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Discussion Paper No. 143

Implications of International Differences in Determinants of Monetary Policy Framework on Price Stability: Inferences from Fifty-Two Central Banks in the Late 1990s

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August 2006

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This research paper is the final output of the postdoctoral research project entitled, "International Differences in the Determinants of Monetary Policy Framework" (Host Researcher: Professor Dr. Hiroshi OSADA, Research Fellow: Dr. Waranya ATCHARIYACHANVANICH) conducted at Graduate School of International Development (GSID), Nagoya University under the Japan Society for the Promotion of Science (JSPS) postdoctoral fellowship program for foreign researchers.

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Table of Content

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Abstract: Observing that there were both successes and failures in attaining price stability among central banks during the 1990s regardless of type of monetary policy frameworks adopted, this paper represents a pioneering attempt in revealing interrelationships among types of the frameworks, nature of their determinants, and effectiveness of monetary policy in terms of price stability.

Toward its objective, this paper lists and systematically classifies relevant determinants of monetary policy frameworks. Among 52 central banks in the late 1990s, macroeconomic determinants represented the most influential dimension in selecting a monetary policy framework, followed by monetary structural and operational determinants. During the period, price stability depended on both the nature of determinants and type of the framework. Monetary structural index perfectly correlated with price stability under monetary targeting. The relationship was found weaker and less symmetric under inflation targeting. In countries with implicit targeting, inflation rate fluctuations tended to determine more strongly the nature of all three indices of determinants than vice versa.

Whether the implications from the late 1990s are well applicable to the present situation or not requires further research that includes more countries and applies differenct time periods. Ultimately, having strong understanding of the implications of the determinants is expected to assist diagnosis and prescription for healing the right sources of monetary policy ineffectiveness in individual countries of different characteristics.

Keywords: Price Stability, Central Banks, Determinants of Monetary Policy framework

JEL Codes: E52, E58, E59

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1. Introduction

Monetary targeting used to be a prominent monetary framework after the collapse of the Bretton Woods system of the fixed exchange rate regime in 1973. In the 1980s, financial innovation was claimed as a main reason for instability in velocity of money that weakened the ability to control the money supply via adjusting monetary base in industrialized countries (Atkinson, Blundell-Wignall, Rondoni, and Ziegelschmidt, 1984). Consequently, there began a need to search for a new monetary policy framework to replace monetary targeting. Inflation targeting has gained its popularity in both industrialized and developing countries since its emergence in the early 1990s. However, during the late 1990s there remained countries such as Germany and Switzerland that had continued applying monetary targeting. The United States and Japan, on the other hand, had been reluctant to officially adopt an explicit monetary policy framework after losing their confidence in monetary targeting. At the end of the 1990s, not all central banks were successful in pursuing price stability regardless of type of monetary policy framework adopted. These observations lead to two presumptions. First, central banks considered several factors, not just the stability of monetary condition in shifting to inflation targeting or other types of monetary policy frameworks. Second, adoption of inappropriate monetary policy framework might be a cause of unsuccessful monetary policy.

Since most central banks aim at achieving desirable outcomes of monetary policy, an appropriate type of monetary policy framework for a country, therefore, should represent a result of deliberate consideration that incorporates all relevant factors that have implications on the effectiveness of monetary policy, defined here as 'determinants of monetary policy framework' (hereafter, determinants).

Despite a general perception that a successful monetary policy framework adopted by a country may not be applicable in another country due to different characteristics of their determinants, so far there is no specific cross-country study that systematically integrates and analyzes all relevant determinants. Such a study, if exists, can assist identifying sources of ineffectiveness of monetary policy and deciding appropriate remedies including the decision on adopting a successful monetary policy framework from a country of similar determinants.

As a pioneering attempt to show the implications of international differences in determinants, this paper conducts a cross-country analysis of 52 central banks in the late 1990s, with an aim to reveal relationships between core latent determinants and the effectiveness of monetary policy in pursuing price stability under different types of monetary policy frameworks.

Toward its objective, this paper is divided into seven sections. The next section provides the scope of determinants in this study based on literature review. The third section uses discriminant analysis to objectively screen and classify determinants that well predict the types of monetary policy frameworks

adopted by the 52 central banks in the late 1990s. The fourth section proposes a construction of aggregate indices of determinants and explains their meanings. The fifth section illustrates international differences in the determinants. The sixth section tries to draw policy implications from interrelationships among determinants, type of monetary policy framework and price stability. The last section contains conclusions and remarks.

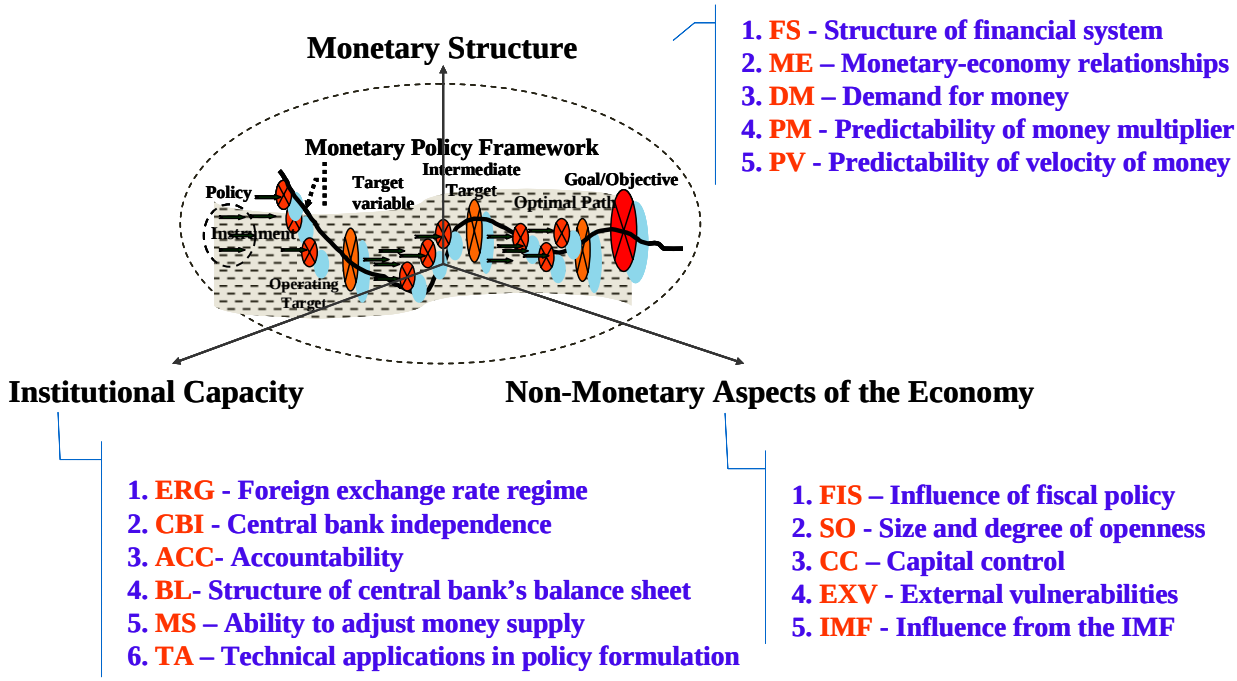
2. Scope of the Determinants of Monetary Policy Framework

Monetary policy can be conceptualized as the "manipulation of certain aspects of the economy that are under the direct control of the monetary authority, usually called 'policy instruments,' so as to attain goals that are considered desirable" (Saving, 1967, p. 447). This fundamental concept implies three main components in determining monetary policy effectiveness: first, capacity of a monetary authority or a central bank in manipulating its monetary instruments – institutional capacity; second, the extent to which economic variables can be influenced by monetary policy – monetary structure; third, the degree of uncertainty due to uncontrollable aspects of the economy – non-monetary aspects of the economy.

In practice, along the path toward achieving selected monetary goal(s), a central bank has to manipulate its monetary policy instruments to achieve 'operating targets' or short-term policy targets that enable it to achieve an intermeditate target of the financial variable corresponding to the particular monetary goal. This comprehensive process from deciding which ultimate goal should be achieved in the long-term to intuitively operating policy instruments according to a selected medium-term target and the appropriate path to achieve the goal is referred to as the "monetary policy framework."

Figure 1 integrates the fundamental concept and the framework of money policy. Regarding the three components of monetary policy effectiveness as the environment surrounding the monetary policy formulation, monetary policy effectiveness, therefore, depends on how well the central bank incorporate relevant information regarding the environment in designing a monetary policy framework. The types of relevant information or relavant factors, in turn, are defined as 'determinants of monetary policy framework' in this paper. Based on literature review, several determinants are recognized and listed under their corresponding components as shown Figure 1. The following subsections of this section provide summary description of each determinant.

Figure 1: Scope of the Determinants of Monetary Policy Framework



Source: Author's conceptualization.

2.1 Institutional Capacity

Central banks need operational freedom and contrallable monetary instruments in monetary policy formulation. This capacity depends on their official and operational stances.

Official stance of a central bank has been discussed in respects of the scope of duty, authority, and accountability. The scope of duty depends on the type of exchange rate regime (ERG). According to Mundell-Fleming model, adopting fixed-exchange rate regime implies the highest degree of the responsibility in stabilizing exchange rate and the loss of independent monetary policy. In particular, being responsible for exchange rate stabilization disallows a central bank to timely respond to domestic shocks (Mishkin, 1999). Beside the type of exchange rate regime, Cukierman (1992, 1994) points out that lack of sufficient degree of legal central bank independence (CBI) may deprive a central bank of ability to maintain monetary stability to ensure its long-term monetary objective if there exist short-term political pressures. However, Cukierman (1994) also recognizes that the central bank independence needs to be leveraged by a comparable degree of accountability (ACC) because central bankers are not elected by voters and may perform in "opportunistic manner that will not lead to the achievement of society's policy objectives" (p. 1443). In exchange for the granted independence, a central bank should be obliged to inform the public of how it implement monetary policy at its best with transparency if the bank wants to maintain its credibility and be successful in influencing public expectation (Issing, 2005).

Legal mandate alone does not give the full picture of institutional capacity. At operational level, a central bank wishes to have flexibility and ability to control money supply. The structure of central bank's balance sheet (BL) reflects flexibility in manipulating monetary base and in dealing with exchange rate volatility. The flexibility is expected to be high when sizes of non-traditional assets such as claims on non-bank sector (Ass), claims on central government (Cg), and central government deposits (Gd) are small; and when those of foreign assets (Fra), and securities of the central bank, the money market instruments and bonds (Cbs) are large.[2]

According to the theoretical mechanistic model, the size of money multiplier in response to an increase in monetary base depends on the cash holding ratio of the public and the reserve ratio of banking system (Bofinger, 2001). A central bank has some control over the latter one via setting legal a reserve requirement ratio (Rr) of which any change is expected to cause consequential adjustments in total commercial banks' lending. However, the central bank would lose the control if the banking system holds reserves substantially beyond the legal requirements. In such a situation, together with high cash holding ratio, the size of money multiplier would be small, indicating a low degree of powerfulness of monetary base (Mb). In addition to large and controllable money multipliers, causal direction of the relationship from monetary base to monetary aggregates ensures the effectiveness of changes in monetary base on monetary aggregates (Ef). To investigate this aspect of Thai monetary structure, Hataiseree (1999) applies Granger causality tests. In more details of instrument settings, Mahadeva and Sterne (2000) review that many central banks continually perform and update several technical analyses such as structural macroeconomic models and VAR-based models based on their comprehensive and on-time data. They also include a survey on the degree of technical applications in the policy formulation (TA) in their survey in 1998 over 94 central banks concerning characteristics of monetary policy frameworks.

2.2 Monetary Structure

Considering the issue that at present there is still no specific set of theoretical requirements to determine the potential for successful application of inflation targeting, the determinants in this subsection are basically to reflect qualifications of a particular economy in applying monetary targeting based on the quantity theory of money. Regarding the extent to which economic variables can be influenced by monetary policy, discussions can be divided into three main aspects: first, the nature of financial system; second,

[2] In countries where debt market is less liquid or government securities are infrequently issued, central banks issue their own securities to support monetary base adjustment operations (Borio, 1997).

existence of relationships between monetary and economic variables; and third, predictability of movements of monetary aggregates.

The nature of financial structure (FS) determines potential role of monetary aggregates in influencing economic variables. As the monetary authority has a more powerful control over bank loans than over corporate stocks and bonds, being a bank-based economy is expected to be a supportive factor in promoting the effectiveness of monetary policy. Although Demirguc-Kunt and Levine (1999) recognize issues in comparing market-based versus bank-based financial systems; it should be justified to regard a country with a high degree of financial intermediation (Fi) and a low degree of capital market development (Cm) as a bank-based one.[3]

Despite being a bank-based economy, there are three factors that can erode the role of monetary policy that relies on credit channel. Firstly, Thornton (1994) shows an evidence of weakening bank credit channel in the United States since the early 1980s and claims that it was a result of an increase in the degree of financial innovation (Inn) that came along with deregulations. Secondly, De Nicolo, Honohan and Ize (2003), from another perspective, argue that for an open economy, where offshore deposits are allowed and inflation rate is not high, high degree of financial dollarization (Dol) can lead to financial instability. In Cambodia, for instance, under high degree of dollarization that began in the early 1990s and resulted in shallow financial intermediation, the authorities had to employ a de facto currency board arrangement in their policy mix (De Zamaroczy & Sa, 2002). Lastly, Friedman (2000) raises a concern on a possible decline in the ability of the monetary authority in adjusting money supply via the use of monetary base along with the deepening of electronic money (Em).[4] Although no particular country has yet realized significant effect of electronic money on monetary policy formulation, the extreme case of perfect substitution calls for attention.

The relationships between monetary and economic variables have been discussed from short-term and long-term perspectives. From short-term perspective, an effective intermediate target variable should be the one that has a strong influence on monetary objective variable without delay. As for the long-term perspective, assessment on stability of long-term demand for money functions (DM) represents a conventional norm. The variables in a long-term demand function basically include real money demand, scale variable such as real GDP, real interest rate on money itself, and some variables representing opportunity

[3] Due to limited public data and limited role in private financing, development of corporate bond markets is neglected.

[4] Electronic money is defined as "a stored value or prepaid product in which a record of the funds or value available to the consumer for multipurpose use is stored on an electronic device in the consumer's possession" (BIS, 2004, p. 2).

costs including inflation rate. Johansen's Cointegration test has been widely employed in testing the long-term relationships among variables.

Stable, or at least predictable, movement of monetary aggregates in response to a change in monetary base is an underlying assumption in pursuing monetary targeting (Bofinger, 2001). The predictability can be discussed in terms of money multipliers (PM) and velocities of money (PV). While the former explains the extent of controllability of the money supply, the latter gives information about stability of the relationship between money supply and output. The predictability of both variables can be determined in terms of statistical stationarity of their time-series in unit-root tests. The design of monetary policy rule based on the quantity theory is expected to be less complicated when the money multiplier and velocity of money are level-stationary.

2.3 Non-Monetary Aspects of the Economy

Two facts that monetary policy is not the only economic policy, and that countries are integrated via trade and investment imply uncertainties in the conduct of monetary policy.

