) + .5\ (y_t) \qquad (2)$$

Where i_t is the targeted policy interest rate, π_t is the rate of inflation, r_t is the assumed real rate of interest, π_t^* is the desired rate of inflation, and y_t is the output gap.

Taylor assumed that the weights the Fed gave to inflation and output had an equal 50% weighting. Therefore, if either inflation or the output gap were above their target, a proportionate adjustment would be made to the federal funds rate.

In order to show the relationship between the actual Federal Reserve policy movements and rates suggested by the rule, Taylor created a plotted graph. The

graph shown below displays time on the x-axis and interest rates on the y-axis. Taylor plotted both the fed funds rates and the rates suggested by Taylor. This graph shows a noticeable resemblance between the Taylor Rule and actual fed fund movements.

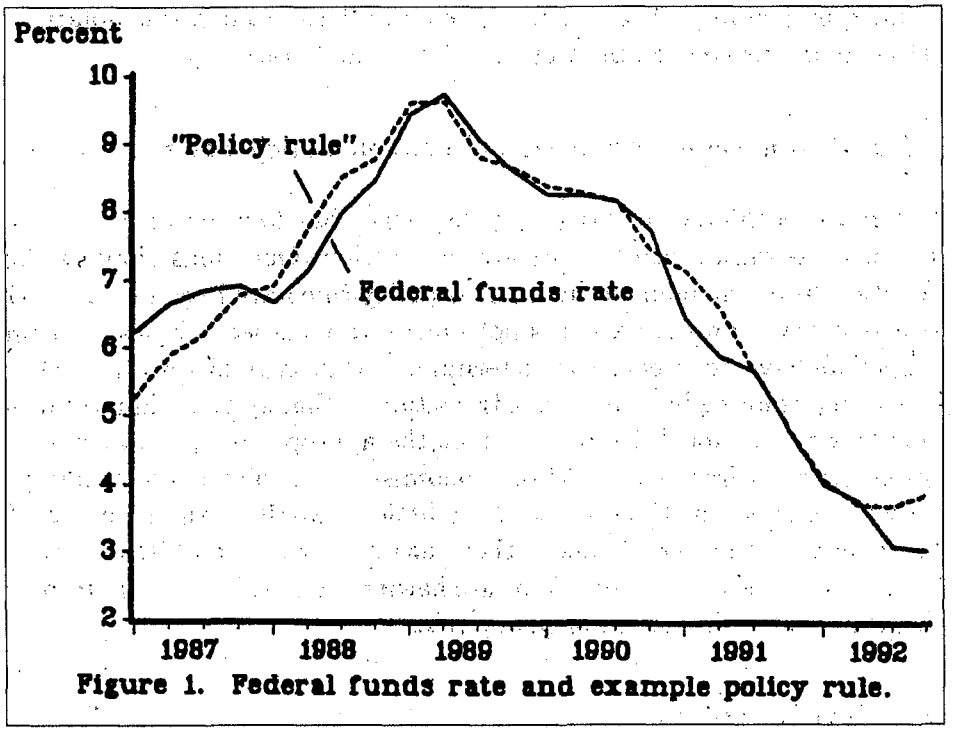

Figure 3. Taylor's Original Policy Rule versus the Fed Funds Rate from John Taylor. *Carnegie-Rochester Conference Series on Public Policy*, Taylor, 1993 p 204.

Taylor's theoretical rule has been tested by many academic scholars and economic practitioners. Yellen (1995) validated the Taylor rule by stating "a reaction function in which the real funds rate changes by roughly equal amounts in response to deviations of inflation from a target of 2 percent and to deviations

of actual from potential output describes reasonably well what this committee has done since 1986... If we wanted a rule I think the Fed (Greenspan) has done very well following such a rule, and I think that is what sensible central banks do." Additional validation came from research conducted by Judd and Rudebusch (1998) when they estimated a model of the United States Federal Reserve's "reaction function" defined as the relationship between economic activity and the US Federal Reserve's response to them. Judd and Rudebusch (1998) focused on how the reaction function estimate changed from period to period, however, their results also show similarities between the Taylor Rule and actual Fed fund movements. In their study, they considered three sub samples categorized by the terms of the residing Fed Chairmen. Specifically they considered the terms of Arthur Burns from 1970-1978, Paul Volcker from 1979-1987 and Alan Greenspan from 1987-1998. The graph from their study is displayed below.

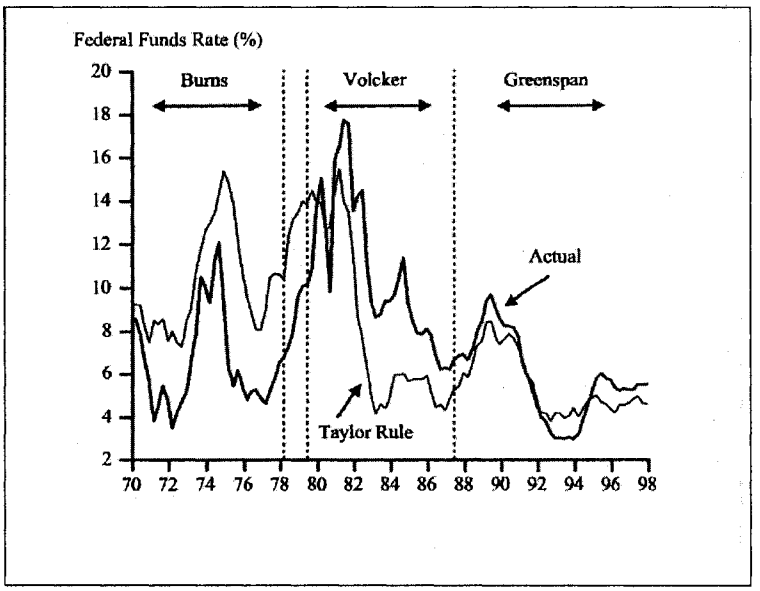

Figure 4. Judd and Rudebush Comparing Taylor Rule to Different Fed Chairs from Judd and Rudebush. *Federal Reserve Bank of San Francisco Economic Review*, 1998, p 5.

Once again, the Taylor Rule shows a strong resemblance to actual Federal Reserve movements especially during the Greenspan and Volcker periods. The underlying principle for Judd and Rudebusch (1998) research was to determine if the Taylor rule can be used as a quality measure of the general weight differences given to policy tool variables. They claim that it is fairly straight forward to estimate a Taylor Rule by inputting the historical rates, adding a residual error term and estimating the rates as coefficients. However, the central banks often adjust interest rates gradually toward a desired setting. To account for this gradual change, Judd and Rudebusch (1998) use a modified version of the Taylor Rule.

Their version is shown below:

$$i_t^* = \pi_t + r^* + B_1(\pi_t - \pi_t^*) + B_2 y_t + B_3 y_{t-1} \quad (5)$$

In contrast to equation 1, this equation contains an extra lagged gap term in addition to the contemporaneous gap. According to Judd and Rudebush, this allows for the possibility of gradual movements in proposed monetary policy rates.

As a summary, Judd and Rudebusch (1998) stated that "overall, the estimated dynamic Taylor-type reaction functions do provide a way to capture important elements of policy regimes in place during these periods" (p. 4). Their results

show that Taylor's theoretical context is a valuable way to summarize important elements of monetary policy.

Results of research by Seyfried and Bremmer (2001) gave further validation when they also used the Taylor Rule in order to analyze the behavior of the United States Federal Reserve under the leadership of three Federal Reserve chairs: Arthur Burns, Paul Volcker and Alan Greenspan. The results of the study showed that Burns paid little attention to inflation and inflationary pressures. Volcker focused on reducing actual inflation during his first term while turning his attention to the GDP gap and inflationary pressures in his second term. Greenspan emphasized preemptive strikes against inflation as indicated by high weights attributed to the GDP gap and expected inflation.

The research by Seyfried and Bremmer (2001) extended the research of Judd and Rudebusch (1998). The research by Seyfried and Bremmer began by pointing out common concerns to consider when using the Taylor rule. One concern is the actual measure of inflation to use in the equation. Should the GDP deflator be used as originally suggested by Taylor or should the consumption deflator, made popular by Greenspan, be used? Should the consumer price index be used since it is more readily available and able to reduce the lag in policy? Should ex post inflation rate data be used instead of survey data about future expected inflation? These questions were addressed in the Seyfried and Bremmer (2001) study and it is concluded that Taylor type rules as originally presented with the GDP deflator, CPI and inflation "perform well in explaining the various Fed regimes" (Seyfried

and Bremmer, 2001, p. 24). However, Seyfried and Bremmer also proposed a change to the original Taylor rule to account for possible changes that the Fed may make to the federal funds rate as an immediate response to changes in the right hand side of the Taylor rule equation. They argue that there is anecdotal evidence suggesting that the Fed may attempt to smooth changes in the federal funds rate to compensate for disturbances in financial markets and uncertainty as to how quickly the economy will respond to policy changes. The equation they used (shown below) is the same modified version as Judd and Rudebusch (1998).

$$i_t^* = \pi_t + r^* + B_1(\pi_t - \pi_t^*) + B_2 y_t + B_3 y_{t-1} \quad (5)$$

These variables were defined earlier. Congruent with Seyfried and Bremmer (2001), this model suggests that rate movements by United States Federal Reserve have a certain lag period. Both Judd and Rudebusch (1998) and Seyfried and Bremmer (2001) decided to account for possible lags with the following equation:

$$\Delta i_t = \gamma (i^*_t - i_{t-1}) + \rho \Delta i_{t-1} \quad (6)$$

Where i_t is the federal funds rate from (3), γ represents the speed of adjustment and ρ measures the persistence of monetary policy.

By substituting equation 3 into 4, they displayed the equation to be estimated:

$$\Delta i_t = \gamma \acute{\alpha} - \gamma i_{t-1} + \gamma(1 + \lambda_1)\pi_t + \gamma \lambda_2 y_t + \gamma \lambda_3 y_{t-1} + \rho \Delta i_{t-1} \quad (7)$$

where $\acute{\alpha} = r^* - \lambda_1 \pi^*$

This equation, presented in studies by Judd and Rudebusch (1998) and Seyfried and Bremmer (2001), uses the same dynamics of the Taylor rule however, it accounts for different speeds in fed adjustments.

