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of Determinants of Monetary Policy Framework**

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A Three-Dimensional Model for Cross-Country Analysis of
Determinants of Monetary Policy Framework

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Abstract: This paper proposes the first analytical model that systematically divides determinants of monetary policy frameworks according to the degree of endogeniety from the point of view of monetary authority into three dimensions, namely, institutional, monetary structural and other determinants. In order to demonstrate the potential applications of the model in a cross-country analysis, the model was applied to a case a study covering the period from 1996 to 2000 of seven industrialized and seven developing countries. Primarily, the results showed that while developing countries were inferior to industrialized countries in terms of institutional aspects and facing higher degree of uncertainties in conducting a monetary policy framework, their monetary conditions were theoretically more favorable in adopting monetary aggregate targeting. Similar findings were found in the case of countries that were pursuing inflation targeting. Within each group, the characteristics of developing countries were found more diverse with no specific homogeneity. Still, the validity of these findings requires further research steps that include a larger number of countries.

Keywords: monetary policy framework, institutional determinants, monetary structural determinants

1. Introduction

In an economy where money is required in the process of capital formation, any changes in its quantity or cost of borrowing (interest rate) can have an implication on real economic variables, such as inflation, growth, and unemployment rates. Based on this fundamental understanding, the ultimate goal of monetary policy is to promote economic stability through manipulating monetary policy instruments that influence one or more real economic variables.

Concerning the design of monetary policy framework, it deals with a comprehensive process from deciding which ultimate goal(s) should be achieved in the long-term to intuitively operating policy

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instruments according to a selected medium-term target and the appropriate path to achieve the goal(s). The type of monetary policy frameowork is usually classified by the type of intermediate target varialbe which is a finanical variable that proxies the monetary goal.[2] Beyond the type of monetary policy framework, details of monetary policy framework can vary across-country, for instance, in terms of single versus multiple monetary goals, implicit versus explicit framework, rule-based versus discretionary decision making, point versus range target setting, etc.

Each stage in the conduct of monetary policy generally deals with the problems of variable selection or priority ranking, time inconsistency between the monetary policy implementation and its feedbacks on real economy, the ability of the monetary authority, and uncertainties. In searching for an appropriate type and details of monetary policy framework, it is necessary to incorporate all relevant factors that can have implications on the effectiveness of monetary policy formulation in achiving selected ultimate goal(s) of monetary policy. These factors can be referred to as determinants of monetary policy framework (hereafter, determinants).

Despite a general understanding that the determinants are different across countries and the selection of a monetary policy framework should not focus only on the merits of each alternative of monetary policy framework drawn from experiences of other countries, none of prior studies has clearly provided an effective analytical model for the examination of all relevant determinants in international context. Considering this issue this paper proposes an analytical model that enables an illustration of the degree differences of the determinants across countries.

The structure of this paper comprises five main sections. The next section discusses issues in conducting a cross-country analysis of the determinants. In order to deal with the issues, a three-dimensional model is proposed in the third section. The fourth section applies the model to a case study covering seven industrialized countries and seven developing countries in order to illustrate degree of differences in their determinants. The last section contains conclusions and suggestions for further research.

2. Issues in Comparing Determinants of Monetary Policy Framework across Countries

Conceptually, a cross-country analysis can be performed by conducting partial analyses for individual determinants of each country, and comparing the characteristics of each determinant across countries. In practice, there are three main issues to consider in constructing an analytical model that well

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[2] In *International Financial Statistics* of the IMF, types of monetary policy framework are classified into Exchange rate anchor, Monetary

aggregate target, Inflation targeting framework, Fund-supported or other monetary program, and Other.

supports discussions and policy implications. The first issue concerns the scope of the determinants to be analyzed. The second issue deals with appropriate proxy variables and standardized methodologies to assess them. How to present the results of individual partial analyses in a systematic way is the third issue.

2.1 Scope of the Determinants

At present there is no specific list of the determinants. Mahadeva and Sterne (2000, ch.1) descriptively and roughly divided them into three categories: economic structure, nature of monetary policy transmission, and ability of monetary policy response. In their explanation, the economic structure refers to the structure of the financial system, fiscal discipline, and degree of openness; the nature of the monetary policy transmission includes the determinants of the speed of the transmission; and the ability of monetary policy responses crucially depends on the institutional arrangements and analytical capacity.

In addition to the above list of the determinants, there are at least three more factors that have implications on the design of monetary policy framework and worth considering. A common one is the type of exchange rate regime. While pursuing fixed or pegged exchange rate regime implies a direct imposition of type of monetary policy framework, adopting other more flexible exchange rate regimes, on the other hand, gives more freedom to the monetary authority in selecting an appropriate intermediate target variable.