In a closed economy, apart from monetary policy, fiscal policy represents another main macroeconomic tool in influencing economic variables. The degree of uncertainty in formulating monetary policy is expected to vary with degree of fiscal influence (FIS) on the economy relative to that of monetary influence. Hence, relative monetary-fiscal influences on real economic variables such as inflation rate and growth rate of GDP (Gp and Gg, respectively) deserve an investigation. For this purpose, the equation proposed by Andersen and Jordan (1968) can be adapted by using the inflation rate and growth rate of GDP as dependendent variables, separately regressed on polynomial distributed lags of selected variables that represent instruments of monetary (e.g. monetary aggregate) and fiscal policies (e.g. governemt spending). Apart from performing econometric analysis, fiscal balance (Fb) and the size of the central government's debt (Cdg) are two common indicators that indicate the possibility that a central government may create fiscal shocks even under legal prohibition. For fiscal balance, the most favorable case for the conduct of monetary policy is when the government maintains balanced budget, as it implies less possibility that the central government would request unanticipated financing from the central bank or allocate the surplus for short-term political purpose. On the contrary, the risk is high when either deficits or surpluses are high, even though the direct financing from central bank is prohibited. This is true when there is an escape clause in the central bank law that allows central government financing in case of emergency. For the size of the central government's debt, a high debt level implies high possibility of financing from the central bank.

An economy is related to the wolrd economy through three main channels: trade, investment and foreign exchange channels. To what extent foreign influences via these three channels can bring about external shocks to the economy depends on size and openness of the economy, degree of capital control, and degree of external vulnerabilities. The size and openness of the economy (SO) implies potential influences from trade. As commonly agreed, a small-open economy has to confront a higher degree of the uncertainty due to uncontrollable variables such as changes in interest rates, inflation rates, and exchange rates in its trade partners as well as effects of globalization shared by all open economies. Apart from trade, free movements of capital across borders further complicate the conduct of monetary policy, as there are several forms of capital flows with different maturities. As evidenced in the Asian financial crisis in 1997, the low degree of capital control (CC) in Asian countries prompted capital flights right after the abolition of de facto fixed exchange rate regime resulted from intolerable speculative attacks in foreign exchange markets. The speculations, in turn, were negative consequences of existing high degree of external vulnerabilities (EXV) reflected in the balance of payment under a fixed exchange rate regime. Even under a flexible exchange rate regime, many central banks in emerging countries sometimes intervene in foreign exchange markets in order to maintain trade condition, to cope with significant currency mismatches, and to limit the possibility of high depreciation (Mohanty & Scatigna, 2005). Under a situation of high degrees of external vulnerabilities, central banks, therefore, may have to give more priority to exchange rate stabilization than to long-term monetary objective in order to avoid a crisis. Common proxy variables of degrees of external vulnerabilities include situation of current account balance (Ca), share of short-term debt in total external debt (Sd), degree of indebtedness of foreign debt (Fd), and availability of foreign reserves to short-term obligations (Fr).

Another factor that is worth recognizing as a determinant is the influence from international organizations, particularly the IMF, in selecting a monetary policy framework. It can be observed that most countries under the IMF's conditionality tend to adopt suggested monetary policy framework, leaving it questionable whether it is really suitable for their economies. Yoshitomi (2003) discusses that although there was rationale behind policies imposed on Thailand, Korea, and Indonesia after the crisis, many microeconomic restructuring measures were beyond the IMF's mandate and contractionary monetary policy by raising interest rates was not appropriate for solving capital account crisis, resulting in worsening rather than strengthening public confidence. It can be inferred that accepting financial assistance from the IMF entitles a country to accept conditionality, which, in turn, limits the freedom in choosing a suitable monetary policy framework. Based on the assumption that the degree of conditionality imposed by the IMF varies with the level of borrowing, the degree of influence of the IMF (IMF) on a country can be inferred from the ratio of liabilities of a country relative to its quota in the IMF.

3. Objective Classification of the Determinants

Since the classification of determinants in the previous section is just an alternative way of conceptualization, it remains arguable that some determinants could be grouped or ungrouped in other manners. Toward objective classification of the determinants, this section takes into account of following two issues: first, each partial analysis has to be simple but reliable, and employs only publicly available data in order to allow future modifications; second, it is necessary to set a benchmark in classifying the results of each partial analysis in order to avoid ranking bias, which usually arises when the inferrence is based on absolute value. With the benchmark, it becomes possible for two or more countries to belong to the same category for a certain determinant.

3.1 Data Selection

Utilizing readily available indices is a solution to resource limitations and helps avoid new sources of debates. This paper, therefore, adopts three useful indices – degrees of central bank independence (CBI), accountability (ACC), and technical applications (TA) – from a survey of the Bank of England over 94 central banks in 1ate 1998, available in Mahadeva and Sterne (2000). Consequently, it becomes necessary to choose the period that covers the year 1998. According to a preliminary survey on *International Financial Statistics* (IFS), many countries just started to report quarterly data on GDP and government spending in late 1990s; while the European Monetary Union (EMU) countries have adopted Euro currency since 1999. As a solution, the period from 1996 to 2000 is chosen for non-EMU countries, and the period from 1994 to 1998 is chosen for the EMU countries. In total, there are 52 countries that have applicable sets of necessary quarterly time-series data to perform nearly all partial analyses. Among these countries, Brazil, Philippines, and Colombia are not covered in Mahadeva and Sterne (2000). Hence, their scores of the three indices are quoted as "NA" or not available. Apart from the adopted indices, the remaining variables are calculated by utilizing raw data from IFS, *World Development Indicator* (WDI), *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER), and inferences from various literature and central banks' websites.

3.2 Data Classification

This subsection explains the criteria of score assignments of proxy variables shown in Tables 1 to 3. By statistical natures, the measurement of a proxy variable can be expressed in one of three forms: index, absolute value, and description. While indices for CBI, ACC, and TA are directly adopted from Mahadeva and Sterne (2000); indices for ERG and CC are five-year-average values of annual index based on AREAER. Specifically, the indexation method proposed by Miniane (2004) is adopted in calculating the value of the

degree of capital control of each country. Similar method and source of data are applied to the calculation of exchange rate regime index (ERG) under which there are six categories of exchange rate regime classified by the IMF. However, there are two remarks on the calculation of the index for capital control (CC) of the year 1996 which is available in AREAER 1997. First, its calculation is based on twelve rather than thirteen categories of capital controls as in the following years. Second, due to the new classifications in AREAER from 1997, the index for capital control of the EMU countries are based on AREAER 1997-1999.

As for proxy variables of which their data are originally expressed in terms of absolute value (Fra, Ass, Cg, Cbs, Gd, Mb, Fi, Cm, Inn, Dol, Fb, Cgd, Size, Open, Ca, Sd, Fr and IMF), it requires three steps in deriving a benchmark to evaluate the stage of each proxy variable of a country into one of three levels: inferior, moderate, and superior. First, five-year-average value (e.g. total foreign assets divided by total assets in central bank's balance sheet) for each country is calculated. Second, the range of mean plus and minus two standard deviations of 52 countries is used in detecting outliers to be excluded before a recalculation. Third, the recalculated mean plus and minus 0.5 recalculated standard deviation is used as a reference in setting up an easy-to-recognize range of the moderate level.[5] With relatively large number countries included and being a result of five-year average, the moderate level is considered as a reliable benchmark.

As for the remaining proxy variables (Rr, Ef, Em, ME, DM, PM, PV, Gp and Gg), their descriptive stages are classified into three ordinal categories: low, moderate or inconclusive, and high potential for achieving effective monetary policy based on underlying assumptions of the quantity theory of money. Among these proxy variables, Rr and Em do not require regression or econometric analyses. It is worth noting that for a country of which the legal reserve requirement ratio is zero per cent or non-existent, the effectiveness of its reserve requirements (Rr) is considered ineffective and assigned score of zero. Developments in electronic money are inferred from the BIS (2004). For the variables that require regression or econometric analyses, time-series of quarterly data available in the IFS are used. Explanations of methodologies are collected in Box 1. Notes on data substitutions are available in Appendix A. However, it should be remarked that the quarterly data of government spending are not available in Canada, Denmark, Indonesia, Israel, Malta, Namibia, New Zealand, Portugal, Slovak Republic, and Turkey. Hence, their scores for the group of fiscal influence (FIS) are calculated by excluding Gp and Gg variables. Similar solution is applied when data are not available.

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[5] However, due to very high standard deviation and for easy-to-recognize purpose, the range for the moderate level of Size is subjectively set.

Box 1: Summaries of Utilized Econometric Analyses

A. Ef - Effects of changes in monetary base on changes in monetary aggregates are assessed by Granger Causality tests that utilize quarterly data of percentage changes in monetary base and monetary aggregate (M1 or M2) from lag 1 to lag 4. A relationship is concluded as one way directional when percentage changes in monetary base Granger cause percentage changes in selected monetary aggregate, at least, at certain lag length with no evidence of reverse directional relationship at any lag length.

B. ME - Relationships between monetary aggregates and real economic variables are assessed by repeatedly regressing individual economic variables (percentage changes in consumer price index and growth rate of GDP) on current and lagged values of changes in monetary variable (growth rate of M1 or M2) up to eight lags. The delays of monetary effect are inferred from the lag length that results in the minimum value of Akaike's information criterion among all the significant relationships.

C. DM - Existences of long-term demand for money are assessed by performing Johansen's Cointegration tests which include ratio of monetary aggregate (M1 or M2) to consumer price index, real GDP, real deposit rate, inflation rate, and exchange rate depreciation. The existence of long-term demand for money is concluded when there is no evidence of no cointegrated relationship found in any of five sets of different deterministic trend assumptions at one and two lags.

D. PM and PV – Stability and predictability of money multipliers and velocities of money are assessed by performing augmented Dickey-Fuller unit root tests on their time-series. The lag length selected is the one that results in the minimum value of Akaike's information criterion.

E. Gp and Gg - The influences of fiscal spending on inflation rate (Gp) and on growth rate of GDP (Gg) in relative to influences of monetary policy on the same dependent variables are assessed by following Atchariyachanvanich (forthcoming) that adapts the equation proposed by Andersen and Jordan (1968). By performing similar process as done for ME, it is possible to derive appropriate lag lengths for changes in government spending. If both changes in monetary aggregate and government spending are individually found significant, the next step is regressing repeatedly each dependent variable on the selected lag lengths of both policy variables using Polynomial Distributed Lag (PDL) technique without constraining the endpoints. While the degree of PDL for one policy variable varies from 1 to its selected lag length, the degrees of PDL for the other policy variable are set equal to its selected lag length. The appropriate degrees of PDL for individual policy variable are the ones that resulted in minimum value of Akaike's information criterion among all degree specifications. The final equation contains selected lag lengths and degrees of PDL for individual policy variables. The relative monetary-fiscal influence is inferred from comparison of absolute values of accumulated coefficients of each policy variable.

Table 1: Coding Criteria of Determinants Reflecting Institutional Capacity

Group		Variable and Definition	Level and Meaning	Score
ERG		Exchange rate regime according to the IMF's classification	Value of Exchange Rate Regime Index	
CBI		Degree of central bank independent	Value of Central Bank Independence Index	
ACC		Degree of accountability of the central bank	Value of Accountability Index	
BL	Fra	Size of foreign assets out of total assets in monetary authority's balance sheet	1. More than 80% 2. Between 60% and 80% 3. Less than 60%	1 0.50 0
	Ass	Size of non-traditional assets out of total assets in monetary authority's balance sheet	1. Less than 0.05% 2. Between 0.05% and 2% 3. More than 2%	1 0.50 0
	Cg	Size of claims on central government in monetary authority's balance	1. Less than 10% 2. Between 10% and 30% 3. More than 30%	1 0.50 0
	Cbs	Size of central bank's securities, money market instrument and bond out of total liabilities in monetary authority's balance sheet.	1. More than 10% 2. Between 0.1% and 10% 3. Less than 0.1%	1 0.50 0
	Gd	Size of government deposits out of total liabilities in monetary authority's balance sheet.	1. Less than 10% 2. Between 10% and 20% 3. More than 20%	1 0.50 0
MS	Rr	Effectiveness of legal reserve requirement ratio	1. Actual reserve ratio is between the legal reserve requirement ratio $\pm$ 0.5 2. Actual reserve ratio is a little below or above the legal reserve requirement ratio $\pm$ 0.5 3. Actual reserve ratio is obviously below or above the legal reserve ratio or there is no legal reserve requirement ratio	1 0.50 0
	Mb	Powerfulness of monetary base measured in terms of size of M1 multiplier	1. More than 2.5 times 2. Between 1.5 and 2.5 times 3. Less than 1.5 times	1 0.50 0
	Ef1	Effects of changes in monetary base on changes in M1 in one year based on Granger Causality tests	1. One way direction 2. Bilateral directions 3. No evidence or inverse direction	1 0.50 0
	Ef2	Effects of changes in monetary base on changes in M2 in one year based on Granger Causality tests	1. One way direction 2. Bilateral directions 3. No evidence or inverse direction	1 0.50 0
TA		Degree of technical applications in the policy formulation	Value of Technical Application Index	

Source: Author's construction.

Sources of raw data: Mahadeva and Sterne (2000, Appendix 1: Tables A.5, A.6, and 10), *International Financial Statistics* (Lines 11 to 17r, 20, 24, and 25), literature reviews and information available in central banks' websites, and *Annual Report on Exchange Arrangements and Exchange Restrictions* (Appendix I).

Notes: Scores in ERG index: 1. Independently floating (1), 2. Managed floating with no pre-announced path for exchange rate (0.8), 3. Exchange rate within crawling band (0.6), 4. Crawling pegged (0.4), 5. Pegged exchange rate within horizontal band (0.2), 6. Currency board arrangement (0). See the methodology to derive Ef1 and Ef2 in Box 1.

Table 2: Coding Criteria of Determinants Reflecting Monetary Structure

Group		Variable and Definition	Level and Meaning	Score
FS	Fi	Degree of financial intermediation in terms of M2 to GDP	1. More than 70%	1
			2. Between 40% and 70%	0.50
			3. Less than 40%	0
	Cm	Degree of capital market development in terms of value traded to GDP	1. Less than 10%	1
			2. Between 10% and 40%	0.50
			3. More than 40%	0
	Inn	Degree of financial innovation in terms of quasi-money to M2	1. Less than 60%	1
			2. Between 60% and 75%	0.50
			3. More than 75%	0
	Dol	Degree of financial dollarization in terms of foreign deposits to total deposits	1. Less than 30%	1
			2. Between 10% and 30%	0.5
			3. More than 10%	0
	Em	Degree of electronic money deepening	1. No significant development	1
			2. Limited used or used nationwide as a substitute for cash with reserve requirements	0.50
			3. Used nationwide as a substitute for cash without reserve requirements	0
ME	Mp1	The relationship between growth rate of M1 and inflation rate	1. Significant relationship with less than 4 lags	1
			2. Significant relationship with more than 4 lags	0.5
			3. No relationship	0
	Mp2	The relationship between growth rate of M2 and inflation rate	1. Significant relationship with less than 4 lags	1
			2. Significant relationship with more than 4 lags	0.5
			3. No relationship	0
	Mg1	The relationship between growth rate of M1 and growth rate of GDP	1. Significant relationship with less than 4 lags	1
			2. Significant relationship with more than 4 lags	0.5
			3. No relationship	0
	Mg2	The relationship between growth rate of M2 and growth rate of GDP	1. Significant relationship with less than 4 lags	1
			2. Significant relationship with more than 4 lags	0.5
			3. No relationship	0
DM	Dm1	Existence of long-term demand for M1 under cointegration tests	1. No evidence of no cointegrated relationship	1
			2. Conflicting results from different criteria	0.5
			3. Some significant evidence of no cointegrated relationship	0
	Dm2	Existence of long-term demand for M1 under cointegration tests	1. No evidence of no cointegrated relationship	1
			2. Conflicting results from different criteria	0.5
			3. Some significant evidence of no cointegrated relationship	0
PM	M1	Stability and predictability of M1's money multiplier under unit root tests	1. Level-stationary	1
			2. Trend-stationary	0.50
			3. Non-stationary	0
	M2	Stability and predictability of M2's money multiplier under unit root tests	1. Level-stationary	1
			2. Trend-stationary	0.50
			3. Non-stationary	0
PV	V1	Stability and predictability of M1's velocity under unit root tests	1. Level-stationary	1
			2. Trend-stationary	0.50
			3. Non-stationary	0
	V2	Stability and predictability of M2' s velocity under unit root tests	1. Level-stationary	1
			2. Trend-stationary	0.50
			3. Non-stationary	0

Source: Author's construction.