The Taylor Rule and the European Union

The research by Seyfried and Bremmer (2001) and Judd and Rudebusch (1998) show that the Taylor Rule can be an effective way of determining how monetary policy should have been set by the United States Federal Reserve Bank. However, does the rule apply to monetary policies set by the ECB? To address this question, this study refers to research from Gerlach and Schnabel (1999) who did a study of the Taylor rule and monetary policy tools in the European Monetary Union (EMU). Their research analyzed monetary policy in the European Monetary Union during a sample period from 1990 to 1997. Prior to the existence of the European Central Bank, the European Monetary Union was created to assist conversion of national currencies to the Euro. The EMU included all National Central Banks in Europe which shared policy framework as they led up to the creation of the European Central Bank (ECB). Countries involved in this research included Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom (Luxembourg, Finland and Portugal were excluded due to unreliable data). Gerlach and Schnabel (1999) claim in their report that a "Taylor Rule captures the behavior of average interest rates in the EMU area in the 1990-1997 period, with the exception of the period of exchange market turbulence in 1992-

1993, extremely well" (p. 1). In their report, Gerlach and Schnabel showed data on a quarterly basis for output gaps in the EMU. They developed this data by interpolating both annual and semi-annual data on output gaps as reported by OECD. The inflation variable used in the Taylor Rule was defined by Gerlach and Schnabel (1999) as the annual change in quarterly averages from national consumer price indices. Like Taylor (1993), they assumed the inflation objective in the EMU area was 2%. Gerlach and Schnabel (1999) admitted that estimating the real rate of interest was more difficult. One option, as stated by Gerlach and Schnabel (1999), was to use a weighted average of ex post real interest rates over that period in discussion. However, Gerlach and Schnabel (1999) claimed that countries with low monetary policy credibility (developing countries of Europe) have had relatively high ex post real interest rates and they felt that this could result in an overestimation of the equilibrium real rate of interest for the EMU. As a result, they extracted the ex post real interest rates that may have been due to low credibility and then computed the average realized real interest rate over the period 1982-1997. Finally, they did a regression analysis for the actual interest rate, output gap and inflation rate. The results of the study show that the monetary policies set by the ECB were in line with the Taylor Rule. Specifically, Gerlach and Schnabel (1999) state that the interest rate movements "would in fact not deviate much from past (weighted) interest rate setting behavior in the countries forming the EMU area" (p 4).

Sauer and Sturm (2003) also applied the Taylor rule to European countries when they estimated several instrument policy reaction functions for the ECB. They analyzed monetary policy for the tenure of the first president of the ECB, Mr. Duisenberg. Sauer and Sturm (2003) compare the official monetary policy during Duisenberg's tenure with actual policy as measured by the Taylor rule. They overlaid the suggested Taylor rule, the suggested interest rate and actual ECB interest rate. The graph shows a strong relationship between the actual central bank policy rate and the expected interest rate as determined by the Taylor rule. When describing the graph, Sauer and Sturm state that "the coincidence of the actual nominal interest rate and the Taylor Rule is quite striking" (p. 7).

Gerlach and Schnabel (1999), and Sauer and Sturm (2003) make the argument that Taylor rule is effectively transferable to monetary policy in the European Union, however their research was conducted on the more developed, long standing members of the European Union. Will the rule be effective for the new entrants, many of which operate in a small developing economy? Laxton and Pesenti (2003) use a stochastic general equilibrium model to give an explanation of trade and macroeconomic reliance between large industrialized countries and smaller open economies. The model was then calibrated with special detail placed on the model's ability to create relevant responses of measurable economic variables to a wide range of shocks in the economy. Specifically, they suggest that the stochastic dynamic general equilibrium model is capable of replicating the important aspects of the monetary policy tools as estimated by monetary

authorities. Finally, they compare the performance of the monetary policy tools in two specific categories - general Taylor Rules and inflation forecasting models. The focus of their research is to compare and to contrast the effect of different policy tools in emerging countries that are very different in size and economic scope. With this in mind, their research can be generally applied to smaller, emerging economies no matter what stage of development they are currently in. To provide a specific example, Laxton and Pesenti identify Czech Republic as a representative in the Euro-area with a small yet emerging economy. The study findings are meant to provide a benchmark in analyzing monetary policy rules in heterogeneous economies. Although the research in this area is limited and new, Laxton and Pesenti claim that it is "expected to take off."

This identifies one of the challenges for present research on monetary policies for the developing countries that recently joined the EU. Research in this area is limited, new and fragmented. The Taylor rule has been proven to be an effective measure of how monetary policy should be conducted in the United States and the established countries in the EU however, there is limited research on the Taylor rule in the smaller emerging economies like the new entrants to the EU. The results of the study by Laxton and Pesenti address this issue. Their study findings show that "rules that perform well in models for the US economy also perform well in our simulation model of a relatively closed economy" (p 41).

After reviewing the methods used in current literature, it can be successfully argued that the Taylor rule is an effective way of determining how monetary policy should have been conducted. The weakness in the rule is the estimation of inflation in order to predict future interest rate movements with gradual Fed movements. However, to account for gradual rate increases by the Fed, a lag adjustment factor can be added as suggested by Judd and Rudebusch (1998) and Seyfried and Bremmer (2001). Carlstrom and Fuerst (2003) summed this up well when they said that "the rule can be easily adjusted to accommodate inflation targets other than the 2 percent level suggested by Taylor or structural changes in the economy that affect the natural real federal funds rate" (p. 3). Carlstrom and Fuerst add that the exact form of the Taylor rule is probably not that important. What is important, however, is that potential guideposts satisfy the Taylor principle. One of the important guideposts on the right side of the equation is the output gap. Unlike the other parts of the equation, the output gap is an estimate. Both Judd and Rudebusch (1998) and Seyfried and Bremmer (2001) use the method for estimating output gap as suggested by the Congressional Budget Office (CBO). The CBO method is also often used by policy makers and the Federal Reserve (Judd and Rudebusch, 1998). As a result, the present study will calculate the output gap using the Hodrick Prescott method according to CBO standards.

Inflation versus Output Gap

The original Taylor rule has a 50% weighting for inflation and a 50% weighting for the output gap. Clarida, Gali and Gertler (1997) used a modified version of the Taylor rule to test whether central banks actually have a proper emphasis on each variable. The study by Clarida, Gali and Gertler (1997) specifically looks at two groups of countries. They study examines G3 – United States, Germany and Japan – and E3 – France, Italy and the United Kingdom. Central banks for these countries have great autonomy over monetary policy decisions and all have claimed price stability to be a top monetary policy priority. Their study explored whether monetary policy movements were aimed at keeping an equal weighting for output and inflation or whether other factors were given greater weight. Their study assumes that during each specified period, a central bank has a short term interest rate target that is based on the state of the economy. Their study estimated coefficients (β) on inflation and the output gap. In their study, if the coefficient was > 1 then they assumed the target real rate adjusts to stabilize both inflation and output. If the coefficient is < 1 then they assumed monetary policy was primarily focused on changes in inflation. In their study, they find that even though the central bank may increase the fed funds rate in response to an expected increase in inflation, it may not increase it sufficiently to keep the real rate from declining. This explains why rapid increases in inflation and output may be possible. Therefore, they claim that the "estimated magnitude of the parameter β provides an important yardstick for evaluating a central bank's policy rule" Clarida, Gali and Gertler 1997, p 5).

The current study will use a similar model to the one introduced by Clarida, Gali and Gertler (1997). In order to estimate coefficients on inflation and the output gap, the current study will use a Generalized Method of Moments (GMM). The Method of Moments is an estimation technique which equates sample moments with unobservable population moments and then solves those equations for the quantities to be estimated. In other words, the Method of Moments suggests that the unknown parameters should be estimated by matching population moments with the appropriate sample moments. The Generalized Method of Moments over identifies the moment conditions. GMM estimation was formalized by Hansen (1982) and has become one of the most widely accepted methods of estimation for models in economics.

The currents study will use GMM to estimate the coefficient on both inflation and the output gap. A p-value will also be calculated for each. The p-value is the probability of obtaining a result at least as extreme as a given data point under the null hypothesis. Under the null for the current study, the ECB will be consistent with its focus on "price stability" where inflation is targeted. If the p-value is less than .1 then we will assume that inflation is targeted. If the p-value is greater than .1 then we will assume inflation was not targeted.

Data for each variable will be collected from recognized authorities such as the ECB, Eurostat, The European Commission and National Central Banks. Below is a summary of the sources to be used in gathering the data:

Real rate of interest (r_t) - In the Euro-area, the long term average for German short term real rates is often used for the Taylor formula since the ECB has been constructed after the model of the Bundesbank (Bofinger, 2002). However, the near term average since 1999 is closer to 1.6%. Taylor's original rule used a 2% rate (Taylor, 1993) and Sauer and Sturm (2003) argue that the original 2% rate as used by Taylor should do reasonably well for the Euro-area. However, in contrast to Sauer and Sturm, this study will be doing a comparative analysis for 15 different countries in the EU. As a result, a short term interest rate as suggested by Bofinger will be most appropriate. Specifically, this study will use the short term overnight rate specific to each country as report by each country's national bank.

Desired Rate of Inflation (π_t^*) - The ECB's Governing Council has stated the following definition for price stability: "Price stability is defined as a year-on-year increase in the Harmonized Index of Consumer Prices (HICP) for the Euro area of below 2%" (taken from the official website of the ECB www.ecb.int). The HICPs are a set of EU Consumer Price Indices calculated with a single set of definitions. The Harmonized methodology is coordinated and led by Eurostat. According to Eurostat, the Harmonizing process is regulated by an internal commission. The commission has a set series of definitions and standards that include the following:

- Treatment of newly significant goods and services – all product types with a weight of at least on part per thousand should be covered

- Formula for the elementary aggregates – forbidding the use of arithmetic means of price relatives except where this can be shown not to affect comparability
- Minimum standards for quality adjustment – explicit quality adjustments must be made whenever possible and the whole of a price change should never be ascribed to quality differences without justification
- Sampling – the sample must be sufficiently representative of the products taking account of their price variability. The target sample must be maintained.
- Initial coverage of the indices – all goods and services available on the domestic market except for a staged introduction of certain items and the specific exclusion of very few
- Missing price observations – carrying forward the most recent observation for more than two months is not permitted
- Geographical and population coverage – The HICPs cover purchases by households within the territory of a country, by both resident and non-resident consumers
- Timing of inclusion of purchaser prices – prices for goods should be included in the HICP when they are observed, whereas prices for services should be entered for the month in which the consumption of the service can commence

The Governing Council also claims they are intent on maintaining inflation rates very close to 2% (or below) in the near term. This is congruent with their strategy of keeping stable prices. With these facts in mind, this study will use 2% as the desired rate of inflation.

Rate of Inflation (π_t) - The rate of inflation is commonly reported by monetary authorities. This study will use HICP statistics reported by Eurostat.

Output Gap (y_t) - This is a comparison of the actual GDP (output) of an economy and the potential GDP (efficient output). To calculate the output gap, the present study will take the monthly industrial production index and apply a Hodrick Prescott Filter to measure the output gap as a deviation of the logarithm of actual industrial production from its linear trend. The monthly industrial production index will be obtained from Eurostat.

Methodology

Using monthly data, the present study will calculate the coefficient on inflation (β_1) and the coefficient on the output gap (β_2). A p-value will also be calculated for each. If the p-value is less than .1 then we will assume that inflation is targeted. Additionally, this study will analyze the coefficient on inflation and see what suggestions the model makes for interest rate movements. The current study will analyze whether the suggested rate movements are consistent with raising rates in a low inflation environment and lower rates in a high inflation environment. Finally, this study will conduct a simple analysis on the average inflation during the focus period to see if it is in line with the 2% target.

The time series will begin with data from March of 2004 (when the new entrants became part of the EU) and end with March of 2007. It should be noted that reliable short term interest rates during the focus period could not be found for

Ireland, Spain, Estonia or Malta. As a result, the study will be limited to 10 of the original members (Austria, Belgium, Finland, France Germany, Greece, Italy, Luxembourg, the Netherlands, and Portugal) and 5 of the new entrants (Cyprus, Latvia, Lithuania, Slovakia and Slovenia).