Another factor that is worth recognizing as a determinant is the influence from international organizations, particularly from the IMF, in selecting a monetary policy framework. It can be observed that most countries under the IMF's conditionality tended to adopt suggested monetary policy framework, leaving it questionable whether it was really suitable for those economies. Park (2003) criticized the IMF's conditionality on crisis-affected countries that it was too broad, overwhelming, reactive, and covering many non-traditional areas; consequently, it resulted in confusion in setting a target for restructuring, inconsistencies between different reform measures, and misguided sequencing of financial and corporate restructuring. Moreover, he pointed out that too many requirements with uncertain scope may discourage recipients to develop and utilize their own analytical capacity.

The third factor is the degree of deepening of electronic money as a substitute for cash.[3] The spread of electronic money represents possible reduction in demand for currency. This creates two main concerns in the conduct of monetary policy. The first concern is a reduction of seigniorage revenue from printing bank notes and coins (Stuber, 1996 and Goodhart, 2000). The second concern raised by Friedman (2000) is the

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[3] 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).

declining in the ability of the monetary authority in adjusting money supply via the use of monetary base along with the deepening of the electronic money. Although at present no particular country has realized significant effect of electronic money on monetary policy formulation, the extreme case of perfect substitution calls for an attention.

2.2 Proxy Variables of the Determinants

Choices of proxy variables to represent individual determinants and methodologies to derive them can become sources of debates. This subsection raises examples of problems in selecting proxy variables.

Regarding financial structure, there are two aspects related to the effectiveness of monetary policy: degrees of financial deepening and financial development. While the first aspect can be illustrated by looking at the ratios of some monetary aggregates (such as bank credit, M1 or M2) to GDP, the second aspect is rather difficult to identify.

Assessing the nature of relationship between monetary variables (e.g. monetary aggregates) and real economic variables (e.g. inflation rate and economic growth) is another source of complications. Although it can be done by constructing a demand function for money, still the results can vary depending on choices of variables representing opportunity costs as well as time horizon in consideration.

Analyzing monetary transmission mechanisms has to deal with two main issues. The first one concerns unsettled methodology in applying Vector Autoregression (VAR) to compare the relative speed of monetary transmission mechanisms among different channels.[4] The second issue deals with the variable representing a monetary policy instrument in the VAR, i.e. whether it should be a monetary aggregate or a short-term interest rate which represents the policy rate. The choice on this variable implies the type of monetary policy framework the country is pursuing. The short-term interest rate gains popularity in recent studies reflecting the popularity of adopting inflation targeting in many countries. Still, it is questionable whether the framework is suitable for those economies. Unfortunately, as the historical experience of inflation targeting remains too short, there is no specific list of determinants to judge the qualifications for particular country to perform it successfully. Common practices of major pioneering countries include increasing the degree of central bank independence, announcing explicit official target for the inflation rate, forecasting inflation rate and continually communicating with the public about plans and changes in there stance. These practices are obviously more costly and complicated than the case of monetary aggregate targeting.

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[4] See further discussions on issues concerning VAR specifications in Atchariyachanvanich (2004).

How to reflect potential fiscal impacts on monetary policy formulation is another important issue because there are several channels. The first channel is through the changes in central government's borrowings and deposits in the central bank's balance sheet. These items are beyond the control of the monetary authority, therefore, limiting the capacity in managing the monetary base. Other channels concern government's activities in real economy, namely government spending, tax collection and budgeting. Theoretically, these activities can have impacts on GDP and price. This means that unanticipated changes on these activities may deprive the monetary authority of achieving its target. However, empirical cross-country studies showed that it is not always the case that government's activities would have significant statistical relationships with monetary target's variable; neither the relative monetary-fiscal influences were found identical across countries.[5]

As for the discussions about the institutional arrangements, many studies focus on the degree of central bank independence which implies the level of freedom from political influence in monetary policy formulation. Information necessary for constructing an index for the degree of central bank independence can be inferred from either central bank law or questionnair filled by the monetary authority. It is easier to get the information from the first source than the latter as nowadays central bank laws are usually available on individual central banks' homepages. However, it is arguable that the real practices may be far from what are writen in the central bank laws. On the other hand, in order to ensure long-term accountability and transparency in the conduct of montary policy some other aspects concerning legal enforcement aspect embedded in the central bank law is also crucial.

Beyond all problems mentioned above, selecting certain proxy variables to perform a cross-country analysis is constrained by data unavailability as well as resources limitations.