Sources of raw data: World Development Indicators 2004 CD-ROM, Bank for International Settlements (2004), and *International Financial Statistics* (Lines rf, 14, 34, 35, 60L, 64, and 99B).

Notes: See the methodologies to derive ME, DM, PM, and PV in Box 1.

Table 3: Coding Criteria of Determinants Reflecting Non-Monetary Aspect of the Economy

Group		Variable and Definition	Level and Meaning	Score
FIS	Gp	The relative influence of fiscal spending on inflation rate	1. Not statistically significant	1
			2. Significant with lower coefficient than change in monetary aggregate	0.50
			3. Significant with higher coefficient than changes in monetary aggregate or inconclusive	0
	Gg	The relative influence of fiscal spending on the growth rate of GDP	1. Not statistically significant	1
			2. Significant with lower coefficient than changes in monetary aggregate	0.50
			3. Significant with higher coefficient than change in monetary aggregate or inconclusive	0
	Fb	Fiscal surplus or deficit as share of GDP	1. Less than 2%	1
			2. Between 2% and 3.5%	0.50
			3. More than 3.5%	0
	Cgd	Size of central government's debt as share of GDP	1. Less than 30%	1
			2. Between 30% and 55%	0.5
			3. More than 55%	0
SO	Size	Size of economy measured by GNI, Atlas method	1. More than 1,000,000 millions of US dollars	1
			2. Between 10,000 to 1,000,000 millions of US dollars	0.5
			3. Less than 10,000 millions of US dollars	0
	Open	Size of imports plus exports as share of GDP	1. Less than 60%	1
			2. Between 60% to 90%	0.5
			3. More than 90%	0
CC		Degree of capital control	Value of Capital Control Index	
EXV	Ca	Current account balance	1. More than 1.5%	1
			2. Between -3% and 1.5%	0.5
			3. Less than -3%	0
	Sd	Share of short-term debt to total external debt	1. Less than 10%	1
			2. Between 10% and 25%	0.50
			3. More than 25%	0
	Fd	Indebtedness according to the World Bank's classification	1. Not classified	1
			2. Less indebted	0.66
			3. Moderately indebted	0.33
			4. Severely indebted	0
	Fr	Size of foreign reserves measured in months of imports	1. More than 4.5 months	1
			2. Between 2.75 and 4.5 months	0.5
			3. Less than 2.75 months	0
IMF		Size of outstanding liabilities to the IMF, as percentage of quota	1. Less than 10%	1
			2. Between 10% and 85%	0.50
			3. More than 85%	0

Source: Author's construction.

Sources of raw data: World Development Indicators 2004 CD-ROM, *International Financial Statistics* (Lines 2tl, 2f.s, 64, 82, and 99B), and De Nicolo, Honohan, and Ize (2003).

Notes: See the methodology to derive Gp and Gg in Box 1.

3.3 Variable Classification

In order to classify proxy variables of determinants objectively into a few dimensions that best separate countries into groups according to types of monetary policy frameworks, discriminant analysis is selected, since it is an analysis that utilizes several independent variables to separate a categorical dependent variable. With four groups of frameworks - exchange rate targeting (ET), monetary targeting (MT), inflation targeting (IT), and others (OT), there can be up to three 'canonical discriminant functions.' Based on explanation of Manly (2004), the functions can be written as follows:

$$Z_1 = a_{11}X_1 + a_{12}X_2 + \ldots + a_{1p}X_p \quad (1)$$

$$Z_2 = a_{21}X_1 + a_{22}X_2 + \ldots + a_{2p}X_p \quad (2)$$

$$Z_3 = a_{31}X_1 + a_{32}X_2 + \ldots + a_{3p}X_p \quad (3)$$

where values of Z_1, Z_2, and Z_3 of each country are derived from linear combination of X independent variables (or proxy variables of selected determinants in this paper). As summarized by Janda and Gillies (1983), canonical discriminant function coefficients a_{11}, a_{12}, …, a_{3p} are estimated in such a way that the first function maximizes the differences of the group means followed by uncorrelated functions that maximize remaining group differences.

According to Manly (2004), discriminant analysis allocates individual cases to their nearest groups based on the Mahalanobis distances to group means; and percentage of correct allocations indicates how well the entered independent variables separate groups.[6] Using the analysis as an approach of variable classification, therefore, becomes possible by entering different sets of independent variables into the analysis and repeating estimations of coefficients to calculate values of each Z until percentage of correct allocations is maximized.

In order to derive the final three canonical discriminant functions that result in the highest level of precision in predicting type of monetary policy framework adopted by each country in the late 1990s, the discriminant analysis starts with entering all main determinants (written in all capital letters) which are unweighted average values of their proxy variables (written in capital and small letters). Actual types of monetary policy framework are inferred from Mahadeva and Sterne (2000, p.38 and p. 92). Settings of prior probabilities in each analysis follow group sizes because numbers of countries under each group of monetary policy frameworks are not equal. Based on the values of F-statistic under ANOVA tests, the least significant main determinants are replaced by their proxy variables in order to detect the source of insignificance. A variable is excluded permanently from the further iterations when its exclusion does not cause a reduction in percentage of cases correctly classified by the model. On the other hand, there are also trials of using unweighted average values of remaining proxy variables for a particular determinant as alternative proxy variables. Results of the selected iteration of discriminant analysis are summarized in Table 4.

[6] See more explanations on discriminant analysis in Manly (2004), and Dillon and Goldstein (1984).

Table 4: Summary of Discriminant Analysis

Part A: Classification Results					
	Preditcted Group				
Actual Group	ET	MT	IT	OT	Total
ET	17	0	1	0	18
	(94.44%)	(0%)	(5.56%)	(0%)	(100%)
MT	0	6	0	0	6
	(0%)	100.0	(0%)	(0%)	(100%)
IT	0	0	21	0	21
	(0%)	(0%)	(100%)	(0%)	(100%)
OT	0	2	2	3	7
	(0%)	(28.57%)	(28.57%)	(42.86%)	(100%)
Part B: Eigenvalues of Discriminant Functions					
	Function				
	(1)		**(2)**		**(3)**
Eigenvalue (Prob. of Wilks' Lamda)	3.085 (0.033)		0.705 (0.747)		0.378 (0.834)
% of Variance of Output	74.005		16.921		9.074
Part C: Standardized (and Structure) Coefficients of Determiants in Discriminant Functions					
ERG	0.739 (0.451)*		-0.390 (-0.299)		0.022 (-0.004)
SO	0.682 (0.352)*		0.031 (-0.172)		-0.019 (-0.190)
FIS	0.410 (0.262)*		0.469 (0.087)		0.184 (0.196)
BL-Fra	-0.195 (-0.161)*		-0.128 (0.034)		-0.063 (-0.136)
CBI	0.680 (0.155)*		0.439 (0.090)		0.159 (0.023)
FS-Cm	0.320 (-0.122)*		0.304 (0.047)		0.245 (-0.109)
TA	0.034 (0.107)*		-0.253 (-0.079)		-0.625 (-0.104)
DM	-0.352 (-0.076)		0.604 (0.293)*		0.274 (-0.073)
PV	-0.181 (0.002)		0.010 (-0.242)*		-0.073 (-0.228)
ME	0.271 (-0.005)		-0.617 (-0.193)*		-0.298 (0.088)
EXV-Ca	0.438 (0.075)		0.570 (0.183)*		0.210 (0.109)
IMF	-0.602 (-0.118)		-0.639 (-0.153)*		-0.011 (-0.050)
BL-Ass	0.102 (-0.177)		0.223 (0.235)		-0.622 (-0.423)*
BL-Cbs	-0.738 (-0.005)		-0.285 (-0.234)		0.580 (0.388)*
ACC	-0.238 (-0.056)		-0.252 (-0.194)		0.686 (0.305)*
FS-Fi	0.513 (-0.026)		0.665 (0.166)		0.711 (0.254)*
CC	0.682 (0.114)		0.031 (-0.208)		0.019 (0.244)*
PM	-0.017 (-0.008)		-0.128 (-0.007)		0.443 (0.058)*
Part D: Group Means of Discriminant Functions by Type of Monetary Policy Framework					
Exchange rate targeting (ET)	-2.122		0.187		-0.232
Monetary targeting (MT)	2.731		0.899		-1.187
Inflation targeting (IT)	0.837		-0.803		0.200
Others (OT)	0.879		1.554		1.169

Notes: Standardized coefficients are standardized versions of canonical discriminant coefficients in Equations 1 to 3. Their values vary within -1 to 1. Structure coefficients are correlation coefficients between variables and canonical discriminant functions. * refers to largest absolute correlation between each variable and any discriminant function.

Part A of Table 4 highlights the results of the selected iteration of discriminant analysis which maximizes percentage of cases correctly classified by entered determinants (47 correctly classified cases out of 52 cases, or 90.38%). Among the five misclassified countries, the exchange-rate-targeting county that is predicted as inflation-targeting one is Colombia. As for the other four countries that pursued other implicit

targets, Malaysia and Brazil are misclassified into the group of inflation targeting, while Japan and the United States into the group of monetary targeting. Missing values in some variables could be a reason for incorrect classifications for Colombia and Brazil. Malaysia had adopted monetary targeting until the mid 1990s and officially began 'interest-rate targeting' in early 1998 (Bank Negara Malaysia, 1999). The new framework resembles inflation targeting more than monetary targeting in terms of operating targets. As for Japan and the United States, both countries had long experience of monetary targeting prior to switching to implicit targeting.

Part B of Table 4 shows relative importance of the three canonical discriminant functions in separating countries into the four groups of monetary policy frameworks. The first function accounts for 74% of output variance, while the second and the third account for 17% and 9%, respectively. Based on the probability of Wilks' Lambda test statistic that represents the ratio of error variance to total variance for each discriminant function, only the first discriminant function is statistically significant at 5% level. This implies that the first function represents the most significant dimension of determinants.

Part C of Table 4 reflects relative contribution of each variable in each discriminant function according to absolute size of structure coefficient, which basically is a correlation coefficient between each variable and each canonical discriminant function.[7] In the first function, the most influential variables include ERG, SO, FIS, BL-Fra, CBI, FS-Cm, and TA. These variables reflect capacity of a central bank in dealing with macroeconomic structure of the economy. Hence, the first discriminant function can be referred to as 'macroeconomic dimension' of the determinants. As for the second function, DM, PV, ME, EXV-Ca, and IMF represent the most influential variables. While the first three variables directly concern monetary structure of the economy, the last two variables indicate degree of uncertainty in the conduct of monetary policy. Since the proxy variable of IMF is the degree of indebtedness to the IMF, apart from reflecting degree of reliance on the IMF, it also implies ability to stabilize foreign exchange rate should there arise shocks in foreign exchange markets. In short, the second function represents 'monetary structural dimension' of the determinants. The remaining variables, namely, BL-Ass, BL-Cbs, ACC, FS-Fi, CC, and PM contribute the most in the third function. These variables involve operational capacity of a central bank that depends on structure of its balance sheet, degree of financial intermediary, and degree of capital control. Therefore, the third function can be denoted as 'operational dimension' of the determinants.[8]

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[7] See explanations of standardized and structure canonical discriminant coefficients in Field (2005).

[8] Proxy variables that are excluded are BL-Cg, BL-Gd, MS, FS-Inn, FS-Dol, FS-Em, EXV-Sd, EXV-Fd, and EXV-Fr.

Part D of Table 4 summarizes scores of group means according to type of monetary policy framework. In the first column, only the group of exchange rate targeting shows negative sign and it is different from the group of monetary targeting the most. It can be inferred from standardized coefficients in Part B that 'macroeconomic dimension' of determinants, particularly the size of foreign currency in central bank's balance, determines whether a country will pursue fixed or flexible exchange rate regime. Moreover, focusing on the most influential variables, it implies that a country may be predicted as adopting monetary targeting when currency is freely floated; the economy is large and relative closed; fiscal condition is favorable to the conduct of monetary policy; central bank is granted a high degree of independence; capital market is less developed; and the central bank has high technical capacity.

The second column of Part D of Table 4 indicates that 'monetary structural dimension' of the determinants separates the best between the groups of inflation targeting and others. By paying attention only to the most influential variables, a country may be predicted as pursuing inflation targeting if its demand for money and velocity of money are unstable with high short-term vulnerabilities in terms of current account deficits, but relationships between monetary and economic variables and the level of liabilities to the IMF are in favorable situations.

The last column of Part D of Table 4 indicates that 'operational dimension' of the determinants separates the best between the groups of monetary targeting and others. However, the values of group means are not clearly different. The group means of exchange rate targeting and monetary targeting have the same negative signs. This finding coincides with the view of Schaechter (2001) that both frameworks usually set operational targets on quantitative variables rather than short-term interest rates. Focusing on the most influential variables, having small size of non-traditional assets appears as the main operational requirement in adopting either exchange rate targeting or monetary targeting. Large size of central bank's securities; high degrees of accountability, financial intermediation, capital control; and predictable money multipliers tend to be operational requirements for inflation targeting and other frameworks.