If the results of these statistical tests show that attention given to inflation was not consistent for the new entrants, yet fairly consistent for the original members then this study will argue that the ECB monetary policies were prejudiced.

It should be noted that this study has focused on the period of March 2004 through March 2007. Many changes continue to happen in the European Union that may deserve consideration in future studies. For example, on January 1 2007, the EU grew to 27 members with the addition of Bulgaria and Romania. On January 1 2007 Slovenia converged to the Euro currency and on January 1 2008, Cyprus and Malta converged. This brings the total number of countries on the Euro currency to 15.

CHAPTER IV

ANALYSIS OF DATA – EURO AREA COUNTRIES

Austria

Variable	Coefficient	Standard Error	P>|t|
Inflation	-0.4438182	0.2646868	0.103
Output Gap	0.353534	5.153401	0.946

The analysis of Austria shows that the estimate of the coefficient on inflation is -.444 with a standard error of .26. The estimate of the coefficient on the output gap is .353 with a standard error of 5.15. The probability of type I error is .103 for inflation and .946 for the output gap. The null hypothesis that the output gap is zero is not rejected since its p-value of .946 is too high. This indicates that the monetary policies of the ECB are not compatible with output targeting for Austria. In the case of inflation, the .103 p-value hints the possibility of inflation targeting for Austria. A lower p-value would have made a more compelling case. It should be noted that during the period of March of 2004 through March of 2007, Austria's inflation rate averaged 1.9% which is slightly below the 2% target. The coefficient on inflation suggests that in order to meet the 2% target, the fed fund interest rate should decline by 4.4 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (1.9-2=0.1; 0.1* .4438= .044 or 4.4 basis points). Decreasing rates by 4.4 basis points is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. These numbers suggest that the ECB monetary policy

movements are addressing Austria's inflation to some extent with less focus on output activity.

Belgium

Variable	Coefficient	Standard Error	P>|t|
Inflation	0.7621078	0.2041799	0.001
Output Gap	23.27978	7.228126	0.003

The results for Belgium show that the estimate of the coefficient on inflation is .762 with a standard error of .204. The estimate of the coefficient on the output gap is 23.27 with a standard error of 7.23. The probability of type I error is .001 for inflation and .003 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .033 is low enough. The conclusion is that the monetary policies set by the ECB are targeting Belgium's output. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .001 p-value. The conclusion is that the monetary policies of the ECB are targeting Belgium's inflation. It should be noted that during the period of March 2004 through March of 2007, Belgium's inflation rate averaged 2.3% which is slightly above the 2% target. The coefficient on inflation suggests that in order to meet the 2% target, the federal funds interest rate should be raised by 23 basis points. This figured is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2.3-2 = 0.3; 0.3*.7621 = .23 or 23 basis points). This is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it

otherwise. In summary, these numbers suggest that the ECB monetary policy movements are broadly addressing Belgium's inflation rate.

Finland

Variable	Coefficient	Standard Error	P>|t|
Inflation	0.8398809	0.0905811	0.000
Output Gap	3.907785	3.429801	0.000

The results for Finland show that the estimate of the coefficient on inflation is .840 with a standard error of .091. The estimate of the coefficient on the output gap is 3.91 with a standard error of 3.43. The probability of type I error is .000 for inflation and .000 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .000 is low enough. The conclusion is that the monetary policies set by the ECB are addressing Finland's output. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .000 p-value. The conclusion is that the monetary policies of the ECB are targeting Finland's inflation. It should be noted that during the period of March 2004 through March of 2007, Finland's inflation rate averaged .8% which is significantly below the 2% target. The coefficient on inflation suggests that in order to meet the 2% target, the fed funds should be raised by 100.8 basis points. This figured is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (.8-2 = 1.2; 1.2*.8400 = 1.08 or 100.8 basis points). These numbers suggest that the ECB monetary policy movements are not broadly addressing Finland's monetary policy needs on two fronts. First, the coefficient on inflation suggests

that Finland needs an increase of 100.8 basis points to draw closer to the 2% target. This is not congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. Second, Finland's .8% inflation rate is clearly well below the 2% target rate.

France

Variable	Coefficient	Standard Error	P>|t|
Inflation	-1.054981	0.2066926	0.000
Output Gap	15.34892	12.35808	0.223

The results for France show that the estimate of the coefficient on inflation is -1.05 with a standard error of .207. The estimate of the coefficient on the output gap is 15.35 with a standard error of 12.36. The probability of type I error is .000 for inflation and .223 for the output gap. The null hypothesis that the output gap is zero is not rejected since its p-value of .223 is too high. This indicates that the monetary policies of the ECB are not compatible with output targeting for France. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .000 p-value. The conclusion is that the monetary policies of the ECB are targeting France's inflation. It should be noted that during the period of March 2004 through March of 2007, France's inflation rate averaged 1.9% which is slightly below the 2% target. The coefficient on inflation suggests that in order to meet the 2% target, the federal funds interest rate should be lowered by 10.55 basis points. This figured is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2-1.9 = .1; .1*1.055 = .1055 or 10.55 basis points). Lowering rates

by 10.55 is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. With a .000 p-value and suggested rate movements in line it appears price stability was addressed for France.

Germany

Variable	Coefficient	Standard Error	P>|t|
Inflation	1.857339	0.4203635	0.000
Output Gap	56.82288	9.958614	0.000

The results for Germany show that the estimate of the coefficient on inflation is 1.86 with a standard error of .420. The estimate of the coefficient on the output gap is 56.83 with a standard error of 9.96. The probability of type I error is .000 for inflation and .000 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .000 is low enough. The conclusion is that the monetary policies set by the ECB are targeting Germany's output. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .000 p-value. The conclusion is that the monetary policies of the ECB are targeting Germany's inflation. It should be noted that during the period of March 2004 through March of 2007, Germany's inflation rate averaged 2.1% which is slightly above the 2% target. The statistical tests suggest that in order to meet the 2% target, interest rates should be raised 18.6 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2.1-2 = .1; .1*1.8573 = .1857 or 18.6 basis points). This is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. Overall,

these numbers suggest that the ECB monetary policy movements are broadly addressing Germany's monetary policy needs. Based on a .000 p-value for both inflation and output, coupled with an inflation rate very close to the 2% target, it appears the monetary policies of the ECB were focused on Germany's price stability.

Greece

Variable	Coefficient	Standard Error	P>|t|
Inflation	0.2153169	0.0726926	0.006
Output Gap	6.025375	1.853194	0.003

The results for Greece show that the estimate of the coefficient on inflation is .215 with a standard error of .073. The estimate of the coefficient on the output gap is 6.03 with a standard error of 1.85. The probability of type I error is .006 for inflation and .003 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .003 is low enough. The conclusion is that the monetary policies set by the ECB are targeting Greece's output. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .006 p-value. The conclusion is that the monetary policies of the ECB are targeting Greece's inflation. It should be noted that during the period of March 2004 through March of 2007, the average inflation rate was 3.3% which is above the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be raised by 4.3 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2.2-.2 = .2;

.2*.2153 = .0431 or 4.3 basis points). This is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. These numbers suggest that the ECB monetary policy movements are broadly addressing Greece's inflation rate.

Italy

Variable	Coefficient	Standard Error	P>|t|
Inflation	-1.085696	0.7639414	0.165
Output Gap	8.738223	4.980256	0.089

The results for Italy show that the estimate of the coefficient on inflation is -1.09 with a standard error of .764. The estimate of the coefficient on the output gap is 8.74 with a standard error of 4.98. The probability of type I error is .165 for inflation and .089 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .089 is low enough. The conclusion is that the monetary policies set by the ECB are targeting Italy's output. In the case of inflation, the null hypothesis that inflation is zero is not rejected as a result of the .165 p-value. The conclusion is that the ECB is not targeting Italy's inflation. It should be noted that during the period of March 2004 through March of 2007, Italy's inflation averaged 2.2% which is above the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be lowered by 22.8 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2.21-.2 = .21; .21*1.086 = .2281 or 22.8 basis points). This is not congruent with monetary policy theory to raise interest rates

if inflation rises and decrease it otherwise. With a .165 p-value and a negative coefficient on inflation in a high inflation environment, it appears the monetary policy movements of the ECB did not address Italy's inflationary needs.

Luxembourg

Variable	Coefficient	Standard Error	P>|t|
Inflation	-0.0459816	0.1393401	0.743
Output Gap	4.955861	9.527037	0.606

The results for Luxembourg show that the estimate of the coefficient on inflation is -.046 with a standard error of .139. The estimate of the coefficient on the output gap is 4.95 with a standard error of 9.53. The probability of type I error is .743 for inflation and .606 for the output gap. The null hypothesis that the output gap is zero is not rejected since its p-value of .606 is too high. This indicates that the monetary policies of the ECB are not compatible with output targeting for Luxembourg. In the case of inflation, null hypothesis that inflation is zero is not rejected as a result of the .743 p-value. The conclusion is that the ECB is not targeting Luxembourg's inflation. It should be noted that during the period of March 2004 through March of 2007, Luxembourg's inflation averaged 1.4% which is below the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be lowered by 2.7 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (1.41-2=.59; .59*.0460= .0271 or 2.7 basis points). This is not congruent with monetary policy theory to raise interest rates if inflation rises and

decrease it otherwise. Overall, these numbers suggest that the ECB monetary policy movements are not broadly addressing Luxembourg's inflationary needs.

The Netherlands

Variable	Coefficient	Standard Error	P>|t|
Inflation	1.917697	0.2056847	0.000
Output Gap	-13.36207	4.844014	0.009

The results for the Netherlands show that the estimate of the coefficient on inflation is 1.92 with a standard error of .206. The estimate of the coefficient on the output gap is -13.36 with a standard error of 4.84. The probability of type I error is .000 for inflation and .009 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .009 is low enough. The conclusion is that the monetary policies set by the ECB are targeting the Netherlands' output. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .000 p-value. The conclusion is that the ECB is targeting Luxembourg's inflation. It should be noted that during the period of March 2004 through March of 2007, the Netherlands inflation averaged 1.5% which is below the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be raised by 96 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (1.5-2=0.5; 0.5* .1.918= .9595 or 96.0 basis points). This is not congruent with monetary policy theory which calls for a central bank to lower rates if inflation is below the target. Overall, the statistical tests for the Netherlands give some

contradicting information. The .000 p-value suggests that inflation is targeted however, the statistical tests suggest that rates should be increased by 96 basis points despite having an interest rate below the target. These numbers suggest that the ECB monetary policy movements are not broadly addressing Netherlands inflationary needs.