2.3 Presentation of the Determinants

There are at least three issues to consider in performing a cross-country analysis on the nature of a particular determinant. The first issue concerns a risk in comparing countries based on ranking of absolute values. When the number of observations (number of countries) is low, ranking may mistakenly lead to a conclusion that one country performs very well (poorly) when in fact all countries actually perform poorly (well). This is because ranking shows the relative, but not the true performance of an economy. The second issue is the flexibility of the model that allows for further analyses. In this regard, repeating the

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[5] Atchariyachanvanich (2005a) represents an example of empirical studies illustrating disparity of relative monetary-fiscal influences on economic variables among countries.

ranking becomes necessary if the comparison relies on an absolute value of the results of the analysis. The tasks become more complicated when the number of countries is large. The third issue is that in some analyses (e.g. the stability of money multiplier), the absolute value (e.g. how high the magnitude) is less important than the conclusion on the nature of the variable (e.g. its time-series is stationary or non-stationary). In this case, it requires a descriptive criterion to classify the performance.

Considering the three issues, it is necessary to set a general standard in classifying the results of partial analysis of each determinant. This is to allow a case that the characteristics of two or more countries are classified into the same category for a certain determinant.

When the number of determinants is large, it is inefficient to report the results of each determinant one by one. There is a need to divide the determinants into groups and present them collectively to ease illustrating overall characteristics and drawing policy recommendations. For the second purpose, the classification of Mahadeva and Sterne (2000, ch.1) has a drawback as it does not clearly distinguish the degree of endogeniety or the controllability of the determinants. This problem clearly exists in the first category that concerns the economic structure. While the monetary authority has some ability to adjust the financial structure in order to improve the effectiveness of the monetary policy, the authority cannot adjust the degree of openness and fiscal discipline for the same purpose. The determinants should, therefore, be separated in such a way to help identify internal and external factors that affect the effectiveness of monetary policy.

3. Construction of a Three-Dimensional Model[6]

This section comprises five subsections, beginning with the classification of the determinants. Three subsequent subsections provide explanation of three aggregate indices one by one. The last subsection explains potential applications of the model for evaluations and policy recommendations.

3.1 Classification of determinants

In order to reflect the degree of endogeniety or the control over the determinants, this paper proposes to classify the determinants into three dimensions: institutional, monetary structural and other determinants. In this proposed classification, institutional determinants are recognized as the most controllable and the most related to the conduct of monetary policy among the three types of the determinants. This is because

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[6] This proposed model is a revision of the one proposed in Atchariyachanvanich (2005b). The author is grateful to the valuable comments from the commentator, Dr. Toyoichiro Shirota of the Bank of Japan.

legislation amendment on the monetary policy objective, for instance, can bring about an immediate change on the monetary policy formulation. The monetary structural determinants are regarded as the second type of determinants because the monetary authority has some ability to adjust and control over the structure of the financial system, but the results of such control are not certainly predictable depending on the nature of the relationships between monetary and real economic variables. On the other hand, there remain other determinants that are beyond the influences of the monetary authority but do have implications on the effectiveness of monetary policy. Therefore, these determinants are considered and classified as the third type with the lowest degree of controllability.