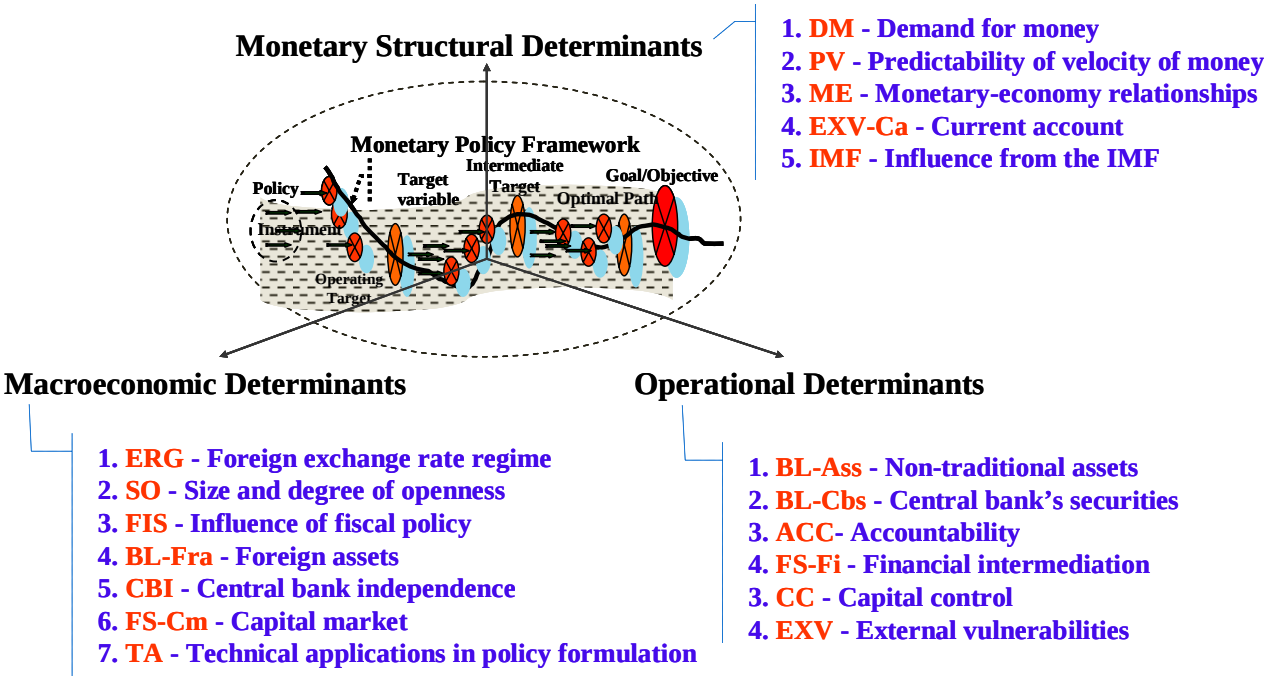
4. Index Construction

In order to assist illustration of overall characteristics and policy recommendations for individual countries, there is a need to categorize determinants into groups and present them collectively. This section, therefore, proposes construction of aggregate indices to represent different dimensions of determinants.

As pointed at the beginning of Section 3, grouping the determinants depends on classification method. In order to be comparable with discussions on types of monetary policy frameworks in the next section, this section follows the classification of determinants based on the results of discriminant analysis in Section 3.

Figure 2 divides the determinants into three groups according to the absolute sizes of structural coefficients in forming the three canonical discriminant functions as shown in Part C of Table 4.

Figure 2: Classification of Determinants for Constructing Three Aggregate Indices



Source: Author's conceptualization.

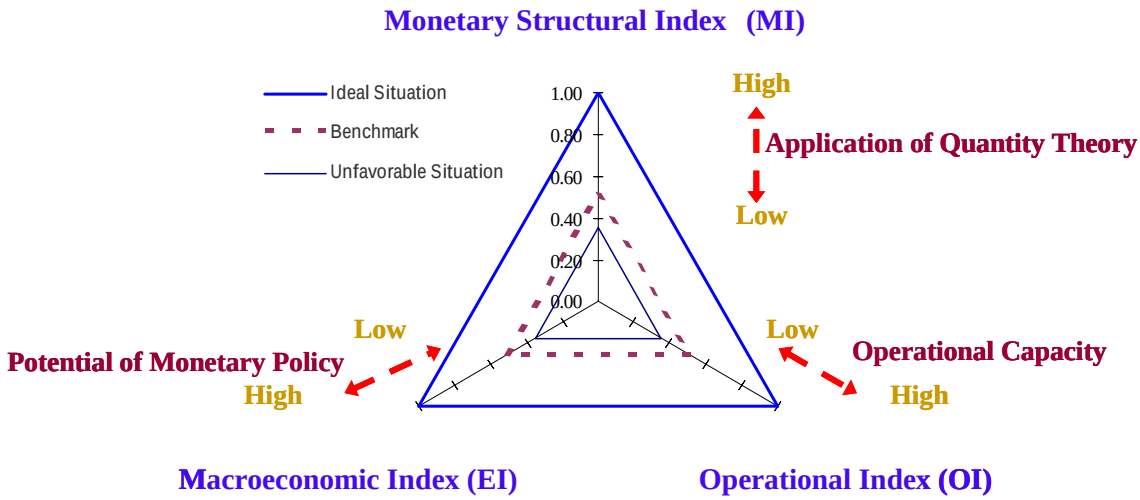
It should be noted that standardized coefficients in Part C of Table 4 are not employed as weights in constructing the three aggregate indices in this section, because the purpose of this section is not to separate countries into groups of framework; rather, it is to generalize characteristics of the determinants. Value of each aggregate index ranges from zero to one, indicating very unfavorable to very favorable situation of each dimension. For this purpose, each aggregate index is derived by averaging out the scores of all groups of proxy variables. In order to avoid subjective biases, equal weight is assigned to all groups as well as within each group.

Following the name of dimension defined in previous section, the first aggregate index is called 'macroeconomic index' (EI); and it comprises ERG, SO, FIS, BL-Fra, CBI, FS-Cm, and TA. The index indicates level of potential of monetary policy for influencing macroeconomic variables. A perfect score of this aggregate index means the country is pursuing freely floated exchange rate regime, and being large and relatively closed economy; all fiscal conditions theoretically support the effectiveness of monetary policy; its central bank has high degree of independence; capital market is still underdeveloped; and the central bank has high technical capacity.

As for the second aggregate index, named as 'monetary structural index' (MI), it contains DM, PV, ME, EXV-Ca, and IMF. The index indicates applicability quantity theory in monetary policy formulation. A perfect score of this aggregate index reflects the most pleasant monetary structure in conducting monetary targeting which relies on the quantity theory, and low degree of short-term vulnerabilities in foreign exchange market as well as low degree of dependence on the IMF.

The last aggregate index, named as 'operational index' (OI), covers BL-Ass, BL-Cbs, ACC, FS-Fi, CC, and PM. A perfect score indicates a high degree of operational capacity of a central bank in controlling monetary base while maintaining its high degree of accountability.

Figure 3: Triangles of Determinants of Monetary Policy Framework



Source: Author's conceptualization.

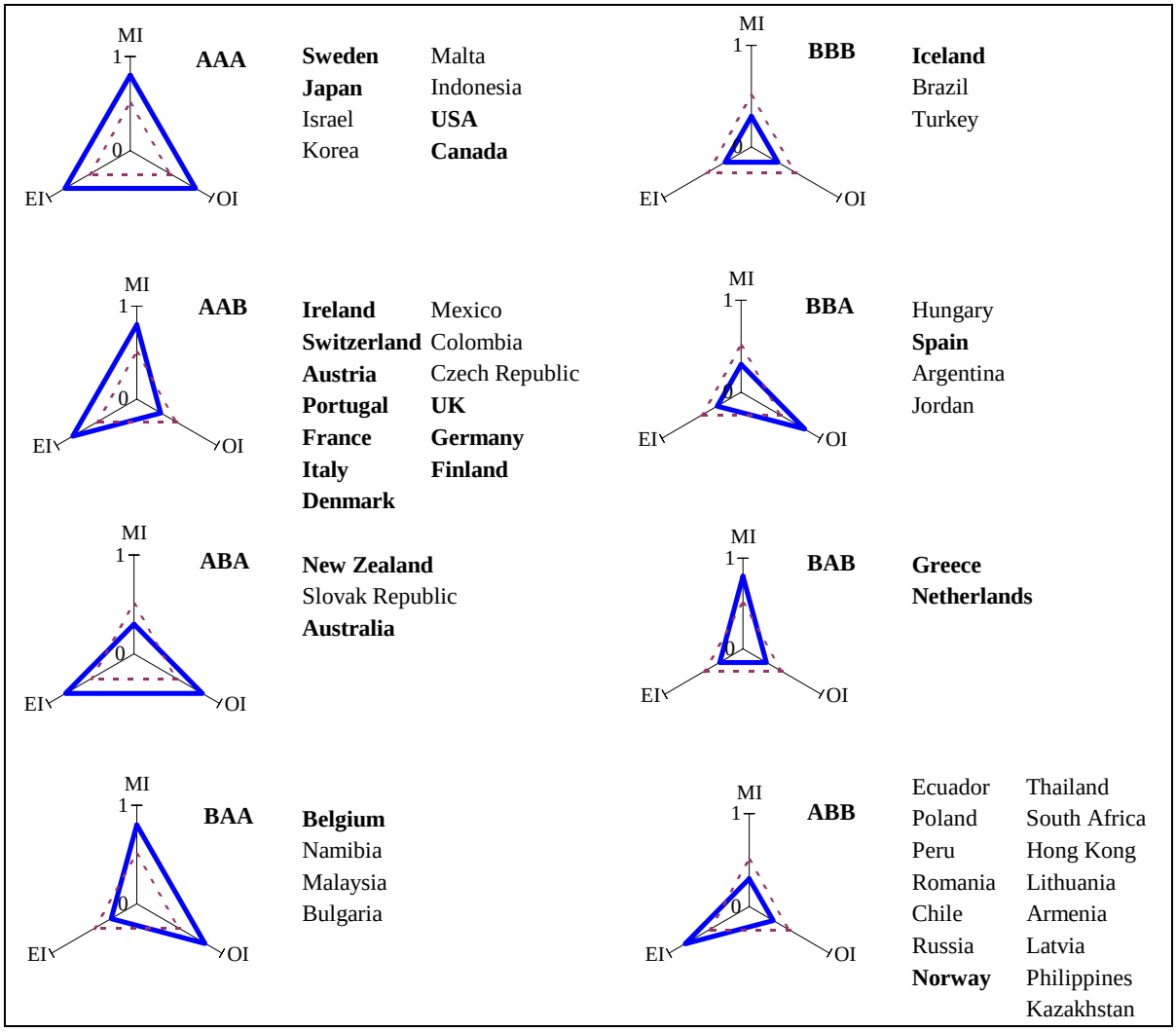
Plotting values of the three indices onto a three-dimension diagram gives a triangle. The size of the triangle, which can be measured in terms of summation of the three aggregate indices, is the largest when the value of each index is one. As depicted by Figure 3, the largest triangle represents ideal situation of the country in all the three dimensions of the determinants. When the country faces unfavorable situation in all dimensions, its triangle becomes very small, implying limited role of monetary policy as well as limited capacity of the central bank in influencing macroeconomic variables to achieve monetary policy objective.

The triangle in the middle of Figure 3 is a result of setting the value of each index as 0.5. The triangle can be used as a benchmark in evaluating performance of each country. Since the value of an aggregate index is either higher or lower than 0.5, there are eight possible shapes of triangles in relative to the benchmark.

Figure 4 classifies the 52 countries into eight groups according to their shapes of triangle. In order to ease further discussions, the shapes are denoted by three alphabets representing the situation of each

dimension of the determinants. The order of alphabets replicates the order of angles from the left to the right horizontally. As for the notation reflecting the result of evaluation, 'A' indicates above-standard case and 'B' denotes below-standard case.

Figure 4: Country Classification by Shape of Triangle of Determinants of Monetary Policy Framework



Notes: Countries written in bold letters are industrialized countries. Israel and Korea remained developing countries in the late 1990s. Details of indexation and evaluations are available in Appendix B.

Figure 4 reflects international differences in the determinants. Moreover, it is observable that characteristics of industrialized and developing countries are not identical. While majority of industrialized countries have AAA and AAB shapes of the triangle of the determinants, majority of developing countries have ABB shape. More detailed discussions regarding the differences are presented in the next section.

5. International Differences in the Determinants

This section aims at generalizing international differences in the determinants by employing statistic tests on group means with different classifications. It begins with detecting common trends shared by all countries, then, investigates the differences in the determinants across countries in three perspectives: level of economic development, type of monetary policy framework, and among inflation-targeting countries.

In order to evaluate whether a mean of a certain group for a particular determinant is statistically different from the moderate level or not, 0.5 is employed as a subjective value of population mean representing the moderate level in performing z-tests. Comparisons of pair-wise group means employ t-tests, assuming unequal group variances. The variable is considered significant when its test statistic under the discussion is significant at 10% level.

Tables 5 to 7 summarize the values of the three aggregate indices of each country along with proxy variables. Details of country-wise scoring are provided in Appendices B and C.

5.1 Overview of the Determinants

Part A of Table 5 shows descriptive statistics of 52 countries collectively. The means of EI, MI, and OI are 0.58, 0.52, and 0.47, respectively. The results of the z-tests show that only MI is moderate. Despite that, the significantly low score of PV confirms worldwide unstable velocities of money during the period. However, there remains existence of stable long-term demand for money.

Specifically, the above-moderate value of EI is a result of significantly high scores in the areas of degrees of fiscal conditions, central independence, and technical applications. This finding confirms upward trends in central bank independence and technical applications during the late 1990s.

Main reasons of being below the moderate level of OI are significantly low scores in BL-Cbs and PM, indicating limited operational capacity of most central banks due to limited holding of central bank's securities in performing open market operations and unpredictable money multipliers.

5.2 Level of Economic Development and Differences in the Determinants

Remaining parts of Table 5 provide descriptive statistics by groups of countries according to the level of economic development and region. The group of industrial countries is used as a control group in t-tests of pair-wise comparisons on group means, with an assumption of unequal group variances.

Focusing only on significant results in t-tests, industrial countries are superior to developing countries in terms of monetary structural determinants; essentially, they have lower levels of current account

deficits and liabilities to the IMF. High levels of current account deficits are particularly prominent in developing countries in Asia, Europe and West Hemisphere.

Regarding macroeconomic and operational determinants, there is no evidence from any t-test on aggregate indices of these dimensions that clearly distinguishes developing countries from industrialized countries. However, it is worth examining individual determinants under each dimension.