Portugal

Variable	Coefficient	Standard Error	P>|t|
Inflation	0.2996022	0.08158	0.001
Output Gap	2.930499	3.255217	0.375

The results for Portugal show that the estimate of the coefficient on inflation is .2996 with a standard error of .0816. The estimate of the coefficient on the output gap is 2.93 with a standard error of 3.25. The probability of type I error is .001 for inflation and .375 for the output gap. The null hypothesis that the output gap is zero is not rejected since its p-value of .375 is too high. This indicates that the monetary policies of the ECB are not compatible with output targeting for Portugal. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .001 p-value. The conclusion is that the monetary policies of the ECB are targeting Portugal's inflation. It should be noted that during the period of March of 2004 through March of 2007, Portugal's inflation rate average 2.6% which is above the 2% target. The statistical tests suggest that in order to meet the 2% target, the fed fund interest rate should rise by 3.0 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on

inflation (2.6-2=0.6; 0.6* .2996= .1798 or 18 basis points). This is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. With a .001 p-value and appropriate interests rate adjustments in place, it appears that the monetary policy movements of the ECB are addressing Portugal's inflationary needs.

Data Analysis - New Entrants

Cyprus

Variable	Coefficient	Standard Error	P>|t|
Inflation	-0.0616624	0.023862	0.014
Output Gap	5.200136	3.952401	0.197

The results for Cyprus show that the estimate of the coefficient on inflation is -.062 with a standard error of .239. The estimate of the coefficient on the output gap is 5.20 with a standard error of 3.95. The probability of type I error is .0014 for inflation and .197 for the output gap. The null hypothesis that the output gap is zero is not rejected since its p-value of .197 is too high. This indicates that the monetary policies of the ECB are not compatible with output targeting for Cyprus. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .014 p-value. The conclusion is that the monetary policies of the ECB are targeting Cyprus' inflation. It should be noted that during the period of March 2004 through March of 2007, Cyprus' inflation rate averaged 2% which is right at the 2% target. The statistical tests suggest that in order to keep the rates at the 2% target, the federal funds interest rate should not be adjusted. This figure is calculated by taking the difference between average

inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2-2=0.0; 0.0* .0617= 0.0 basis points). No movement in interest rates is understandable with inflation at the 2% target. In summary, these numbers suggest that the ECB monetary policy movements are broadly addressing inflation for Cyprus.

Latvia

Variable	Coefficient	Standard Error	P>|t|
Inflation	0.1984232	0.0736318	0.011
Output Gap	-23.15546	4.214372	0.000

The results for Latvia show that the estimate of the coefficient on inflation is .198 with a standard error of .074. The estimate of the coefficient on the output gap is -23.16 with a standard error of 4.21. The probability of type I error is .011 for inflation and .000 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .000 is low enough. The conclusion is that the monetary policies set by the ECB are targeting Latvia's output. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .011 p-value. The conclusion is that the monetary policies of the ECB are targeting Latvia's inflation. It should be noted that during the period of March 2004 through March of 2007, the average inflation rate was 6.8% which is well above the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be raised by 720 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (6.8-2=4.8;

4.8* .1984= 7.206 or 721 basis points). This is not congruent with the monetary policy theory which calls for a central bank to lower rates if inflation is below the target. These numbers suggest that the ECB monetary policy movements are not broadly addressing Latvia's inflationary needs. With the ECB's stated focus on price stability, it appears that the monetary policy movements were not fair for Latvia.

Lithuania

Variable	Coefficient	Standard Error	P>|t|
Inflation	0.0289575	0.0024816	0.000
Output Gap	-0.0164452	0.1523922	0.915

The analysis of Lithuania shows that the estimate of the coefficient on inflation is .290 with a standard error of .002. The estimate of the coefficient on the output gap is -.016 with a standard error of .152. The probability of type I error is .000 for inflation and .915 for the output gap. The null hypothesis that the output gap is zero is not rejected since its p-value of .915 is too high. This indicates that the monetary policies of the ECB are not compatible with output targeting for Lithuania. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .000 p-value. The conclusion is that the monetary policies of the ECB are targeting Lithuania's inflation. It should be noted that during the period of March of 2004 through March of 2007, Lithuania's inflation averaged 2.9% which is above the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be raised by 2.6 basis points. This figure is calculated by taking the difference between average

inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2.9-2=0.9; 0.9* .0290= .0261 or 2.6 basis points). This is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. With a .000 p-value and appropriate interest rate movements in place, it appears that the ECB is addressing the inflationary needs of Lithuania.

Slovakia

Variable	Coefficient	Standard Error	P>|t|
Inflation	-0.0274653	0.0540875	0.615
Output Gap	32.05663	4.668737	0.000

The results for Slovakia show that the estimate of the coefficient on inflation is -.0275 with a standard error of .0541. The estimate of the coefficient on the output gap is 32.06 with a standard error of 4.669. The probability of type I error is .615 for inflation and .000 for the output gap. The null hypothesis that the output gap is zero is rejected since its p-value of .000 is low enough. The conclusion is that the monetary policies set by the ECB are targeting Slovakia's output. The null hypothesis that inflation is zero is not rejected since its p-value of .615 is too high. This indicates that the monetary policies of the ECB are not compatible with inflation targeting for Slovakia. It should be noted that during the period of March 2004 through March of 2007, Slovakia's inflation averaged 4.4% which is well above the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be lowered by 0.3 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation

(4.4-2=2.4; 2.4* .0275= .066 or 6.6 basis points). However, with a standard error (.054) larger than the coefficient on inflation (.0275) it is inconclusive on whether rates should be raised or lowered. These numbers suggest that ECB monetary policy movements are not broadly addressing Slovakia's inflation needs on two fronts. First, the .615 p-test suggests that inflation is not targeted. Second, an average inflation rate of 4.4% is clearly well above the 2% target. These numbers suggest that the ECB was not addressing Slovakia's inflationary needs.

Slovenia

Variable	Coefficient	Standard Error	P>|t|
Inflation	0.8838902	0.1799559	0.000
Output Gap	-0.6783797	7.965044	0.933

The analysis of Slovenia shows that the estimate of the coefficient on inflation is .8840 with a standard error of .1800. The estimate of the coefficient on the output gap is -.6784 with a standard error of 7.965. The probability of type I error is .000 for inflation and .933 for the output gap. The null hypothesis that the output gap is zero is not rejected since its p-value of .933 is too high. This indicates that the monetary policies of the ECB are not compatible with output targeting for Slovenia. In the case of inflation, the null hypothesis that inflation is zero is rejected as a result of the .000 p-value. The conclusion is that the monetary policies of the ECB are targeting Slovenia's inflation. It should be noted that during the period of March of 2004 through March of 2007, Slovenia's inflation averaged 2.8% which is above the 2% target. The statistical tests suggest that in order to meet the 2% target, the federal funds interest rate should be raised by

70.7 basis points. This figure is calculated by taking the difference between average inflation and the inflation target and then multiplying that figure by the coefficient on inflation (2.8-2=.8; .8* .8840= .7072 or 70.7 basis points). This is congruent with monetary policy theory to raise interest rates if inflation rises and decrease it otherwise. With a .000 p-value and appropriate interests rate adjustments in place, it appears that the monetary policy movements of the ECB are addressing Slovenia's inflationary needs.

CHAPTER V

CONCLUSION

The present study explored whether the ECB had proper focus on price stability for all countries in the Euro-area community. Using economic indicators for each country and the funds rate of the ECB, the current study used the Taylor Rule to test whether the ECB focused on price stability for both old and new member countries. The research sought to answer the following question. During the period of March 2004 through March 2007, did the Taylor Rule apply to old and new member countries in the Euro-Area?

Based on the analysis, it appears that the Taylor rule did not apply for all countries. As a result, it appears that the ECB did not have proper focus on inflation for all countries in the Euro-area. Additionally, the 2% inflation goal was not reached by all countries. In fact the only country that average 2% during the focus period was Cyprus – one of the new entrants. Ten countries in the current study were within 150 basis points of the 2 percent target, however 2 of the new entrant countries (Latvia and Slovenia) were well above the 2 percent target. The table below shows the average inflation for all countries in the study.

Euro Area Countries	Average Inflation Rate
Austria*	1.9
Belgium	2.3
Finland	0.8
France*	1.9
Germany*	2.1
Greece*	3.3
Italy*	2.2
Luxembourg	1.4
The Netherlands	1.5
Portugal	2.6
* Executive Board Seat	
New Entrants	
Cyprus	2.0
Lativa	6.8
Lithuania	2.9
Slovakia	4.4
Slovenia	2.8

Once again, a breakdown of the 18 votes cast for monetary policy during the focus period shows that Austria, France, Germany, Greece, Italy and Spain each had 2 votes; Finland, Portugal, Ireland, the Netherlands, Luxembourg, and Belgium each had 1 vote; and the new entrants had zero votes. It is interesting to note that Austria, France and Germany were within 10 basis points of the 2% target. These 3 countries each had 2 votes on how monetary policies were set.

In order to test whether monetary policy movements were focused on price stability, the current study used a version of the Taylor Rule similar to the model use by Clarida, Gali and Gertler (1997). In order to estimate coefficients on inflation (β_1) and the output gap (β_2), the current study used a Generalized Method of Moments. A p-value was also calculated for each country to obtain the probability getting a result at least as extreme as a given data point under the null hypothesis. If the p-value was less than .1 for inflation then it was assumed that

inflation was targeted. If the p-value was less than .1 for the output gap then it was assumed that output was targeted. Under the null, the ECB would be consistent with its focus on "price stability" where inflation is targeted. Additionally, this study analyzed the coefficient on inflation to see whether the suggested rate movements were consistent with raising rates in a low inflation environment and lower rates in a high inflation environment.

The analysis of each country ended with a conclusion on whether the ECB had proper focus on price stability. A summary of the results are displayed in the following chart.

Euro Area Countries	Focused on Price Stability	Not Focused on Price Stability
Austria*	✓	
Belgium	✓	
Finland		✓
France*	✓	
Germany*	✓	
Greece*	✓	
Italy*		✓
Luxembourg		✓
The Netherlands		✓
Portugal	✓	
* Executive Board Seat		
New Entrants		
Cyprus	✓	
Lativa		✓
Lithuania	✓	
Slovakia		✓
Slovenia	✓	

Overall, the statistical tests using the Taylor Rule showed some mixed results. The analysis showed that 6 out of 10 Euro Area Countries and 3 out of 5 new entrants had proper focus on price stability. It is interesting to note that 4 out of 5

countries with executive board seats had proper focus on price stability. Additionally, 4 out of 5 countries with board seats had inflation rates within 20 basis points of the 2 percent target.

Why did some countries have proper focus on inflation while others did not? Germany's long standing influence may explain why they had proper focus on price stability. As the largest economy in the Euro-area, it is important to make sure that their economic needs are met. All voting members of the ECB understand this. The ECB, located in Frankfurt, was modeled after the Bundesbank and consequently Germany has always had significant influence on monetary policy decisions. Conversely, the lack of history and influence for new entrants like Latvia and Slovakia makes them subject to policy decisions influenced by the more powerful countries in the Euro-area. Not having voting rights for monetary policy may also be a reason why their inflation was not properly addressed. Alternatively, there are countries that achieved monetary policy goals despite not having a strong influence or any voting rights. For example, Cyprus was the lone country to meet the 2% target during the focus period despite being a new entrant with no votes. They were the beneficiary of monetary policies that arbitrarily worked in their favor.