Table 5: International Differences by Level of Economic Development

	EI	ERG	SO	FIS	BL -Fra	CBI	FS -Cm	TA	MI	DM	PV	ME	EXV -Ca	IMF	OI	BL -Ass	BL -Cbs	ACC	FS -Fi	CC	PM
Part A: All countries																					
Mean	**0.58**	0.57	0.51	0.57	0.48	0.82	0.56	0.58	**0.52**	0.75	0.24	0.45	0.51	0.66	**0.47**	0.6	0.26	0.74	0.49	0.53	0.22
S.D.	**0.11**	0.36	0.29	0.25	0.37	0.11	0.4	0.29	**0.16**	0.31	0.28	0.27	0.41	0.45	**0.12**	0.42	0.39	0.23	0.4	0.31	0.32
Max	**0.86**	1	1	1	1	0.98	1	1	**1**	1	1	1	1	1	**0.73**	1	1	1	1	1	1
Min	**0.39**	0	0	0	0	0.5	0	0	**0.1**	0	0	0	0	0	**0.28**	0	0	0.17	0	0.08	0
n	**52**	52	52	52	52	49	51	49	**52**	50	52	52	52	52	**52**	52	52	48	52	52	52
z-test against 0.5 (Prob.)	**0.00**	0.19	0.81	0.04	0.71	0.00	0.29	0.05	**0.33**	0.00	0.00	0.22	0.87	0.01	**0.06**	0.10	0.00	0.00	0.86	0.49	0
Part B: Industrialized countries (control group)																					
Mean	**0.57**	0.54	0.63	0.58	0.36	0.84	0.36	0.68	**0.61**	0.71	0.27	0.41	0.64	1	**0.48**	0.7	0.23	0.71	0.7	0.29	0.25
S.D.	**0.08**	0.37	0.28	0.22	0.38	0.11	0.32	0.23	**0.14**	0.31	0.28	0.29	0.38	0	**0.11**	0.37	0.4	0.26	0.3	0.15	0.32
n	**22**	22	22	22	22	22	22	22	**22**	20	22	22	22	22	**22**	22	22	21	22	22	22
z-test against 0.5 (Prob.)	**0**	0.6	0.03	0.08	0.1	0	0.04	0	**0**	0	0	0.17	0.1	NA	**0.42**	0.01	0	0	0	0	0
Part C: All developing countries																					
Mean	**0.59**	0.58	0.43	0.56	0.57	0.8	0.71	0.5	**0.46**	0.78	0.21	0.48	0.42	0.42	**0.46**	0.52	0.28	0.76	0.33	0.71	0.2
S.D.	**0.12**	0.36	0.28	0.27	0.34	0.11	0.39	0.3	**0.14**	0.32	0.28	0.25	0.42	0.46	**0.12**	0.44	0.39	0.21	0.4	0.28	0.32
n	**30**	30	30	30	30	27	29	27	**30**	30	30	30	30	30	**30**	30	30	27	30	30	30
z-test against 0.5 (Prob.)	**0**	0.19	0.14	0.23	0.28	0	0	0.97	**0.12**	0	0	0.71	0.27	0.32	**0.08**	0.84	0	0	0.02	0	0
t-test against control group (Prob.)	**0.54**	0.67	0.01	0.71	0.05	0.24	0	0.02	**0**	0.49	0.41	0.38	0.06	0	**0.55**	0.1	0.62	0.5	0	0	0.58
Part D: Developing Africa																					
Mean	**0.52**	0.5	0.38	0.38	0.75	0.67	0.5	0.5	**0.59**	1	0.13	0.31	0.75	0.75	**0.46**	0.5	0	0.54	0.25	0.96	0.5
S.D.	**0.19**	0.71	0.53	0.53	0.35	0.25	0.71	0.39	**0.23**	0	0.18	0.27	0.35	0.35	**0.14**	0.71	0	0.29	0.35	0.06	0.71
n	**2**	2	2	2	2	2	2	2	**2**	2	2	2	2	2	**2**	2	2	2	2	2	2
z-test against 0.5 (Prob.)	**0.86**	1	0.74	0.74	0.32	0.33	1	1	**0.59**	NA	0	0.32	0.32	0.32	**0.67**	1	NA	0.84	0.32	0	1
t-test against control group (Prob.)	**0.79**	0.95	0.62	0.68	0.35	0.52	0.83	0.63	**0.93**	0	0.43	0.68	0.73	0.5	**0.86**	0.75	0.01	0.56	0.31	0	0.7
Part E: Developing Asia																					
Mean	**0.54**	0.7	0.33	0.72	0.5	0.74	0.25	0.61	**0.53**	0.63	0.08	0.63	1	0.33	**0.5**	0.17	0.5	0.78	0.75	0.74	0.13
S.D.	**0.08**	0.32	0.13	0.2	0.32	0.11	0.27	0.37	**0.15**	0.38	0.13	0.35	0	0.52	**0.1**	0.41	0.45	0.16	0.27	0.33	0.21
n	**6**	6	6	6	6	5	6	5	**6**	6	6	6	6	6	**6**	6	6	5	6	6	6
z-test against 0.5 (Prob.)	**0.2**	0.13	0	0.01	1	0	0.03	0.5	**0.6**	0.42	0	0.39	NA	0.43	**0.98**	0.05	1	0	0.03	0.07	0
t-test against control group (Prob.)	**0.49**	0.34	0	0.2	0.39	0.12	0.41	0.69	**0.34**	0.62	0.03	0.22	0	0.03	**0.7**	0.02	0.22	0.47	0.73	0.02	0.27
Part F: Developing countries in Europe																					
Mean	**0.59**	0.53	0.35	0.51	0.62	0.83	0.83	0.47	**0.43**	0.77	0.27	0.47	0.19	0.42	**0.44**	0.65	0.15	0.78	0.19	0.69	0.19
S.D.	**0.12**	0.34	0.28	0.27	0.36	0.09	0.33	0.32	**0.14**	0.35	0.35	0.23	0.33	0.45	**0.14**	0.38	0.32	0.16	0.33	0.27	0.34
n	**13**	13	13	13	13	13	12	13	**13**	13	13	13	13	13	**13**	13	13	13	13	13	13
z-test against 0.5 (Prob.)	**0.01**	0.74	0.05	0.93	0.25	0	0	0.7	**0.05**	0	0.02	0.65	0	0.54	**0.15**	0.14	0	0	0	0.01	0
t-test against control group (Prob.)	**0.66**	0.94	0.01	0.39	0.06	0.85	0	0.05	**0**	0.63	0.98	0.53	0	0	**0.43**	0.7	0.55	0.41	0	0	0.62
Part G: Developing countries in Middle East																					
Mean	**0.54**	0.31	0.25	0.5	0.75	0.7	0.75	0.53	**0.44**	0.88	0	0.31	0.5	0.5	**0.61**	1	0	0.88	1	0.53	0.25
S.D.	**0.13**	0.44	0.35	0	0.35	0.05	0.35	0.2	**0.16**	0.18	0	0.27	0	0.71	**0.12**	0	0	0.18	0	0.21	0.35
n	**2**	2	2	2	2	2	2	2	**2**	2	2	2	2	2	**2**	2	2	2	2	2	2
z-test against 0.5 (Prob.)	**0.66**	0.55	0.32	NA	0.32	0	0.32	0.84	**0.58**	0	NA	0.32	NA	1	**0.21**	NA	NA	0	NA	0.85	0.32
t-test against control group (Prob.)	**0.8**	0.59	0.36	0.09	0.35	0.09	0.35	0.45	**0.36**	0.39	0	0.68	0.11	0.5	**0.37**	0	0.01	0.4	0	0.34	1
Part H: Developing countries in Western Hemisphere																					
Mean	**0.66**	0.69	0.71	0.59	0.43	0.87	0.93	0.46	**0.43**	0.82	0.29	0.48	0.21	0.36	**0.42**	0.43	0.5	0.75	0.07	0.69	0.18
S.D.	**0.14**	0.36	0.09	0.28	0.35	0.07	0.19	0.29	**0.12**	0.28	0.27	0.17	0.27	0.48	**0.09**	0.45	0.41	0.34	0.19	0.3	0.31
n	**7**	7	7	7	7	5	7	5	**7**	7	7	7	7	7	**7**	7	7	5	7	7	7
z-test against 0.5 (Prob.)	**0**	0.16	0	0.4	0.58	0	0	0.73	**0.12**	0	0.03	0.78	0	0.43	**0.01**	0.67	1	0.1	0	0.11	0.01
t-test against control group (Prob.)	**0.15**	0.36	0.21	0.96	0.68	0.41	0	0.16	**0.01**	0.4	0.91	0.46	0.01	0.01	**0.16**	0.18	0.15	0.83	0	0.01	0.61

Notes: t-tests assume unequal variances. EI - macroeconomic index, MI - monetary structural index, OI - operational index. See definitions of remaining variables in Tables 1 to 3.

Apart from being small-open economies, developing countries, particularly those in Europe, are inferior in terms of technical applications. At operational level, central banks in developing countries,

particularly those in Asia, hold larger sizes of non-traditional assets in their balance sheets than those in industrial countries do. Low degrees of financial intermediation persist in developing countries in Europe and Western Hemisphere. The relatively high degree of capital control represents the only superior operational determinant of developing countries in comparison with industrialized countries. However, the characteristics of developing countries are not identical across regions. Developing countries in the Middle East do not have substantial sizes of non-traditional assets and central bank's securities in their central banks' balance sheets, and their economies are well financially deepened.

5.3 Types of Monetary Policy Frameworks and Differences in the Determinants

This subsection discusses the differences in the determinants among countries in terms of the type of monetary policy framework in 1998. The group of countries that pursued monetary aggregate targeting is treated as a control group in performing t-tests. The classification of countries followed the self-classifications available in Mahadeva and Sterned (2000, Table 5.2, pp.92-3) that divided monetary policy frameworks into four types: monetary aggregate targeting, exchange rate targeting, inflation targeting and others.[9] Detailed classifications and results of t-tests are presented in Table 6.

Table 6: International Differences by Type of Monetary Policy Framework

	EI	**ERG**	**SO**	**FIS**	**BL -Fra**	**CBI**	**FS -Cm**	**TA**	**MI**	**DM**	**PV**	**ME**	**EXV -Ca**	**IMF**	**OI**	**BL -Ass**	**BL -Cbs**	**ACC**	**FS -Fi**	**CC**	**PM**
Part A: Monetary Targeting (control group)																					
Mean	**0.65**	0.83	0.67	0.67	0.42	0.87	0.5	0.68	**0.48**	0.75	0.21	0.38	0.67	0.42	**0.38**	0.58	0	0.57	0.42	0.56	0.21
S.D.	**0.11**	0.31	0.26	0.22	0.38	0.07	0.45	0.14	**0.1**	0.22	0.25	0.16	0.41	0.49	**0.05**	0.49	0	0.37	0.38	0.41	0.25
n	**6**	6	6	6	6	5	6	5	**6**	6	6	6	6	6	**6**	6	6	5	6	6	6
z-test against 0.5 (Prob.)	**0.00**	0.01	0.11	0.06	0.59	0.00	1.00	0.00	**0.70**	0.01	0.00	0.05	0.32	0.68	**0.00**	0.68	NA	0.69	0.59	0.72	0
Part B: Exchage Rate Targeting																					
Mean	**0.53**	0.26	0.33	0.46	0.64	0.79	0.69	0.52	**0.55**	0.82	0.24	0.44	0.47	0.81	**0.48**	0.78	0.22	0.74	0.5	0.45	0.21
S.D.	**0.1**	0.23	0.26	0.31	0.38	0.13	0.35	0.32	**0.11**	0.29	0.26	0.24	0.44	0.39	**0.12**	0.31	0.39	0.23	0.45	0.31	0.33
n	**18**	18	18	18	18	17	18	17	**18**	17	18	18	18	18	**18**	18	18	17	18	18	18
z-test against 0.5 (Prob.)	**0.24**	0	0.01	0.54	0.12	0	0.02	0.84	**0.05**	0	0	0.27	0.79	0	**0.43**	0	0	0	1	0.46	0
t-test against control group (Prob.)	**0.04**	0	0.02	0.09	0.24	0.08	0.36	0.13	**0.2**	0.54	0.82	0.48	0.35	0.12	**0.01**	0.4	0.03	0.37	0.67	0.56	1
Part C: Inflation Targeting																					
Mean	**0.61**	0.73	0.6	0.62	0.43	0.82	0.48	0.62	**0.51**	0.68	0.26	0.51	0.45	0.67	**0.47**	0.45	0.33	0.79	0.45	0.58	0.21
S.D.	**0.09**	0.3	0.23	0.17	0.36	0.11	0.41	0.29	**0.19**	0.35	0.32	0.3	0.42	0.46	**0.14**	0.44	0.43	0.21	0.35	0.3	0.33
n	**21**	21	21	21	21	21	20	21	**21**	20	21	21	21	21	**21**	21	21	21	21	21	21
z-test against 0.5 (Prob.)	**0**	0	0.06	0	0.37	0	0.79	0.06	**0.77**	0.03	0	0.85	0.6	0.09	**0.32**	0.62	0.07	0	0.53	0.22	0
t-test against control group (Prob.)	**0.46**	0.49	0.56	0.64	0.95	0.21	0.91	0.5	**0.63**	0.55	0.67	0.15	0.29	0.3	**0.02**	0.57	0	0.26	0.84	0.91	0.96
Part E: Others																					
Mean	**0.57**	0.63	0.57	0.63	0.29	0.86	0.5	0.56	**0.5**	0.79	0.18	0.39	0.64	0.5	**0.52**	0.57	0.36	0.73	0.64	0.57	0.29
S.D.	**0.13**	0.38	0.4	0.24	0.27	0.08	0.41	0.29	**0.22**	0.3	0.24	0.33	0.38	0.5	**0.06**	0.45	0.38	0.14	0.48	0.29	0.37
n	**7**	7	7	7	7	6	7	6	**7**	7	7	7	7	7	**7**	7	7	5	7	7	7
z-test against 0.5 (Prob.)	**0.15**	0.37	0.64	0.16	0.03	0	1	0.58	**1**	0.01	0	0.38	0.32	1	**0.45**	0.67	0.32	0	0.43	0.54	0.12
t-test against control group (Prob.)	**0.23**	0.3	0.62	0.75	0.49	0.85	1	0.42	**0.86**	0.81	0.83	0.9	0.92	0.77	**0**	0.96	0.05	0.39	0.36	0.97	0.66

Notes: t-tests assume unequal variances. EI - macroeconomic index, MI - monetary structural index, OI - operational index. See definitions of remaining variables in Tables 1 to 3.

[9] Classifiation of monetary policy frameworks in Brazil, Colombia and Philippines followed IFS 1999.

The mean of MI of the group of monetary aggregate targeting is the lowest among all groups, although its z-statistic is not significantly below the moderate level. The group of exchange rate targeting performs the best on this respect, as its mean is significant and the highest.

Focusing on the results of t-tests in Part B of Table 6, the group of monetary targeting significantly differs from the group of exchange rate targeting on two dimensions of the determinants. Specifically, the first group has more favorable macroeconomic conditions in conducting independent monetary policy, but lesser flexibility in manipulating items in the balance sheet than the second group.Fewer significant t-statistics are found in Parts C and D of Table 6. This implies that the group of monetary targeting is not much different from the groups of inflation targeting and others.

The above findings are contradictory to what has been claimed that inflation targeting is an alternative to replace monetary aggregate target for an economy under which monetary structural situations are unpredictable. It is expected that the mean of MI of monetary aggregate targeting group would be the highest, or at least, higher than that of inflation targeting group.

5.4 Differences in the Determinants among Inflation-Targeting Countries

After the 1998 which was the year after the Asian financial crisis many crisis-affected countries decided to switch to inflation targeting. In order to incorporate this change, this subsection is devoted for exploring characteristics of countries that have pursued inflation targeting in the late 1990s and the beginning of 2000s. Specifically, Brazil, the Philippines, and Thailand are added to the group of inflation targeting in previous subsection.[10] The group of three pioneering countries namely, New Zealand, Canada and the United Kingdom, is treated as a control group in performing t-tests. The countries are categorized by type of monetary policy framework before switching to inflation targeting and by level of economic development. Detailed classifications and results of t-tests are presented in Table 7.

Part A of Table 7 provides characteristics of the group of pioneering countries of inflation targeting. Although the mean of MI is not significantly below the standard, the significantly weak relationships between monetary and economic variables is inferred as the main reason for ineffective monetary targeting. It is clear that the pioneering countries promoted high levels of central bank independence, technical applications and accountability as main features of inflation targeting. Among these three aspects, only the high level of central bank independce is commonly shared by all late comers.

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[10] Since Kazakhstan switched to monetary targeting, while Italy, Slovak Republic, and Armenia switched to other frameworks, the number of countries under the group of inflation targeting remains the same as in previous subsection.