Overall, the ECB has primarily focused on the largest, most influential economies. Smaller economies either suffer from the lack of focus on their inflation or they can get lucky to have inflation at proper levels without intention.

This needs to change. The ECB should understand that too much focus on the large economies and limited focus on the smaller new entrants becomes detrimental to the Euro-area as a whole. Research shows that all major contractions in the economy, including the great depression, came during a period of economic instability (Friedman and Schwartz 1963, Bernanke 1983, and Mishkin 1991). The financial crisis and economic downturn in Mexico and East Asia also support this view (Mishkin 1996, and Corsetti, Pesenti and Roubini 1998). If the monetary policy needs of certain countries in the Euro-area are neglected in favor of the monetary policy needs of other countries, then the possibility exists for major contractions in the economies of countries being neglected. This is not good for these individual countries or for the European Union as a whole. The 1997 Asian Crisis is a good example of how the deteriorating financial conditions of a country can have a spill over affect and cause greater problems throughout a region. The Asian crisis started in Thailand in July 1997 when the national currency collapsed. The collapse was in large part due to a severe downturn in the Thai real estate market and the large amount of foreign debt that almost left Thailand bankrupt. The Thai government tried to correct the downturn by cutting its peg to the US dollar and allowing the national currency to float. The currency continued to devalue and this severely impacted import revenue, resulting in a further economic downturn. Two important regional trading partners, Indonesia and South Korea, also became seriously affected by Thailand's downturn. Additionally, Hong Kong, the Phillipines and Malasia experienced a devaluation of their currencies to the US dollar. These

devaluations throughout East Asia contributed to many financial woes including business collapses, stock market crashes, and political unrest. The Asian crisis is a good example of why it is important to keep financial stability in a region. The 19 neighboring countries in the Euro-area are regional trading partners. The ECB needs to foster economic health for all countries in the Euro-area to assure financial stability in the entire region.

One of the biggest challenges for the ECB is the implementation of policies that keep all countries economically healthy. Similarities can be pointed out with the United States Federal Reserve as they try to meet the economic needs of all 50 states. Unfortunately, certain economic policies may be good for one state but not good for another state. For example, the housing industry in Florida hit record highs during 2004. According to statistics released by the Office of Federal Housing Enterprise Oversight (OFHEO), the increase in average house prices for Florida was 18.79% during fiscal 2004. That was almost double the growth rate averaged over the previous 5 years. The fast increase in values during 2004 caused the prices to be heavily inflated and this attributed to a severe downfall when the market turned in 2006 and 2007. According to the OFHEO, Florida's average home price decreased by almost 5% during fiscal 2007. The number of new home sales also decreased by 15% from 2006 to 2007. This downturn in the housing market had a rippling effect on many other industries and caused serious problems with the Florida economy. For example, Florida has a heavy concentration in the assisted living facility (ALF) industry as a result of the older

population. The ALF industry became suppressed because elder individuals who were candidates for an ALF could not sell their homes. As a result they stayed longer in their current homes aided by family members who pitched in to help until their homes could be sold. With fewer residents moving into ALFs, the industry saw reduced revenues resulting in lay offs, lost wages and reduced consumer spending. This is just one example of the rippling affect from the depressed housing industry in Florida. There are many more industries that were similarly affected by the real estate slow down. According to the Florida Manufacturing Extension Partnership, the state lost over 5,000 manufacturing jobs in 2006 as result of Florida's economic slowdown. According to the Bureau of Labor Statistics, the Department Store industry witnessed the largest drop in employment among all Florida industries. A total of 18,775 jobs were lost between 2003 and 2007. Overall, the Florida economy was in a severe downturn by the end of 2007 fueled by a severe drop in the housing sector. To help bolster this downturn in the economy, Florida needed rate cuts from the United States Federal Reserve.

In a complete contrast to Florida, Utah was one of the isolated areas in the United States that saw an increase in the housing sector during 2006 and 2007. According to the OFHEO, Utah led the country with a 13% increase in average home prices during fiscal 2007 compared to Florida's 5% decrease during the same period. According to the Utah Association of Realtors, 25,000 new households were formed in Utah during 2007. This resulted in Utah's population

increasing 3.2% from 2006 to 2007. This increase is the highest growth rate Utah has experienced during the past 15 years. As a result of the increasing resident base, Utah experienced increased house prices and increased spending at local businesses. To control the potential for higher inflation as a result of increased economic activity, Utah would benefit from stable interest rates or possibly even higher interest rates. This would help them control growth and potentially keep them off the path that Florida followed when they grew too fast during 2003-2004. Unfortunately the United State Federal Reserve has a monetary policy system that addresses the economic needs for the United States as whole. It is not possible to raise rates for Utah and lower rates for Florida. During fiscal year 2007 the Fed actually chose to lower rates by 100 basis points. This was not because Utah had no votes on how monetary policy should be set nor was it because Florida had significant influence with the Federal Reserve. This is the result of the Fed acting upon what is best for the United States economy as a whole. Unlike Utah, most states had deteriorating economic conditions so the Fed acted on what was best for the majority of the United States.

The challenges facing the European Central Bank are similar to the challenges facing the United States Federal Reserve. The ECB has 19 countries that are dependent on their policies and these countries all have diverse economies. As a result, the ECB is faced with the difficult situation of trying to meet the economic needs of all countries. The influence of Germany and France will continue to be strong because the Euro-area economy depends on their success. Additionally,

the countries with 2 votes may still lean toward meeting the needs of their own countries. However, it is imperative that the new entrants have a strong voice to assure that their economic conditions have some bearing on monetary policy decisions. The ECB will always have a significant focus on the larger economies however, reverting back to the Asian Crisis example, it is important for all economies in the region to be healthy and the ECB needs to take note of this.

The ECB should pay attention to the current research data which shows that Finland, Italy, Luxembourg, the Netherlands, Lithuania and Slovakia do not have proper focus on inflation. To ensure that these countries are getting proper attention, one suggestion would be to allow the new entrants to vote on monetary policy once they become part of the Exchange Rate Mechanism (ERM II). As stated earlier, new entrants need to be part of the ERM II for at least two years prior to adopting the Euro. Participation in the ERM II includes shadowing monetary policy movements of the ECB. Participation also means meeting financial and economic convergence criteria which includes pegging the national currency to the Euro. Cyprus, Estonia, Latvia, Lithuania, Malta, Slovakia and Slovenia are all currently in the ERM II. Allowing these countries to vote on monetary policy will ensure that their economies get at least some focus when monetary policies are set.

If the new entrants are given voting rights, this might also entice the Czech Republic, Hungary and Poland to speed up their efforts to get on the Euro

currency. Poland's average inflation rate during the period of March 2004 through March 2007 was 2.3%. They fought off high inflation during to 2004 and 2005 and have made noticeable improvement since then. From January 2006 to March 2007 their annual inflation rate averaged .41%. They are currently operating in good economic conditions and they lack the necessary incentives to get on the Euro at this time. It is hard to disagree with their position. They currently have the freedom to peg the Euro or they have the ability to float. Obviously getting on the Euro would foster long term stability for their national currency but having the ability to implement their own independent monetary policies still remains enticing given their current economic success. If the ECB would give ERM II members a vote on how monetary policies are set, the idea of getting on the Euro sooner than later becomes more compelling for countries like Poland. Additionally, having all countries in the region on a single currency and giving all economies proper focus on price stability will make the ECB most valuable.

In summary, the results of the present study show that monetary policies set by the ECB focused on price stability for Germany, France, Austria, Belgium, Greece, Portugal, Cyprus, Lithuania and Slovenia. However, Latvia, Slovakia, Italy, Luxembourg and the Netherlands did not have proper focus on price stability. In some instances the monetary policy results were intended. This is true for Germany as result of their economic importance to the Euro-area. For

others it was pure circumstance like Cyprus who was the lone country to average 2% during the focus period despite being a new entrant with no votes.

Deciphering what policies were intended is not the important issue. What's important is the issue of awareness. It is important for the ECB to be aware that Finland, Italy, Luxembourg, the Netherlands, Latvia and Slovakia did not have proper focus on inflation. Being aware of the results of this study and understanding the needs of all countries will help the ECB with the very difficult task of setting balanced monetary policies. This balance will foster economic health for the Euro-area as a whole. Having 19 strong economies is important to the overall economic health of the region and history shows that each country needs stability in their region to help ensure their own economic health. The smaller economies need to make sure that the ECB is aware of their economic needs. Likewise, the influential countries, especially countries with extra votes, need to realize that economic downturns for their regional trading partners in the Euro-area can have a rippling affect. A joint awareness of the economic needs of all countries will help the ECB and Euro-area countries make monetary policy decisions that foster economic health and unity for the Euro-area as a whole.

Appendix 1: Taylor Rule Variables for Original European Union Members

1. Austria Data

Austria	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	1.5	0.86	2	110.10
4/30/2004	3.0000	1.5	0.84	2	110.80
5/31/2004	3.0000	2.1	0.84	2	111.40
6/30/2004	3.0000	2.3	0.89	2	112.10
7/31/2004	3.0000	2.1	0.91	2	112.90
8/31/2004	3.0000	2.2	0.92	2	113.70
9/30/2004	3.0000	1.8	0.92	2	114.30
10/31/2004	3.0000	2.4	0.91	2	114.70
11/30/2004	3.0000	2.3	0.91	2	114.80
12/31/2004	3.0000	2.5	0.95	2	114.80
1/31/2005	3.0000	2.4	0.97	2	114.90
2/28/2005	3.0000	2.3	0.97	2	115.20
3/31/2005	3.0000	2.4	0.97	2	115.70
4/30/2005	3.0000	2.3	0.96	2	116.20
5/31/2005	3.0000	2.0	0.98	2	116.70
6/30/2005	3.0000	2.0	0.97	2	117.10
7/31/2005	3.0000	2.1	0.97	2	117.50
8/31/2005	3.0000	1.9	0.98	2	117.80
9/30/2005	3.0000	2.6	0.96	2	118.20
10/31/2005	3.0000	2.0	0.97	2	118.60
11/30/2005	3.0000	1.7	0.96	2	119.00
12/31/2005	3.2500	1.6	1.00	2	119.50
1/31/2006	3.2500	1.5	1.04	2	120.20
2/28/2006	3.2500	1.5	1.05	2	121.00
3/31/2006	3.5000	1.3	1.12	2	122.20
4/30/2006	3.5000	2.1	1.12	2	123.70
5/31/2006	3.5000	2.1	1.18	2	125.20
6/30/2006	3.7500	1.9	1.23	2	126.50
7/31/2006	3.7500	2.0	1.29	2	127.50
8/31/2006	4.0000	2.1	1.35	2	128.30
9/30/2006	4.0000	1.3	1.34	2	128.80
10/31/2006	4.2500	1.3	1.42	2	129.20
11/30/2006	4.2500	1.6	1.41	2	129.70
12/31/2006	4.5000	1.6	1.46	2	130.20
1/31/2007	4.5000	1.7	1.56	2	130.90
2/28/2007	4.5000	1.7	1.60	2	131.40
3/31/2007	4.7500	1.9	1.64	2	132.00