Table 7: International Differences among Inflation-Targeting Countries

	EI	ERG	SO	FIS	BL -Fra	CBI	FS -Cm	TA	MI	DM	PV	ME	EXV -Ca	IMF	OI	BL -Ass	BL -Cbs	ACC	FS -Fi	CC	PM
Part A: Pioneering Countries (control group)																					
Mean	**0.63**	1	0.67	0.63	0.17	0.86	0.17	0.94	**0.49**	0.5	0.42	0.21	0.33	1	**0.52**	0.67	0.17	1	0.83	0.14	0.33
S.D.	**0.08**	0	0.29	0.22	0.29	0.07	0.29	0.06	**0.08**	0.35	0.14	0.19	0.29	0	**0.17**	0.58	0.29	0	0.29	0.03	0.29
n	**3**	3	3	3	3	3	3	3	**3**	2	3	3	3	3	**3**	3	3	3	3	3	3
z-test against 0.5 (Prob.)	**0.00**	NA	0.32	0.32	0.05	0.00	0.05	0.00	**0.89**	1.00	0.32	0.01	0.32	NA	**0.81**	0.62	0.05	NA	0.05	0.00	0.32
Part B: All Late Comers																					
Mean	**0.6**	0.73	0.58	0.59	0.44	0.81	0.5	0.59	**0.52**	0.68	0.26	0.56	0.53	0.58	**0.45**	0.33	0.42	0.74	0.42	0.73	0.14
S.D.	**0.1**	0.27	0.21	0.18	0.34	0.12	0.38	0.27	**0.18**	0.33	0.34	0.26	0.44	0.49	**0.14**	0.42	0.46	0.22	0.35	0.2	0.27
n	**18**	18	18	18	18	15	18	15	**18**	18	18	18	18	18	**18**	18	18	15	18	18	18
z-test against 0.5 (Prob.)	**0**	0	0.09	0.03	0.49	0	1	0.19	**0.6**	0.02	0	0.37	0.79	0.47	**0.15**	0.09	0.44	0	0.32	0	0
t-test against control group (Prob.)	**0.6**	0	0.67	0.83	0.23	0.39	0.17	0	**0.67**	0.6	0.23	0.06	0.38	0	**0.55**	0.43	0.28	0	0.11	0	0.37
Part C.1: Industrialized Countries																					
Mean	**0.54**	0.53	0.7	0.55	0.4	0.86	0.2	0.53	**0.66**	0.6	0.35	0.65	0.7	1	**0.48**	0.5	0.2	0.85	0.6	0.47	0.25
S.D.	**0.09**	0.43	0.21	0.16	0.42	0.09	0.27	0.17	**0.24**	0.45	0.42	0.39	0.45	0	**0.18**	0.5	0.45	0.04	0.22	0.1	0.43
n	**5**	5	5	5	5	5	5	5	**5**	5	5	5	5	5	**5**	5	5	5	5	5	5
z-test against 0.5 (Prob.)	**0.34**	0.87	0.03	0.49	0.59	0	0.01	0.66	**0.14**	0.62	0.42	0.39	0.32	NA	**0.78**	1	0.13	0	0.32	0.45	0.2
t-test against control group (Prob.)	**0.2**	0.07	0.87	0.64	0.39	0.96	0.88	0	**0.22**	0.78	0.76	0.08	0.21	NA	**0.73**	0.7	0.9	0	0.31	0	0.76
Part C.2: Developing Countries																					
Mean	**0.63**	0.8	0.54	0.61	0.46	0.78	0.62	0.62	**0.47**	0.71	0.23	0.52	0.46	0.42	**0.44**	0.27	0.5	0.68	0.35	0.84	0.1
S.D.	**0.1**	0.14	0.2	0.19	0.32	0.13	0.36	0.32	**0.12**	0.29	0.31	0.2	0.43	0.49	**0.13**	0.39	0.46	0.26	0.38	0.12	0.19
n	**13**	13	13	13	13	10	13	10	**13**	13	13	13	13	13	**13**	13	13	10	13	13	13
z-test against 0.5 (Prob.)	**0**	0	0.49	0.04	0.67	0	0.25	0.22	**0.37**	0.01	0	0.73	0.75	0.57	**0.11**	0.03	1	0.03	0.14	0	0
t-test against control group (Prob.)	**0.91**	0	0.53	0.91	0.21	0.24	0.09	0.01	**0.69**	0.55	0.17	0.08	0.56	0	**0.5**	0.36	0.18	0	0.07	0	0.29
Part D.1: Countries that shifted from monetary targeting																					
Mean	**0.62**	0.83	0.52	0.64	0.45	0.77	0.55	0.59	**0.49**	0.75	0.27	0.51	0.5	0.41	**0.42**	0.27	0.41	0.72	0.32	0.8	0.09
S.D.	**0.1**	0.15	0.21	0.19	0.27	0.12	0.42	0.35	**0.1**	0.27	0.33	0.26	0.45	0.49	**0.12**	0.41	0.44	0.18	0.34	0.14	0.17
n	**11**	11	11	11	11	9	11	9	**11**	11	11	11	11	11	**11**	11	11	9	11	11	11
z-test against 0.5 (Prob.)	**0**	0	0.72	0.01	0.58	0	0.72	0.42	**0.71**	0	0.02	0.88	1	0.54	**0.03**	0.07	0.49	0	0.07	0	0
t-test against control group (Prob.)	**0.85**	0	0.49	0.9	0.22	0.19	0.13	0.02	**0.93**	0.49	0.29	0.08	0.47	0	**0.41**	0.36	0.31	0	0.06	0	0.28
Part D.2: Countries that shifted from exchange rate targeting																					
Mean	**0.57**	0.56	0.68	0.51	0.43	0.86	0.43	0.59	**0.58**	0.57	0.25	0.63	0.57	0.86	**0.5**	0.43	0.43	0.76	0.57	0.62	0.21
S.D.	**0.1**	0.34	0.19	0.16	0.45	0.11	0.35	0.12	**0.27**	0.4	0.38	0.27	0.45	0.38	**0.17**	0.45	0.53	0.3	0.35	0.25	0.39
n	**7**	7	7	7	7	6	7	6	**7**	7	7	7	7	7	**7**	7	7	6	7	7	7
z-test against 0.5 (Prob.)	**0.06**	0.63	0.01	0.84	0.67	0	0.58	0.06	**0.45**	0.64	0.08	0.22	0.67	0.01	**0.98**	0.67	0.72	0.03	0.58	0.18	0.05
t-test against control group (Prob.)	**0.35**	0.01	0.95	0.47	0.31	0.97	0.28	0	**0.48**	0.83	0.35	0.04	0.36	0.36	**0.84**	0.57	0.35	0.11	0.28	0	0.62

Notes: t-tests assume unequal variances. EI - macroeconomic index, MI - monetary structural index, OI - operational index.

See definitions of remaining variables in Tables 1 to 3.

From the results of t-tests in Part B of Table 7, although there is no difference on the three indices; the group of late comers, in general, does not face the problem of weak monetary-economic relationships as serious as the group of pioneering problem does. Moreover, the group of late comers is inferier in terms of technical applications, liabilities to the IMF, and accountability.

By level of development, the results of t-tests in Parts C.1 and C.2 quite replicate those of Part B of Table 7 with a few exceptions. The group of industrialized countries is free from the influence from the IMF. The group of developing countries, on the other hand, has lower average levels of capital market development as well as degree of financial intermediation than the group of pioneering countries has.

Focusing on type of monetary policy prior to switching to inflation targeting, the results of t-tests in Parts D.1 and D.2 of Table 7 again quite replicate those of Part B with a few exceptions. The group of countries that switched from monetary targeting has significantly lower level of financial intermediation than the group of pioneering countries has. As for the group of countries that switched from exchange rate

targeting, its means of degrees of accountability and liabilities to the IMF are comparable to those of the group of pioneering countries.

Although some stylized facts regarding characteristics of industrialized and developing countries are detected, distinctions between groups of countries by type of monetary policy framework remain unclear. On the one hand, the above controversial findings in the results of t-tests could be due to limitation of the proposed analytical framework in capturing all critical determinants. On the other hand, the results can be inferred as an evidence of inconsistencies between theoretically suitable and actually pursued monetary policy framework in some countries. Korea and Indonesia, for instance, selected to adopt inflation targeting after the crisis despite of their relatively qualified monetary structural conditions in conducting monetary aggregate targeting, inferable from the MI of 0.62 and 0.65, respectively (Appendix B).

6. Implications on Price Stability

This section investigates interrelations among nature of the determinants, type of monetary policy framework, and effectiveness of monetary policy in achieving price stability by applying ordinal categorical analysis. One reason for not employing regression analysis as commonly found in prior studies is to reflect a concern that it is more practical for a country to try to achieve certain standards than to strive for perfection in all aspects. Another reason is that in performing categorical analysis, it does not require data to be normally distributed as in regression analysis.

Conversion of scale data of each aggregate index into categorical data again uses 0.5 as the benchmark.[11] As for the measurement of monetary policy effectiveness, for simplicity, this paper views price stability in two perspectives, i.e. low average inflation rates and low fluctuations in inflation rates, and treats these two proxy variables separately to reflect different problems faced by industrialized and developing countries. For developing countries that usually have two-digit inflation rates, aiming at low inflation rate fluctuations may be more realistic than at low inflation rates.

According to a literature survey by Hataiseree (1999) regarding target settings in seven industrialized countries in the early 1990s, inflation targets are normally set as range targets with upper limits below 5%, and the widths of the ranges not exceed 3%. Considering this information, this paper sets three choices of values to be used as the benchmark in converting scale data on five-year-average annual inflation rate (Inf) and standard deviation of the five-year annual inflation rates (S.D.) of each country into categorical data.

[11] When the score is exactly 0.5, the country is still classified as below standard.

Table 8 summarizes the counting of each scenario of cross-tabulations together with Somers'd statistics that indicate signs and directions of the relationships between nature of each aggregate index and inflation rates, layered by types of monetary policy frameworks.[12] Part A presents cross-tabulations under which the proxy variable of price stability is the five-year-average annual inflation rate; where the proxy variable is standard deviation of the five-year annual inflation rates in Part B.

Focusing only significant relationships at 10% level, under exchange rate targeting, nature of the determinants and price stability are not correlated in any direction, except for the case of monetary structural index in Part B where 0.5% standard deviation is a benchmark. Still, the value of Somers'd statistics are relatively low, indicating that monetary structural depends on inflation rate fluctuations.

Under monetary targeting, monetary structural index perfect correlates with price stability in all cases of both measurements, except for one case in Part B where 1.5% standard deviation is a benchmark. On the contrary, no relationship could be detected on the remaining two aggregate indices.

Under inflation targeting, monetary structural index also shows significant associations with inflation rate fluctuations. However, the relationship is not as strong as under the case of monetary targeting. Moreover, the influence from the determinants to the standard deviation of inflation rates seems to be weaker than vice versa.

Under other types of monetary policy frameworks of which targets are implicit, the nature of operational index has bilateral positive relationships with average inflation rates when the benchmark is either in the ranges between 0% and 3% or between 0% and 4%. The former benchmark results in a higher degree of association than the latter one. As for the cases of price stability measured in terms of standard deviation, all indices are found significant when the benchmark is 1%, with a remark that the indices tend to be dependent rather than independent variables in the relationships. When the benchmark is 1.5% standard deviation, strong and significant bilateral relationships are found in the cases of monetary structural and operational indices.

[12] See explanations of statistical meaning and calculation of Somers'd statistic in Agresti (1984, p. 161).

Table 8: Directional Relationships between Price Stability and Determinants

Part A: Y is Average of 5-Year Annual Inflation Rates (Inf)

Group		Is 0% < Inf < 2% ?							Is 0% < Inf < 3% ?							Is 0% < Inf < 4% ?						
		X: EI		X: MI		X: OI			X: EI		X: MI		X: OI			X: EI		X: MI		X: OI		
	Y	< 0.5	> 0.5	< 0.5	> 0.5	< 0.5	> 0.5	Total	< 0.5	> 0.5	< 0.5	> 0.5	< 0.5	> 0.5	Total	< 0.5	> 0.5	< 0.5	> 0.5	< 0.5	> 0.5	Total
ET	No	7	8	6	9	10	5	15	5	4	4	5	5	3	8	5	3	4	4	4	4	8
	Yes	1	2	1	2	2	1	3	3	6	3	6	7	3	10	3	7	3	7	8	2	10
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	0.08	0.66	0.04	0.82	0.00	1.00		0.23	0.33	0.12	0.63	-0.25	0.30		0.33	0.15	0.21	0.38	-0.33	0.17	
	Y --> X	0.13	0.66	0.07	0.82	0.00	1.00		0.22	0.33	0.11	0.63	-0.22	0.30		0.33	0.15	0.20	0.38	-0.30	0.17	
MT	No		4	4	0	4		4		4	4	0	4		4		4	4	0	4		4
	Yes		2	0	2	2		2		2	0	2	2		2		2	0	2	2		2
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	NA		1.00	0.00	NA			NA		1.00	0.00	NA			NA		1.00	0.00	NA		
	Y --> X	NA		1.00	0.00	NA			NA		1.00	0.00	NA			NA		1.00	0.00	NA		
IT	No	2	13	8	7	10	5	15	2	12	8	6	9	5	14	1	10	7	4	8	3	11
	Yes	0	6	2	4	2	4	6	0	7	2	5	3	4	7	1	9	3	7	4	6	10
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	0.32	0.15	0.16	0.40	0.28	0.16		0.37	0.14	0.25	0.19	0.19	0.35		-0.03	0.94	0.34	0.10	0.33	0.11	
	Y --> X	0.13	0.15	0.20	0.40	0.33	0.16		0.14	0.14	0.29	0.19	0.21	0.35		-0.01	0.94	0.34	0.10	0.33	0.11	
OT	No	3	3	4	2	3	3	6	2	2	3	1	3	1	4	1	2	3	0	3	0	3
	Yes	0	1	0	1	0	1	1	1	2	1	2	0	3	3	2	2	1	3	0	4	4
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	0.25	0.25	0.33	0.22	0.25	0.25		0.17	0.65	0.42	0.23	0.75	0.00		-0.17	0.65	0.75	0.00	0.11	0.00	
	Y --> X	0.50	0.25	0.67	0.22	0.50	0.25		0.17	0.65	0.42	0.23	0.75	0.00		-0.17	0.65	0.75	0.00	0.11	0.00	
	Total	13	39	25	27	33	19	52	13	39	25	27	33	19	52	13	39	25	27	33	19	52

Part B: Y is Standard Deviation of 5-Year Annual Inflation Rates (S.D.)

Group		Is S.D. < 0.5%?							Is S.D. < 1%?							Is S.D. < 1.5%?						
		X: EI		X: MI		X: OI			X: EI		X: MI		X: OI			X: EI		X: MI		X: OI		
	Y	< 0.5	> 0.5	< 0.5	> 0.5	< 0.5	> 0.5	Total	< 0.5	> 0.5	< 0.5	> 0.5	< 0.5	> 0.5	Total	< 0.5	> 0.5	< 0.5	> 0.5	< 0.5	> 0.5	Total
ET	No	7	7	7	7	9	5	14	5	5	5	5	7	3	10	3	4	4	3	5	2	7
	Yes	1	3	0	4	3	1	4	3	5	2	6	5	3	8	5	6	3	8	7	4	11
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	0.18	0.35	0.36	0.02	-0.08	0.67		0.13	0.59	0.26	0.26	0.08	0.74		-0.03	0.91	0.30	0.20	0.08	0.73	
	Y --> X	0.25	0.35	0.50	0.02	-0.11	0.67		0.13	0.59	0.25	0.26	0.08	0.74		-0.03	0.91	0.30	0.20	0.08	0.73	
MT	No		6	4	2	6		6		4	4	0	4		4		3	3	0	3		3
	Yes		0	0	0	0		0		2	0	2	2		2		3	1	2	3		3
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	NA		NA		NA			NA		1.00	0.00	NA			NA		0.75	0.01	NA		
	Y --> X	NA		NA		NA			NA		1.00	0.00	NA			NA		0.67	0.01	NA		
IT	No	2	17	10	9	11	8	19	2	14	10	6	9	7	16	1	12	8	5	8	5	13
	Yes	0	2	0	2	1	1	2	0	5	0	5	3	2	5	1	7	2	6	4	4	8
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	0.11	0.27	0.18	0.12	0.03	0.83		0.26	0.16	0.45	0.00	-0.03	0.88		-0.13	0.73	0.35	0.08	0.11	0.60	
	Y --> X	0.11	0.27	0.53	0.12	0.08	0.83		0.13	0.16	0.63	0.00	-0.04	0.88		-0.05	0.73	0.37	0.08	0.12	0.60	
OT	No	3	4	4	3	3	4	7	3	2	4	1	3	2	5	2	2	4	0	3	1	4
	Yes	0	0	0	0	0	0	0	0	2	0	2	0	2	2	1	2	0	3	0	3	3
	Somers'd	Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.		Value	Prob.	Value	Prob.	Value	Prob.	
	X --> Y	NA		NA		NA			0.50	0.05	0.67	0.02	0.50	0.05		0.17	0.65	1.00	0.00	0.75	0.00	
	Y --> X	NA		NA		NA			0.60	0.05	0.80	0.02	0.60	0.05		0.17	0.65	1.00	0.00	0.75	0.00	
	Total	13	39	25	27	33	19	52	13	39	25	27	33	19	52	13	39	25	27	33	19	52

Notes: X → Y means Y is dependent variable; and Y → X means X is dependent variable. Group name: ET- exchange rate targeting, MT- monetary targeting, IT- inflation targting, OT – others. X variable: EI - macroeconomic index, MI - monetary structural index, OI - operational index. Highlighted cells represent significant values of Somers'd statistics at 10% level.

7. Conclusions and Remarks

Observing that there were both successes and failures in attaining price stability among central banks during the 1990s, regardless of type of monetary policy frameworks adopted, this paper represents a pioneering attempt in revealing interrelationships among types of the frameworks, nature of their determinants, and effectiveness of monetary policy in terms of price stability.

Based on availability of comparable quarterly data, this paper covers 52 countries including both industrialized and developing countries. The period from 1996 to 2000 is chosen for non-EMU countries, while it is from 1994 to 1998 for EMU countries.

Discriminant analysis screens and reclassifies listed determinants objectively in forming macroeconomic, monetary structural, and operational dimensions. Main results of this analysis imply that macroeconomic determinants, particularly the size of foreign assets in their balance sheet, were the most important for central banks in the late 1990s in choosing between fixed and floating exchange rate regime. Monetary targeting seemed to be preferable in large-closed countries in which monetary policy played more significant role than fiscal policy, and capital markets remained small. Inflation targeting tended to be adopted when demand for money and velocity of money were unpredictable together with existing high current account deficits.

Based on the results of the final discriminant analysis, three aggregate indices representing each dimension of the determinants are constructed. Four main findings regarding international differences in the determinants are drawn. First, there are two common trends shared by most countries in the late 1990s: the high degree of central bank independence and the unstable velocities of money. Second, developing countries were generally inferior to industrialized countries in terms of overall monetary structural determinants. In some regions, developing countries experienced high current account deficits and had high level of liabilities to the IMF. Despite comparable levels of central bank independence and accountability, the level of technical applications in developing countries, in general, was lower than those in industrialized countries. Third, there were inconsistencies between type of monetary policy framework and nature of monetary structural determinants in many countries. Fourth, late comers of inflation targeting differed from pioneering countries in a number of respects. Reasons for adopting inflation targeting might be different among these groups of countries. It is worth noticing that many of these developing countries were under crisis and had been financed by the IMF. It becomes skeptical whether the adoption of the inflation target was a result of self-determination or an influence from the IMF. For instance, a country that was highly dependent on the IMF like Indonesia, of which the MD was above standard, had switched back from inflation targeting to monetary aggregate targeting after some years of unsuccessful results.

After converting scale data of the aggregate indices and those of two proxy variables of price stability into categorical data and performing simple ordinal categorical analysis, it can be inferred that monetary targeting is the most promising type of monetary policy framework that ensures price stability, given that value of monetary structural index of the country is above the moderate level. For a country that has relatively low monetary structural index, adopting implicit targeting is recommended if its value of operational index is above the moderate level. Inflation targeting, under which the directional relationships are weak, seems to be useful only when the two indices stay below the moderate levels.

Integrating the main findings from analyses above, two implications can be drawn. First, despite worldwide experience of unpredictable velocity of money, some countries could still achieve price stability under monetary targeting as their other monetary structural determinants remained superior. Second, although inflation targeting has gained its popularity and has led to promotion of central bank independence and accountability, the relationship from monetary structural index to inflation rate fluctuations under the framework was weak and tended to reverse.

These two implications from the late 1990s together with the view of Ball (2000) who argues that “In open economies, inflation targeting is sub-optimal unless it is modified in an important way” (p. 3) lead to a question whether it is worthwhile for a developing country with limited resources to switch from monetary targeting to inflation targeting just because of unstable velocity of money as usually claimed by industrialized countries. Without switching to inflation targeting, a monetary targeting country may try adjusting controllable determinants such as the size of non-traditional assets of its central bank and the level of current account deficits. These adjustments may help improve the value of monetary structural index to surpass the moderate level and regain the controllability over the inflation.

From another perspective, if inflation targeting or other implicit frameworks actually help improve the value of monetary structural index, it may be worthwhile for the country to switch to monetary targeting after its monetary structural index or operational index surpasses the moderate level.

Whether the implications from the late 1990s are well applicable to the present situation or not requires further research that includes more countries and applies differenct time periods. Apart from increasing the sample size and revising some determinants, incorporating output growth as another monetary policy objective variable is another source of modifications. Ultimately, having strong understanding of the implications of the determinants is expected to assist diagnosis and prescription for healing the right sources of monetary policy ineffectiveness in individual countries of different characteristics.

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Appendix A: Notes on Data Substitutions

Variable	Suggested Line in IFS	Substitution
Monetary base	14 - Reserve Money	▪ Summation of 14a - Currency Issued and 14c - Liabilities to Banking Institutions in Country - Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain
M1	34 - Money	▪ Summation of 34a - Currency in Circulation and 34b - Demand Deposits - Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain ▪ 59MA - M1 (National Definition) - Sweden ▪ Difference between 35L - Money and Quasi Money and 25L - Demand, Time, Saving and Foreign Currency deposits - United Kingdom
M2	M1+35 - Quasi Money	▪ 35L - Money and Quasi Money - Sweden
Government spending	82 - Government Expenditure	▪ 82z - Expenditure and lending minus repayment - France ▪ 91f - Government Consumption - Japan
Interest Rate	60L - Deposit Rate	▪ 60c - Treasury Bill Rate - Kazakhstan ▪ 60a - Structural Credit Rate - Romania ▪ 60LC - Certificate of Deposit (Secondary Market) 3 - United States
Exchange rate	rf - Official Rate of domestic currency per US dollar	▪ rh - Market Rate for US dollar per domestic currency - Australia, New Zealand, United Kingdom ▪ wf - Principal Rate - Belgium, Mexico, South Africa ▪ ed - ECUs per domestic currency - Ireland ▪ EB - US dollar per ECU currency - United States ▪ Excluded, as shown stable - Jordan, Lithuania

Appendix B: Scores of Selected Determinants

No.	Country	Frm	Dev	EI	ERG	SO	Size	Open	FIS	BL -Fra	CBI	FS -Cm	TA	MI	DM	PV	ME	EXV -Ca	IMF	OI	BL -Ass	BL -Cbs	ACC	FS -Fi	SO -Cc	PM	Inf (%)	S.D. (%)	Evaluation EI	Evaluation MI	Evaluation OI	Inflation Inf	Inflation S.D.
1	Argentina	1	6	**0.46**	0	0.75	0.5	1	0.17	0.5	0.79	1	0	**0.45**	1	0.5	0.75	0	0	**0.55**	1	0	1	0	0.58	0.75	-0.10	0.91	B	B	A	-0.10	0.9
2	Armenia	3	4	**0.63**	1	0.25	0	0.5	0.5	1	0.76	NA	0.28	**0.35**	1	0	0.75	0	0	**0.33**	1	0	0.83	0	0.13	0	8.23	8.38	A	B	B	8.23	8.4
3	Australia	3	1	**0.51**	1	0.75	0.5	1	0.75	0	0.73	0	0.33	**0.45**	0.75	0.5	0	0	1	**0.52**	1	0	0.83	0.5	0.53	0.25	1.93	1.67	A	B	A	1.93	1.7
4	Austria	1	1	**0.6**	0.22	0.5	0.5	0.5	0.38	0.5	0.68	1	0.89	**0.63**	1	0	0.63	0.5	1	**0.49**	1	0	0.67	1	0.29	0	1.86	0.80	A	A	B	1.86	0.8
5	Belgium	1	1	**0.46**	0.22	0.25	0.5	0	0.38	0.5	0.77	0.5	0.61	**0.75**	1	0.25	0.5	1	1	**0.63**	1	1	0.33	1	0.47	0	1.70	0.55	B	A	A	1.7	0.5
6	Brazil	4	6	**0.49**	0.86	0.75	0.5	1	0.33	0	NA	0.5	NA	**0.2**	0.25	0.5	0.25	0	0	**0.48**	0.5	1	NA	0	0.89	0	7.56	4.85	B	B	B	7.56	4.9
7	Bulgaria	1	4	**0.44**	0.2	0.25	0.5	0	0	0	0.79	1	0.33	**0.6**	1	0.75	0.75	0.5	0	**0.54**	1	0	1	0	0.72	0.5	242.31	458.77	B	A	A	242	459
8	Canada	3	1	**0.54**	1	0.5	0.5	0.5	0.5	0	0.91	0	0.89	**0.55**	0.75	0.5	0	0.5	1	**0.52**	1	0	1	0.5	0.11	0.5	1.73	0.64	A	A	A	1.73	0.6
9	Chile	3	6	**0.68**	0.78	0.75	0.5	1	0.75	0	0.93	1	0.56	**0.43**	0.75	0	0.38	0	1	**0.44**	0	1	0.17	0.5	1	0	5.16	1.65	A	B	B	5.16	1.6
10	Colombia	1	6	**0.74**	0.72	0.75	0.5	1	0.75	0.5	NA	1	NA	**0.55**	0.75	0	0.5	0.5	1	**0.29**	0	0.5	NA	0	0.94	0	15.49	5.05	A	A	B	15.5	5.1
11	Czech	3	4	**0.69**	0.61	0.25	0.5	0	0.63	1	0.98	0.5	0.89	**0.58**	0.25	1	0.63	0	1	**0.31**	0	0	0.75	0.5	0.58	0	6.80	3.60	A	A	B	6.8	3.6
12	Denmark	1	1	**0.53**	0.27	0.5	0.5	0.5	0.5	0.5	0.88	0.5	0.56	**0.6**	1	0	0.5	0.5	1	**0.48**	0.5	1	0.75	0.5	0.12	0	2.31	0.41	A	A	B	2.31	0.4
13	Ecuador	4	6	**0.72**	0.46	0.75	0.5	1	1	0.5	0.93	1	0.39	**0.48**	1	0	0.38	0.5	0.5	**0.44**	0.5	0.5	0.75	0	0.41	0.5	47.89	28.86	A	B	B	47.9	29
14	Finland	3	1	**0.61**	0.22	0.5	0.5	0.5	0.5	1	0.91	0.5	0.61	**0.58**	0.25	0	0.63	1	1	**0.3**	0	0	0.92	0.5	0.4	0	1.06	0.29	A	A	B	1.06	0.3
15	France	3	1	**0.56**	0.22	1	1	1	0.33	0.5	0.9	0.5	0.44	**0.83**	1	0.25	0.88	1	1	**0.28**	0	0	0.83	0.5	0.37	0	1.46	0.53	A	A	B	1.46	0.5
16	Germany	2	1	**0.57**	0.22	1	1	1	0.75	0	0.96	0.5	0.56	**0.55**	0.5	0.25	0.5	0.5	1	**0.4**	1	0	0.17	0.5	0.21	0.5	1.75	0.68	A	A	B	1.75	0.7
17	Greece	1	1	**0.47**	0.4	0.75	0.5	1	0.13	0	0.86	0.5	0.67	**0.65**	1	0.25	0.5	0.5	1	**0.42**	0.5	1	0.33	0.5	0.16	0	7.67	2.52	B	A	B	7.67	2.5
18	Hong Kong	1	3	**0.5**	0.26	0.25	0.5	0	1	1	0.74	0	0.28	**0.43**	0	0	0.13	1	1	**0.5**	1	0	0.92	1	0.08	0	1.45	5.02	A	B	B	1.45	5
19	Hungary	1	4	**0.39**	0.62	0.25	0.5	0	0.25	0	0.86	0.5	0.22	**0.5**	1	0	0.5	0	1	**0.62**	1	0.5	0.83	0.5	0.88	0	15.18	5.86	B	B	A	15.2	5.9
20	Iceland	1	1	**0.45**	0.3	0.25	0	0.5	0.88	0	0.59	1	0.11	**0.4**	0.5	0.25	0.25	0	1	**0.4**	0.5	0	0.92	0	0.48	0.5	2.83	1.44	B	B	B	2.83	1.4
21	Indonesia	3	3	**0.61**	0.93	0.5	0.5	0.5	0.75	0	0.56	0.5	1	**0.65**	1	0.25	1	1	0	**0.53**	0	1	0.83	0.5	0.86	0	19.44	22.23	A	A	A	19.4	22
22	Ireland	1	1	**0.58**	0.22	0.25	0.5	0	0.67	1	0.87	0.5	0.56	**0.69**	NA	0.5	0.25	1	1	**0.5**	1	0	0.83	1	0.16	0	2.09	0.49	A	A	B	2.09	0.5
23	Israel	3	5	**0.64**	0.62	0.5	0.5	0.5	0.5	1	0.66	0.5	0.67	**0.55**	0.75	0	0.5	0.5	1	**0.7**	1	0	1	1	0.68	0.5	6.41	3.89	A	A	A	6.41	3.9
24	Italy	3	1	**0.6**	0.22	1	1	1	0.67	0	0.88	0.5	0.94	**0.65**	0.75	0	0.5	1	1	**0.39**	0.5	0.5	0.58	0.5	0.24	0	3.45	1.42	A	A	B	3.45	1.4
25	Japan	4	1	**0.66**	1	1	1	1	0.5	0	0.93	0.5	0.72	**0.8**	1	0.5	0.5	1	1	**0.61**	1	0	N.A.	1	0.3	0.75	0.30	0.94	A	A	A	0.3	0.9
26	Jordan	4	5	**0.45**	0	0	0	0	0.5	0.5	0.74	1	0.39	**0.33**	1	0	0.13	0.5	0	**0.52**	1	0	0.75	1	0.38	0	2.78	2.41	B	B	A	2.78	2.4
27	Kazakhstan	3	4	**0.67**	0.85	0.5	0.5	0.5	0.63	0.5	0.76	1	0.44	**0.1**	0	0	0	0.5	0	**0.43**	0	0.5	0.83	0	0.97	0.25	17.06	13.09	A	B	B	17.1	13
28	Korea	3	3	**0.62**	0.93	0.5	0.5	0.5	0.88	0.5	0.73	0	0.78	**0.6**	1	0.25	0.75	1	0	**0.62**	0	1	0.83	0.5	0.91	0.5	4.00	2.59	A	A	A	4	2.6
29	Latvia	1	4	**0.53**	0.13	0	0	0	0.5	1	0.98	1	0.11	**0.4**	1	0	0.5	0	0.5	**0.34**	1	0	0.67	0	0.37	0	7.14	6.33	A	B	B	7.14	6.3
30	Lithuania	1	4	**0.68**	0	0	0	0	0.88	1	0.89	1	1	**0.4**	1	0.25	0.75	0	0	**0.29**	0.5	0	1	0	0.27	0	8.07	9.83	A	B	B	8.07	9.8
31	Malaysia	4	3	**0.39**	0.33	0.25	0.5	0	0.67	0.5	0.85	0	0.17	**0.75**	0.75	0	1	1	1	**0.54**	0	0.5	0.83	1	0.92	0	3.14	1.38	B	A	A	3.14	1.4
32	Malta	1	4	**0.54**	0	0	0	0	0.25	1	0.83	1	0.67	**0.55**	1	0.5	0.25	0	1	**0.73**	1	0	0.83	1	0.83	0.75	2.41	0.42	A	A	A	2.41	0.4
33	Mexico	3	6	**0.7**	1	0.5	0.5	0.5	0.5	0.5	0.82	1	0.56	**0.53**	1	0.5	0.63	0.5	0	**0.37**	0	0.5	0.92	0	0.8	0	19.40	9.27	A	A	B	19.4	9.3
34	Namibia	1	2	**0.39**	0	0	0	0	0	1	0.5	1	0.22	**0.75**	1	0.25	0.5	1	1	**0.56**	1	0	0.33	0	1	1	8.12	1.15	B	A	A	8.12	1.2
35	Netherlands	1	1	**0.47**	0.22	0.25	0.5	0	0.38	0.5	0.91	0	1	**0.55**	0.75	0	0	1	1	**0.44**	0.5	0	0.83	1	0.08	0.25	2.18	0.36	B	A	B	2.18	0.4
36	New Zealand	3	1	**0.7**	1	0.5	0.5	0.5	0.5	0.5	0.89	0.5	1	**0.4**	0.25	0.5	0.25	0	1	**0.69**	1	0.5	1	1	0.16	0.5	1.45	1.08	A	B	A	1.45	1.1
37	Norway	1	1	**0.62**	0.74	0.5	0.5	0.5	0.38	1	0.57	0.5	0.67	**0.5**	0.5	0	0	1	1	**0.38**	1	0	0.5	0.5	0.3	0	2.30	0.67	A	B	B	2.3	0.7
38	Peru	2	6	**0.86**	1	0.75	0.5	1	0.63	1	0.89	1	0.78	**0.4**	1	0.5	0.5	0	0	**0.35**	1	0	0.92	0	0.19	0	6.92	3.39	A	B	B	6.92	3.4
39	Philippines	2	3	**0.55**	1	0.25	0.5	0	0.5	0.5	NA	0.5	NA	**0.38**	0.5	0	0.38	1	0	**0.33**	0	0	NA	0.5	0.92	0.25	7.13	2.23	A	B	B	7.13	2.2
40	Poland	3	4	**0.77**	0.78	0.75	0.5	1	0.75	0.5	0.86	1	0.78	**0.35**	0.5	0	0.25	0	1	**0.5**	0.5	1	0.58	0	0.91	0	12.81	4.82	A	B	B	12.8	4.8
41	Portugal	1	1	**0.67**	0.22	0.5	0.5	0.5	0.75	1	0.85	0.5	0.89	**0.58**	0.5	0.75	0.63	0	1	**0.44**	0.5	0	0.83	1	0.32	0	3.47	1.21	A	A	B	3.47	1.2
42	Romania	3	4	**0.64**	0.81	0.5	0.5	0.5	0.83	0.5	0.77	1	0.06	**0.5**	1	0.5	0.5	0	0.5	**0.45**	1	0	0.83	0	0.86	0	68.83	48.59	A	B	B	68.8	49
43	Russia	2	4	**0.64**	0.78	0.75	0.5	1	0.38	0	0.76	1	0.78	**0.5**	0.75	0.5	0.25	1	0	**0.38**	0.5	0	0.83	0	0.95	0	39.31	28.74	A	B	B	39.3	29
44	Slovak	3	4	**0.61**	0.48	0.25	0.5	0	0.75	0.5	0.9	1	0.39	**0.3**	0.5	0	0.5	0	0.5	**0.57**	0.5	0	0.67	0.5	0.77	1	8.24	2.86	A	B	A	8.24	2.9
45	South Africa	2	2	**0.66**	1	0.75	0.5	1	0.75	0.5	0.85	0	0.78	**0.43**	1	0	0.13	0.5	0.5	**0.36**	0	0	0.75	0.5	0.92	0	6.67	1.43	A	B	B	6.67	1.4
46	Spain	3	1	**0.4**	0.22	0.75	0.5	1	0.5	0	0.8	0	0.5	**0.45**	0	0	0.75	0.5	1	**0.66**	0.5	1	0.83	1	0.6	0	3.35	1.40	B	B	A	3.35	1.4
47	Sweden	3	1	**0.63**	1	0.5	0.5	0.5	0.67	0.5	0.97	0	0.78	**1**	1	1	1	1	1	**0.63**	1	0	0.83	0.5	0.44	1	0.46	0.44	A	A	A	0.46	0.4
48	Switzerland	2	1	**0.63**	1	0.5	0.5	0.5	1	0.5	0.9	0	0.5	**0.65**	0.75	0	0.5	1	1	**0.47**	1	0	0.17	1	0.16	0.5	0.75	0.55	A	A	B	0.75	0.6
49	Thailand	4	3	**0.59**	0.73	0.25	0.5	0	0.5	0.5	0.82	0.5	0.83	**0.4**	0.5	0	0.5	1	0	**0.46**	0	0.5	0.5	1	0.78	0	4.27	3.23	A	B	B	4.27	3.2
50	Turkey	3	4	**0.42**	0.62	0.75	0.5	1	0.25	0.5	0.7	0	0.11	**0.4**	1	0	0.5	0.5	0	**0.28**	0.5	0	0.42	0	0.75	0	74.10	13.59	B	B	B	74.1	14
51	UK	3	1	**0.66**	1	1	1	1	0.88	0	0.77	0	0.94	**0.53**	NA	0.25	0.38	0.5	1	**0.36**	0	0	1	1	0.16	0	2.70	0.73	A	A	B	2.7	0.7
52	USA	4	1	**0.67**	1	1	1	1	0.88	0	0.92	0	0.89	**0.55**	1	0.25	0	0.5	1	**0.56**	1	0	0.83	0.5	0.28	0.75	2.48	0.70	A	A	A	2.48	0.7