2. Belgium Data

Belgium	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	1.0	1.9	2	104.27
4/30/2004	3.0000	1.7	2.0	2	104.40
5/31/2004	3.0000	2.4	2.0	2	104.51
6/30/2004	3.0000	2.0	2.0	2	104.89
7/31/2004	3.0000	2.1	2.0	2	105.48
8/31/2004	3.0000	2.0	2.0	2	105.92
9/30/2004	3.0000	1.8	2.0	2	105.98
10/31/2004	3.0000	2.7	2.0	2	105.72
11/30/2004	3.0000	2.3	1.9	2	105.29
12/31/2004	3.0000	1.9	2.0	2	104.82
1/31/2005	3.0000	2.0	2.0	2	104.33
2/28/2005	3.0000	2.3	2.0	2	103.83
3/31/2005	3.0000	2.8	2.0	2	103.63
4/30/2005	3.0000	2.4	2.0	2	103.89
5/31/2005	3.0000	2.3	2.0	2	104.45
6/30/2005	3.0000	2.7	2.0	2	105.05
7/31/2005	3.0000	2.7	2.0	2	105.42
8/31/2005	3.0000	2.9	2.0	2	105.77
9/30/2005	3.0000	3.0	2.0	2	106.40
10/31/2005	3.0000	2.2	2.1	2	107.17
11/30/2005	3.0000	2.3	2.2	2	107.79
12/31/2005	3.2500	2.8	2.2	2	108.19
1/31/2006	3.2500	2.8	2.1	2	108.55
2/28/2006	3.2500	2.8	2.3	2	109.01
3/31/2006	3.5000	2.2	2.5	2	109.44
4/30/2006	3.5000	2.6	2.5	2	109.83
5/31/2006	3.5000	2.8	2.6	2	110.15
6/30/2006	3.7500	2.5	2.8	2	110.20
7/31/2006	3.7500	2.4	2.8	2	110.23
8/31/2006	4.0000	2.3	2.8	2	110.52
9/30/2006	4.0000	1.9	2.9	2	110.94
10/31/2006	4.2500	1.7	3.2	2	111.30
11/30/2006	4.2500	2.0	3.2	2	111.64
12/31/2006	4.5000	2.1	3.3	2	112.08
1/31/2007	4.5000	1.7	3.5	2	112.47
2/28/2007	4.5000	1.8	3.6	2	112.76
3/31/2007	4.7500	1.8	3.8	2	113.13

3. Finland

Finland	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	-0.4	2.04	2	106.60
4/30/2004	3.0000	-0.4	2.05	2	107.30
5/31/2004	3.0000	-0.1	2.06	2	108.20
6/30/2004	3.0000	-0.1	2.08	2	108.70
7/31/2004	3.0000	0.2	2.08	2	109.00
8/31/2004	3.0000	0.3	2.08	2	109.40
9/30/2004	3.0000	0.2	2.08	2	109.60
10/31/2004	3.0000	0.6	2.09	2	109.80
11/30/2004	3.0000	0.2	2.11	2	110.00
12/31/2004	3.0000	0.1	2.17	2	110.20
1/31/2005	3.0000	-0.2	2.11	2	110.00
2/28/2005	3.0000	0.0	2.10	2	109.40
3/31/2005	3.0000	0.9	2.10	2	109.00
4/30/2005	3.0000	1.2	2.11	2	108.40
5/31/2005	3.0000	0.6	2.10	2	107.90
6/30/2005	3.0000	1.0	2.10	2	108.20
7/31/2005	3.0000	0.9	2.11	2	109.00
8/31/2005	3.0000	1.0	2.11	2	109.80
9/30/2005	3.0000	1.1	2.12	2	110.80
10/31/2005	3.0000	0.8	2.12	2	111.80
11/30/2005	3.0000	1.0	2.22	2	112.60
12/31/2005	3.2500	1.1	2.41	2	113.30
1/31/2006	3.2500	1.2	2.39	2	114.10
2/28/2006	3.2500	1.3	2.46	2	115.10
3/31/2006	3.5000	1.2	2.63	2	116.00
4/30/2006	3.5000	1.5	2.65	2	117.20
5/31/2006	3.5000	1.7	2.69	2	118.30
6/30/2006	3.7500	1.5	2.87	2	119.00
7/31/2006	3.7500	1.4	2.94	2	119.10
8/31/2006	4.0000	1.3	3.09	2	118.90
9/30/2006	4.0000	0.8	3.16	2	118.60
10/31/2006	4.2500	0.9	3.35	2	118.40
11/30/2006	4.2500	1.3	3.42	2	118.40
12/31/2006	4.5000	1.2	3.64	2	118.30
1/31/2007	4.5000	1.3	3.62	2	118.10
2/28/2007	4.5000	1.2	3.65	2	118.10
3/31/2007	4.7500	1.6	3.89	2	118.10

4. France

France	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	1.9	2.05	2	101.53
4/30/2004	3.0000	2.4	2.00	2	101.56
5/31/2004	3.0000	2.8	1.93	2	101.56
6/30/2004	3.0000	2.7	1.91	2	101.58
7/31/2004	3.0000	2.6	1.90	2	101.48
8/31/2004	3.0000	2.5	1.91	2	101.47
9/30/2004	3.0000	2.2	1.90	2	101.82
10/31/2004	3.0000	2.3	1.89	2	102.18
11/30/2004	3.0000	2.2	1.93	2	102.30
12/31/2004	3.0000	2.3	1.93	2	102.40
1/31/2005	3.0000	1.6	2.00	2	102.41
2/28/2005	3.0000	1.9	1.98	2	102.19
3/31/2005	3.0000	2.1	1.97	2	101.90
4/30/2005	3.0000	2.0	1.95	2	101.70
5/31/2005	3.0000	1.7	1.98	2	101.53
6/30/2005	3.0000	1.8	1.98	2	101.44
7/31/2005	3.0000	1.8	2.00	2	101.49
8/31/2005	3.0000	2.0	2.00	2	101.72
9/30/2005	3.0000	2.4	2.02	2	101.88
10/31/2005	3.0000	2.0	2.02	2	101.95
11/30/2005	3.0000	1.8	2.01	2	102.24
12/31/2005	3.2500	1.8	2.01	2	102.49
1/31/2006	3.2500	2.3	2.05	2	102.50
2/28/2006	3.2500	2.0	2.06	2	102.48
3/31/2006	3.5000	1.7	2.12	2	102.64
4/30/2006	3.5000	2.0	2.16	2	102.97
5/31/2006	3.5000	2.4	2.19	2	103.30
6/30/2006	3.7500	2.2	2.25	2	103.29
7/31/2006	3.7500	2.2	2.32	2	103.02
8/31/2006	4.0000	2.1	2.39	2	102.93
9/30/2006	4.0000	1.5	2.46	2	102.92
10/31/2006	4.2500	1.2	2.58	2	102.73
11/30/2006	4.2500	1.6	2.69	2	102.64
12/31/2006	4.5000	1.7	2.78	2	102.81
1/31/2007	4.5000	1.4	2.90	2	103.10
2/28/2007	4.5000	1.2	2.99	2	103.41
3/31/2007	4.7500	1.2	3.07	2	103.68

5. Germany

Germany	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	1.1	2.01	2	101.90
4/30/2004	3.0000	1.7	2.07	2	102.30
5/31/2004	3.0000	2.1	2.02	2	102.50
6/30/2004	3.0000	2.0	2.03	2	102.70
7/31/2004	3.0000	2.1	2.06	2	102.80
8/31/2004	3.0000	2.1	2.04	2	103.00
9/30/2004	3.0000	2.0	2.05	2	103.10
10/31/2004	3.0000	2.3	2.11	2	103.20
11/30/2004	3.0000	2.0	2.09	2	103.30
12/31/2004	3.0000	2.3	2.05	2	103.50
1/31/2005	3.0000	1.6	2.07	2	103.70
2/28/2005	3.0000	1.9	2.06	2	104.00
3/31/2005	3.0000	1.6	2.06	2	104.30
4/30/2005	3.0000	1.4	2.08	2	104.70
5/31/2005	3.0000	1.6	2.07	2	105.10
6/30/2005	3.0000	1.8	2.07	2	105.50
7/31/2005	3.0000	1.8	2.07	2	106.00
8/31/2005	3.0000	1.9	2.08	2	106.50
9/30/2005	3.0000	2.5	2.09	2	107.00
10/31/2005	3.0000	2.3	2.07	2	107.60
11/30/2005	3.0000	2.2	2.08	2	108.10
12/31/2005	3.2500	2.1	2.28	2	108.60
1/31/2006	3.2500	2.1	2.33	2	109.10
2/28/2006	3.2500	2.1	2.35	2	109.60
3/31/2006	3.5000	1.9	2.52	2	110.20
4/30/2006	3.5000	2.3	2.63	2	110.70
5/31/2006	3.5000	2.1	2.57	2	111.30
6/30/2006	3.7500	2.0	2.7	2	112.00
7/31/2006	3.7500	2.1	2.81	2	112.60
8/31/2006	4.0000	1.8	2.97	2	113.20
9/30/2006	4.0000	1.0	3.04	2	113.70
10/31/2006	4.2500	1.1	3.28	2	114.30
11/30/2006	4.2500	1.5	3.33	2	114.90
12/31/2006	4.5000	1.4	3.5	2	115.40
1/31/2007	4.5000	1.8	3.56	2	116.00
2/28/2007	4.5000	1.9	3.56	2	116.60
3/31/2007	4.7500	2.0	3.69	2	117.10

6. Greece

Greece	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	2.9	0.89	2	101.17
4/30/2004	3.0000	3.1	0.89	2	101.52
5/31/2004	3.0000	3.1	0.9	2	101.46
6/30/2004	3.0000	3.0	0.91	2	101.15
7/31/2004	3.0000	3.1	0.91	2	100.68
8/31/2004	3.0000	2.8	0.92	2	100.14
9/30/2004	3.0000	2.9	0.93	2	99.72
10/31/2004	3.0000	3.3	0.94	2	99.48
11/30/2004	3.0000	3.2	0.95	2	99.42
12/31/2004	3.0000	3.1	0.96	2	99.44
1/31/2005	3.0000	4.2	0.96	2	99.42
2/28/2005	3.0000	3.2	0.95	2	99.39
3/31/2005	3.0000	2.9	0.93	2	99.35
4/30/2005	3.0000	3.3	0.89	2	99.43
5/31/2005	3.0000	3.2	0.89	2	99.41
6/30/2005	3.0000	3.2	0.89	2	99.32
7/31/2005	3.0000	3.9	0.88	2	99.46
8/31/2005	3.0000	3.6	0.89	2	99.84
9/30/2005	3.0000	3.8	0.89	2	100.18
10/31/2005	3.0000	3.7	0.89	2	100.30
11/30/2005	3.0000	3.4	0.9	2	100.18
12/31/2005	3.2500	3.5	0.91	2	99.94
1/31/2006	3.2500	3.0	0.93	2	99.76
2/28/2006	3.2500	3.1	0.93	2	99.75
3/31/2006	3.5000	3.3	0.99	2	99.82
4/30/2006	3.5000	3.5	0.98	2	99.95
5/31/2006	3.5000	3.3	0.98	2	100.16
6/30/2006	3.7500	3.4	1.02	2	100.31
7/31/2006	3.7500	3.9	1.02	2	100.42
8/31/2006	4.0000	3.4	1.04	2	100.54
9/30/2006	4.0000	3.1	1.05	2	100.64
10/31/2006	4.2500	3.1	1.11	2	100.79
11/30/2006	4.2500	3.2	1.09	2	101.02
12/31/2006	4.5000	3.2	1.14	2	101.38
1/31/2007	4.5000	3.0	1.16	2	101.66
2/28/2007	4.5000	3.0	1.16	2	101.64
3/31/2007	4.7500	2.8	1.18	2	101.45

7. Italy

Italy	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	2.3	0.68	2	97.17
4/30/2004	3.0000	2.3	0.67	2	97.20
5/31/2004	3.0000	2.3	0.67	2	97.14
6/30/2004	3.0000	2.4	0.68	2	96.99
7/31/2004	3.0000	2.3	0.66	2	96.76
8/31/2004	3.0000	2.4	0.67	2	96.51
9/30/2004	3.0000	2.2	0.69	2	96.43
10/31/2004	3.0000	2.1	0.69	2	96.22
11/30/2004	3.0000	2.1	0.70	2	95.72
12/31/2004	3.0000	2.4	0.71	2	95.30
1/31/2005	3.0000	2	0.70	2	95.19
2/28/2005	3.0000	2	0.68	2	95.25
3/31/2005	3.0000	2.2	0.70	2	95.47
4/30/2005	3.0000	2.1	0.70	2	95.72
5/31/2005	3.0000	2.3	0.71	2	95.77
6/30/2005	3.0000	2.1	0.70	2	95.87
7/31/2005	3.0000	2.1	0.69	2	96.20
8/31/2005	3.0000	2.1	0.71	2	96.36
9/30/2005	3.0000	2.2	0.72	2	96.23
10/31/2005	3.0000	2.6	0.72	2	96.17
11/30/2005	3.0000	2.4	0.74	2	96.42
12/31/2005	3.2500	2.1	0.77	2	96.79
1/31/2006	3.2500	2.2	0.79	2	97.14
2/28/2006	3.2500	2.2	0.80	2	97.43
3/31/2006	3.5000	2.2	0.86	2	97.57
4/30/2006	3.5000	2.3	0.87	2	97.69
5/31/2006	3.5000	2.3	0.89	2	97.94
6/30/2006	3.7500	2.4	0.92	2	98.13
7/31/2006	3.7500	2.3	0.93	2	98.27
8/31/2006	4.0000	2.3	0.98	2	98.43
9/30/2006	4.0000	2.4	1.02	2	98.61
10/31/2006	4.2500	1.9	1.07	2	98.89
11/30/2006	4.2500	2	1.11	2	99.25
12/31/2006	4.5000	2.1	1.16	2	99.40
1/31/2007	4.5000	1.9	0.12	2	99.17
2/28/2007	4.5000	2.1	1.24	2	98.87
3/31/2007	4.7500	2.1	1.31	2	98.73

8. Luxembourg

Luxembourg	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	2.0	1.20	2	113.11
4/30/2004	3.0000	2.7	1.17	2	113.36
5/31/2004	3.0000	3.4	1.17	2	113.58
6/30/2004	3.0000	3.8	1.17	2	113.86
7/31/2004	3.0000	3.8	1.16	2	113.80
8/31/2004	3.0000	3.6	1.19	2	113.56
9/30/2004	3.0000	3.1	1.19	2	113.43
10/31/2004	3.0000	4.1	1.15	2	113.28
11/30/2004	3.0000	4.0	1.15	2	113.08
12/31/2004	3.0000	3.5	1.16	2	112.92
1/31/2005	3.0000	2.9	1.17	2	112.79
2/28/2005	3.0000	3.2	1.17	2	112.67
3/31/2005	3.0000	3.5	1.15	2	112.66
4/30/2005	3.0000	3.7	1.16	2	112.93
5/31/2005	3.0000	3.7	1.16	2	113.49
6/30/2005	3.0000	3.2	1.15	2	114.36
7/31/2005	3.0000	4.0	1.12	2	115.43
8/31/2005	3.0000	4.3	1.15	2	116.16
9/30/2005	3.0000	4.7	1.21	2	116.37
10/31/2005	3.0000	5.0	1.16	2	116.40
11/30/2005	3.0000	3.6	1.16	2	116.56
12/31/2005	3.2500	3.4	1.19	2	116.80
1/31/2006	3.2500	4.1	1.33	2	116.84
2/28/2006	3.2500	3.9	1.33	2	116.69
3/31/2006	3.5000	3.7	1.40	2	116.59
4/30/2006	3.5000	3.5	1.45	2	116.61
5/31/2006	3.5000	3.6	1.51	2	116.65
6/30/2006	3.7500	3.9	1.59	2	116.77
7/31/2006	3.7500	3.4	1.69	2	117.16
8/31/2006	4.0000	3.1	1.76	2	117.65
9/30/2006	4.0000	2.0	1.77	2	117.99
10/31/2006	4.2500	0.6	1.94	2	118.26
11/30/2006	4.2500	1.8	1.96	2	118.60
12/31/2006	4.5000	2.3	2.16	2	118.86
1/31/2007	4.5000	2.3	2.19	2	118.87
2/28/2007	4.5000	1.8	2.24	2	118.65
3/31/2007	4.7500	2.4	2.30	2	118.32

9. The Netherlands

Netherlands	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	1.2	1.5	2	103.67
4/30/2004	3.0000	1.5	1.5	2	104.08
5/31/2004	3.0000	1.7	1.48	2	104.45
6/30/2004	3.0000	1.5	1.51	2	104.78
7/31/2004	3.0000	1.2	1.51	2	105.04
8/31/2004	3.0000	1.2	1.46	2	105.26
9/30/2004	3.0000	1.2	1.48	2	105.34
10/31/2004	3.0000	1.5	1.44	2	105.26
11/30/2004	3.0000	1.5	1.41	2	105.03
12/31/2004	3.0000	1.2	1.44	2	104.67
1/31/2005	3.0000	1.2	1.54	2	104.33
2/28/2005	3.0000	1.5	1.56	2	104.12
3/31/2005	3.0000	1.5	1.57	2	103.99
4/30/2005	3.0000	1.3	1.53	2	103.90
5/31/2005	3.0000	1.0	1.54	2	103.87
6/30/2005	3.0000	1.5	1.55	2	103.80
7/31/2005	3.0000	1.5	1.53	2	103.71
8/31/2005	3.0000	1.6	1.52	2	103.63
9/30/2005	3.0000	1.7	1.53	2	103.65
10/31/2005	3.0000	1.5	1.5	2	103.88
11/30/2005	3.0000	1.6	1.53	2	104.35
12/31/2005	3.2500	2.0	1.57	2	104.86
1/31/2006	3.2500	1.8	1.56	2	105.27
2/28/2006	3.2500	1.4	1.61	2	105.52
3/31/2006	3.5000	1.4	1.71	2	105.56
4/30/2006	3.5000	1.8	1.69	2	105.33
5/31/2006	3.5000	1.8	1.75	2	104.95
6/30/2006	3.7500	1.8	1.85	2	104.59
7/31/2006	3.7500	1.7	1.82	2	104.24
8/31/2006	4.0000	1.9	1.93	2	103.94
9/30/2006	4.0000	1.5	2.15	2	103.78
10/31/2006	4.2500	1.3	2.16	2	103.83
11/30/2006	4.2500	1.6	2.22	2	104.00
12/31/2006	4.5000	1.7	2.22	2	104.11
1/31/2007	4.5000	1.2	2.28	2	104.12
2/28/2007	4.5000	1.4	2.29	2	104.24
3/31/2007	4.7500	1.9	2.46	2	104.56

10. Portugal

Portugal	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	2.2	0.45	2	101.04
4/30/2004	3.0000	2.4	0.45	2	100.79
5/31/2004	3.0000	2.5	0.48	2	100.54
6/30/2004	3.0000	3.7	0.47	2	100.27
7/31/2004	3.0000	2.9	0.46	2	99.98
8/31/2004	3.0000	2.4	0.44	2	99.73
9/30/2004	3.0000	2.1	0.42	2	99.54
10/31/2004	3.0000	2.4	0.47	2	99.42
11/30/2004	3.0000	2.6	0.45	2	99.38
12/31/2004	3.0000	2.6	0.51	2	99.45
1/31/2005	3.0000	2.0	0.44	2	99.59
2/28/2005	3.0000	2.1	0.45	2	99.65
3/31/2005	3.0000	2.3	0.48	2	99.70
4/30/2005	3.0000	2.0	0.47	2	99.79
5/31/2005	3.0000	1.8	0.47	2	99.90
6/30/2005	3.0000	0.6	0.45	2	100.03
7/31/2005	3.0000	1.9	0.46	2	100.15
8/31/2005	3.0000	2.5	0.47	2	100.22
9/30/2005	3.0000	2.7	0.45	2	100.31
10/31/2005	3.0000	2.6	0.44	2	100.45
11/30/2005	3.0000	2.5	0.43	2	100.66
12/31/2005	3.2500	2.5	0.71	2	100.90
1/31/2006	3.2500	2.7	0.52	2	101.11
2/28/2006	3.2500	3.0	0.49	2	101.39
3/31/2006	3.5000	3.8	0.54	2	101.76
4/30/2006	3.5000	3.7	0.55	2	102.14
5/31/2006	3.5000	3.7	0.56	2	102.54
6/30/2006	3.7500	3.5	0.56	2	102.92
7/31/2006	3.7500	3.0	0.59	2	103.28
8/31/2006	4.0000	2.7	0.69	2	103.63
9/30/2006	4.0000	3.0	0.74	2	103.91
10/31/2006	4.2500	2.6	0.68	2	104.16
11/30/2006	4.2500	2.4	0.71	2	104.44
12/31/2006	4.5000	2.5	1.11	2	104.67
1/31/2007	4.5000	2.6	1	2	104.80
2/28/2007	4.5000	2.3	0.81	2	104.90
3/31/2007	4.7500	2.4	0.96	2	104.96