Notes:

Frm - Type of framework
1 - Exchange rate targeting
2 - Monetary targeting
3 - Inflation targeting
4 - Others

Dev - Economic development
1 - Industrialized
2 - Developing Africa
3 - Developing Asia
4 - Developing Europe
5 - Developing Middle East
6 - Developing Western Hemisphere

EI - Macroeconomic index
MI - Monetary structural index
OI - Operational index
A - above 0.5
B - below or equal to 0.5

Macroeconomic determinants
ERG - Exchange rate regime
SO - Size and openness of economy
FIS - Fiscal influence
BL-Fra - Size of foreign assets
CBI - Central bank independence
FS-Cm - Capital market development
TA - Technical applications

Monetary structural determinants
DM - Demand for money
PV - Predictability of velocity of money
ME - Monetary-economic relationship
EXV-Ca - Current account
IMF - Liabilities to the IMF

Operational determinants
BL-Ass - Non-traditional assets
BL-Cbs - Central bank's securities
ACC - Accountability
FS-Fi - Financial intermediation
SO-Cc - Capital control
PM - Predictability of money multiplier

Proxy variables of price stability
Inf - average of 5-year inflation rates
S.D. - S.D. of 5-year inflation rates

Sources of raw data:
- IFS, WDI, AREAER
- Mahadeva and Sterne (2000)
- Central banks' websites and literature

Appendix C: Scores of Excluded Determinants

No.	Country	Frm	Dev	BL -Cg	BL -Gd	MS	Rr	Mb	Ef1	Ef2	FS -Inn	FS -Dol	FS -Em	EXV -Sd	EXV -Fd	EXV -Fr
1	Argentina	1	6	0.5	1	0	0	0	0	0	0.5	0	NA	0.5	0	1
2	Armenia	3	4	0.5	1	0	NA	0	0	0	1	0	1	1	0.75	0.5
3	Australia	3	1	0	0.5	0.38	0.5	1	0	0	0.5	1	0.5	NA	1	0
4	Austria	1	1	1	1	0.38	1	0.5	0	0	0	1	0.5	NA	1	0.5
5	Belgium	1	1	1	1	0.38	0	1	0.5	0	0	NA	0	NA	1	0
6	Brazil	4	6	0	0	0.25	1	0	0	0	0	NA	0	0.5	0	1
7	Bulgaria	1	4	0.5	0	0.25	0.5	0	0.5	0	0.5	0	NA	1	0.5	1
8	Canada	3	1	0	0	0.5	0	1	0	1	0.5	NA	1	NA	1	0
9	Chile	3	6	0.5	0.5	0.25	0	0.5	0.5	0	0	1	0	1	0.5	1
10	Colombia	1	6	1	1	0	0	0	0	0	0.5	NA	0.5	0.5	0.33	1
11	Czech	3	4	1	0.5	0.5	0	0	1	1	0.5	0.5	0.5	0	0.75	0.5
12	Denmark	1	1	1	0	0.25	0	1	0	0	1	1	NA	NA	1	0
13	Ecuador	4	6	0.5	0	0.75	1	0	1	1	0.5	0	NA	0.5	0	0.5
14	Finland	3	1	1	1	0.25	0	1	0	0	1	1	0	NA	1	0.5
15	France	3	1	1	0.5	0.5	1	1	0	0	0.5	NA	0	NA	1	0
16	Germany	2	1	1	1	0.38	0.5	1	0	0	0.5	NA	0.5	NA	1	0
17	Greece	1	1	0	1	0	0	0	0	0	0	0.5	1	NA	1	1
18	Hong Kong	1	3	1	0	0	0	0	0	0	0	0	0	NA	1	1
19	Hungary	1	4	0	1	0.25	0.5	0.5	0	0	0.5	0.5	1	0.5	0.5	0.5
20	Iceland	1	1	0.5	0	0.38	0	0.5	1	0	0	NA	1	NA	1	0
21	Indonesia	3	3	0	0	0	0	0	0	0	0	0.5	0	0.5	0	1
22	Ireland	1	1	1	0	0.5	0.5	0.5	1	0	0.5	NA	1	NA	1	0
23	Israel	3	5	0.5	0	0	0	0	0	0	0	0.5	0.5	NA	1	1
24	Italy	3	1	0	0	0.63	0	1	0.5	1	1	1	0	NA	1	0
25	Japan	4	1	0	0.5	0.5	0.5	1	0	0.5	0.5	1	0.5	NA	1	1
26	Jordan	4	5	0.5	1	0	0	0	0	0	0.5	NA	NA	1	0	1
27	Kazakhstan	3	4	0.5	0	0.63	0.5	0.5	1	0.5	1	0	NA	1	0.5	0.5
28	Korea	3	3	1	1	0.38	1	0.5	0	0	0	1	0.5	NA	1	0.5
29	Latvia	1	4	0.5	1	0	0	0	0	0	1	0	0	0	0	0.5
30	Lithuania	1	4	1	1	0	0	0	0	0	1	0	NA	0.5	0.5	0
31	Malaysia	4	3	1	0.5	0.13	0	0	0	0.5	0.5	1	0.5	0.5	0.5	0.5
32	Malta	1	4	1	1	0.38	0.5	0	1	0	0	NA	NA	NA	1	1
33	Mexico	3	6	1	0	0.13	0	0.5	0	0	0.5	1	0.5	0.5	0.75	0
34	Namibia	1	2	0.5	0	0.38	0.5	1	0	0	1	NA	NA	NA	1	0
35	Netherlands	1	1	1	0.5	0.25	0	1	0	0	0.5	1	0.5	NA	1	0
36	New Zealand	3	1	0.5	0	0.5	0	1	0	1	0	1	0	NA	1	0
37	Norway	1	1	1	0	0.25	0	1	0	0	1	1	0.5	NA	1	1
38	Peru	2	6	1	0	0.13	0	0	0	0.5	0.5	0	0	0.5	0	1
39	Philippines	2	3	0.5	0.5	0.13	0.5	0	0	0	0	0	NA	0.5	0.5	0.5
40	Poland	3	4	0.5	1	0.5	1	0.5	0	0.5	0.5	0.5	0	1	0.75	1
41	Portugal	1	1	1	0	0.25	0	1	0	0	0.5	NA	0.5	NA	1	1
42	Romania	3	4	0.5	1	0	0	0	0	0	0.5	0	0.5	1	0.75	0.5
43	Russia	2	4	0	0.5	0.25	0	0	0.5	0.5	1	0	0	1	0.5	0
44	Slovak	3	4	1	0.5	0.13	0	0.5	0	0	0.5	0.5	1	0	0.5	0.5
45	South Africa	2	2	0.5	0.5	0.38	0.5	1	0	0	1	1	0.5	0	0.75	0
46	Spain	3	1	0.5	0.5	0.13	0	0.5	0	0	0.5	1	0.5	NA	1	0.5
47	Sweden	3	1	0.5	1	0	0	NA	0	0	NA	1	0.5	NA	1	0
48	Switzerland	2	1	1	0.5	0.75	1	1	1	0	0.5	1	0	NA	1	1
49	Thailand	4	3	1	0.5	0	0	0	0	0	0	1	0	0	0.5	1
50	Turkey	3	4	1	1	0.13	0.5	0	0	0	0	0	0.5	0.5	0	0.5
51	UK	3	1	0	1	0	0	0	0	0	NA	0.5	0	NA	1	0
52	USA	4	1	0	1	0.38	1	0.5	0	0	0.5	NA	0	NA	1	0

Notes:

Frm - Type of framework
1 - Exchange rate targeting
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4 - Others

Dev - Economic development
1 - Industrialized
2 - Developing Africa
3 - Developing Asia
4 - Developing Europe
5 - Developing Middle East
6 - Developing Western Hemisphere

BL-Cg - Claims on central government
BL-Gg - Central government deposits

MS - Money supply controllability
Rr - Reserve requirement ratio
Mb - Monetary base
Ef1 - Effects on changes in M1
Ef2 - Effects on changes in M2

FS-Inn - Financial innovations
FS-Dol - Financial dollarization
FS-Em - Electronic money deepening

EXV-Sd - Short-term external debt
EXV-Fd - Indebtedness
EXV-Fr - Foreign reserves in months of imports

Sources of raw data:

- IFS, WDI, AREAER
- Mahadeva and Sterne (2000)
- Central banks' websites and literature