Appendix 2: Taylor Rule Variables for New Entrants to the European Union

1. Cyprus

Cyprus	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	0.1	0.44	2	110.24
4/30/2004	3.0000	0.1	0.42	2	110.06
5/31/2004	3.0000	1.2	0.69	2	109.83
6/30/2004	3.0000	2.4	0.66	2	109.62
7/31/2004	3.0000	2.9	0.66	2	109.45
8/31/2004	3.0000	2.8	0.67	2	109.38
9/30/2004	3.0000	1.8	0.66	2	109.52
10/31/2004	3.0000	2.0	0.66	2	109.80
11/30/2004	3.0000	2.6	0.64	2	110.04
12/31/2004	3.0000	3.9	0.63	2	110.24
1/31/2005	3.0000	2.8	0.66	2	110.43
2/28/2005	3.0000	2.4	0.67	2	110.58
3/31/2005	3.0000	2.4	0.65	2	110.67
4/30/2005	3.0000	2.7	0.64	2	110.66
5/31/2005	3.0000	2.1	0.55	2	110.57
6/30/2005	3.0000	1.5	0.39	2	110.53
7/31/2005	3.0000	1.3	0.42	2	110.60
8/31/2005	3.0000	1.5	0.45	2	110.72
9/30/2005	3.0000	2.1	0.46	2	110.79
10/31/2005	3.0000	2.2	0.47	2	110.84
11/30/2005	3.0000	2.0	0.46	2	110.89
12/31/2005	3.2500	1.4	0.45	2	110.90
1/31/2006	3.2500	2.0	0.46	2	110.89
2/28/2006	3.2500	2.3	0.45	2	110.86
3/31/2006	3.5000	2.6	0.47	2	110.85
4/30/2006	3.5000	2.5	0.48	2	110.97
5/31/2006	3.5000	2.5	0.47	2	111.22
6/30/2006	3.7500	2.6	0.43	2	111.48
7/31/2006	3.7500	2.8	0.46	2	111.76
8/31/2006	4.0000	2.7	0.46	2	112.09
9/30/2006	4.0000	2.2	0.55	2	112.39
10/31/2006	4.2500	1.7	0.51	2	112.60
11/30/2006	4.2500	1.3	0.5	2	112.82
12/31/2006	4.5000	1.5	0.51	2	113.01
1/31/2007	4.5000	1.4	0.54	2	113.16
2/28/2007	4.5000	1.2	0.53	2	113.36
3/31/2007	4.7500	1.4	0.53	2	113.64

2. Latvia

Latvia	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	4.7	0.96	2	126.36
4/30/2004	3.0000	5.0	0.83	2	126.31
5/31/2004	3.0000	6.1	0.69	2	126.01
6/30/2004	3.0000	6.1	0.97	2	125.96
7/31/2004	3.0000	6.7	1.07	2	126.48
8/31/2004	3.0000	7.8	1.07	2	127.39
9/30/2004	3.0000	7.7	1.22	2	128.30
10/31/2004	3.0000	7.2	1.17	2	129.10
11/30/2004	3.0000	7.2	1.07	2	129.88
12/31/2004	3.0000	7.4	1.13	2	130.60
1/31/2005	3.0000	6.7	0.89	2	131.33
2/28/2005	3.0000	7.0	1.2	2	132.33
3/31/2005	3.0000	6.6	0.94	2	133.85
4/30/2005	3.0000	7.1	0.71	2	135.80
5/31/2005	3.0000	6.5	0.71	2	137.32
6/30/2005	3.0000	6.6	0.71	2	138.02
7/31/2005	3.0000	6.3	0.63	2	138.29
8/31/2005	3.0000	6.3	0.67	2	138.64
9/30/2005	3.0000	7.4	0.71	2	139.41
10/31/2005	3.0000	7.7	0.74	2	140.35
11/30/2005	3.0000	7.6	0.7	2	141.10
12/31/2005	3.2500	7.1	1.04	2	141.69
1/31/2006	3.2500	7.6	1.11	2	142.36
2/28/2006	3.2500	7.0	1.04	2	143.16
3/31/2006	3.5000	6.6	0.69	2	143.76
4/30/2006	3.5000	6.1	0.75	2	143.93
5/31/2006	3.5000	7.1	1.22	2	144.20
6/30/2006	3.7500	6.3	0.98	2	144.76
7/31/2006	3.7500	6.9	1.2	2	145.15
8/31/2006	4.0000	6.8	0.97	2	145.47
9/30/2006	4.0000	5.9	1.34	2	145.96
10/31/2006	4.2500	5.6	1.07	2	146.42
11/30/2006	4.2500	6.3	0.83	2	146.75
12/31/2006	4.5000	6.8	0.74	2	147.01
1/31/2007	4.5000	7.1	0.99	2	147.07
2/28/2007	4.5000	7.2	1.32	2	147.03
3/31/2007	4.7500	8.5	2.27	2	146.84

3. Lithuania

Lithuania	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	-0.9	0.23	2	151.05
4/30/2004	3.0000	-0.7	0.23	2	150.28
5/31/2004	3.0000	1.1	0.24	2	149.81
6/30/2004	3.0000	1.1	0.23	2	150.26
7/31/2004	3.0000	1.7	0.24	2	151.63
8/31/2004	3.0000	2.2	0.24	2	153.54
9/30/2004	3.0000	3.1	0.23	2	155.83
10/31/2004	3.0000	3.1	0.25	2	157.64
11/30/2004	3.0000	2.9	0.3	2	158.60
12/31/2004	3.0000	2.8	0.29	2	159.30
1/31/2005	3.0000	2.8	0.29	2	159.65
2/28/2005	3.0000	3.2	0.31	2	159.78
3/31/2005	3.0000	3.2	0.33	2	160.36
4/30/2005	3.0000	3.2	0.31	2	161.24
5/31/2005	3.0000	1.9	0.32	2	161.68
6/30/2005	3.0000	2.0	0.31	2	161.62
7/31/2005	3.0000	1.9	0.31	2	162.39
8/31/2005	3.0000	2.3	0.3	2	164.84
9/30/2005	3.0000	2.5	0.29	2	167.84
10/31/2005	3.0000	3.0	0.29	2	170.50
11/30/2005	3.0000	2.9	0.31	2	173.15
12/31/2005	3.2500	3.0	0.3	2	175.35
1/31/2006	3.2500	3.5	0.32	2	176.58
2/28/2006	3.2500	3.4	0.33	2	177.62
3/31/2006	3.5000	3.1	0.34	2	178.93
4/30/2006	3.5000	3.4	0.35	2	180.02
5/31/2006	3.5000	3.6	0.32	2	180.16
6/30/2006	3.7500	3.7	0.31	2	178.91
7/31/2006	3.7500	4.4	0.32	2	177.20
8/31/2006	4.0000	4.3	0.31	2	176.39
9/30/2006	4.0000	3.3	0.37	2	176.16
10/31/2006	4.2500	3.7	0.34	2	175.46
11/30/2006	4.2500	4.4	0.34	2	174.63
12/31/2006	4.5000	4.5	0.35	2	174.62
1/31/2007	4.5000	4.0	0.34	2	175.88
2/28/2007	4.5000	4.4	0.37	2	177.92
3/31/2007	4.7500	4.8	0.38	2	180.36

4. Slovakia

Slovakia	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	8.0	5.37	2	124.00
4/30/2004	3.0000	7.9	4.65	2	123.90
5/31/2004	3.0000	8.2	3.92	2	124.00
6/30/2004	3.0000	8.2	3.64	2	124.00
7/31/2004	3.0000	8.4	3.53	2	123.90
8/31/2004	3.0000	7.1	3.74	2	124.20
9/30/2004	3.0000	6.6	3.67	2	124.50
10/31/2004	3.0000	6.6	3.64	2	124.60
11/30/2004	3.0000	6.3	4.05	2	124.70
12/31/2004	3.0000	5.8	2.92	2	124.80
1/31/2005	3.0000	3.2	3.94	2	125.10
2/28/2005	3.0000	2.7	2.25	2	125.30
3/31/2005	3.0000	2.4	1.72	2	125.50
4/30/2005	3.0000	2.7	1.96	2	126.00
5/31/2005	3.0000	2.4	2.59	2	126.50
6/30/2005	3.0000	2.6	2.46	2	127.10
7/31/2005	3.0000	2.1	2.22	2	128.00
8/31/2005	3.0000	2.1	2.68	2	129.00
9/30/2005	3.0000	2.3	2.41	2	129.90
10/31/2005	3.0000	3.5	2.25	2	130.80
11/30/2005	3.0000	3.6	2.07	2	131.90
12/31/2005	3.2500	3.9	2.49	2	132.90
1/31/2006	3.2500	4.1	2.45	2	133.90
2/28/2006	3.2500	4.3	2.44	2	135.00
3/31/2006	3.5000	4.3	2.8	2	136.40
4/30/2006	3.5000	4.4	3.04	2	137.70
5/31/2006	3.5000	4.8	2.7	2	139.30
6/30/2006	3.7500	4.5	4.21	2	140.90
7/31/2006	3.7500	5.0	3.53	2	142.50
8/31/2006	4.0000	5.0	3.8	2	143.90
9/30/2006	4.0000	4.5	4.54	2	145.00
10/31/2006	4.2500	3.1	4.28	2	145.90
11/30/2006	4.2500	3.7	3.72	2	147.30
12/31/2006	4.5000	3.7	4.73	2	149.40
1/31/2007	4.5000	2.2	3.18	2	151.80
2/28/2007	4.5000	2.0	5.25	2	153.80
3/31/2007	4.7500	2.1	3.44	2	155.50

5. Slovenia

Slovenia	Actual ECB Rate	πt - Inflation	r_t - short term real rate	πt* ECB 2%	Industrial Production Index
3/31/2004	3.0000	3.5	3.6	2	110.53
4/30/2004	3.0000	3.6	3.72	2	110.66
5/31/2004	3.0000	3.9	3.6	2	110.78
6/30/2004	3.0000	3.9	3.72	2	111.09
7/31/2004	3.0000	3.7	3.6	2	111.47
8/31/2004	3.0000	3.7	3.6	2	111.76
9/30/2004	3.0000	3.4	3.72	2	111.83
10/31/2004	3.0000	3.4	3.6	2	111.65
11/30/2004	3.0000	3.8	3.72	2	111.44
12/31/2004	3.0000	3.3	3.6	2	111.40
1/31/2005	3.0000	2.3	3.59	2	111.59
2/28/2005	3.0000	2.8	3.98	2	112.03
3/31/2005	3.0000	3.3	2.38	2	112.81
4/30/2005	3.0000	2.7	3.71	2	113.80
5/31/2005	3.0000	2.1	2.38	2	114.74
6/30/2005	3.0000	1.7	2.46	2	115.51
7/31/2005	3.0000	2.0	2.38	2	115.95
8/31/2005	3.0000	1.8	2.38	2	116.23
9/30/2005	3.0000	3.2	2.46	2	116.78
10/31/2005	3.0000	3.2	3.59	2	117.57
11/30/2005	3.0000	2.1	3.71	2	118.40
12/31/2005	3.2500	2.4	2.38	2	118.97
1/31/2006	3.2500	2.6	2.38	2	119.13
2/28/2006	3.2500	2.3	2.64	2	119.16
3/31/2006	3.5000	2.0	2.38	2	119.53
4/30/2006	3.5000	2.8	2.46	2	120.47
5/31/2006	3.5000	3.4	2.38	2	121.62
6/30/2006	3.7500	3.0	3.71	2	122.61
7/31/2006	3.7500	1.9	2.38	2	123.61
8/31/2006	4.0000	3.1	2.38	2	124.62
9/30/2006	4.0000	2.5	3.71	2	125.52
10/31/2006	4.2500	1.5	2.38	2	126.46
11/30/2006	4.2500	2.4	1.22	2	127.54
12/31/2006	4.5000	3.0	2.38	2	128.51
1/31/2007	4.5000	2.8	2.38	2	129.13
2/28/2007	4.5000	2.3	2.64	2	129.64
3/31/2007	4.7500	2.6	2.38	2	130.25

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