Figure 1: Three-Dimensional Determinants of Monetary Policy Model

Institutional Determinants

1. Central bank independence, CBI

2. Accountability, ACC

3. Management capacity of monetary authority's balance

   sheet, BL

4. Ability to adjust money supply, MS

5. Technical applications in policy formulation, TA

Other Determinants

1. Influence of fiscal policy, FIS

2. Size and degree of openness, S&O

3. External vulnerabilities, EXV

4. Foreign exchange rate regime, ERG

5. Influence from the IMF, IMF

Monetary Structual Determinants

1. Structure of financial system, FS

2. Relationships between money aggregates and economic variables, ME

3. Stability of demand for money, DM

4. Predictability of money multiplier, PM
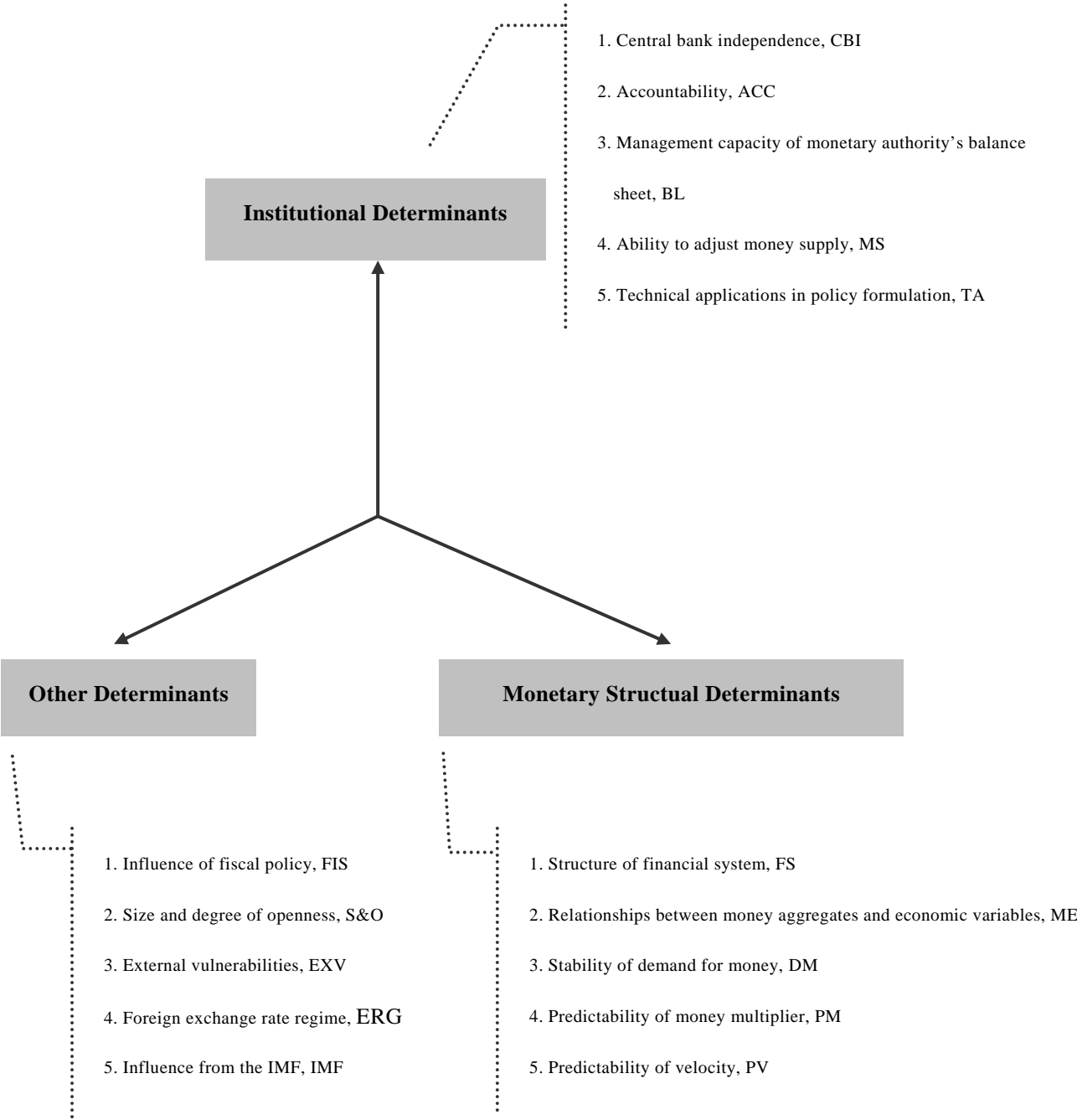
5. Predictability of velocity, PV

Figure 1 summarizes of types of determinants under the proposed three-dimensional model. In order to integrate the results of partial analyses on individual determinants for the purpose of cross-country analysis, construction of three aggregate indices representing each dimension is proposed. In particular, indexation is possible by assigning scores to all possible cases of the nature of proxy variables. Each dimension contains several determinants and there can be more than one proxy variable for a particular determinant. The aggregate index is simply an average score of all groups of proxy variables under the same dimension. In order to avoid subjectivity, equal weights are applied both across and within the groups. The details of variables and their classifications are explained in each corresponding subsection.

Selection of proxy variables is based on the availability of publicly available data in order to allow future modifications by any interested parties. Complicated econometric analyses are kept to the minimum with standard methodologies.

3.2 Indexation of Institutional Determinants

In order to derive an aggregate index to represent the institutional determinants, this subsection begins with setting variables and assigning scores according to the possibility that monetary authority can manipulate monetary instruments effectively. A higher score signifies higher possibility.

The capacity of a monetary authority in formulating a monetary policy framework can be evaluated by looking at both legal and operation aspects. While the legal capacity is reflected in the central bank law, the operational capacity here refers to the potential of the monetary authority in performing the role of monetary control under a current operational structure.

The legal aspect is discussed in terms of degrees of central bank independence (CBI) and accountability (ACC). As for the operational capacity, the discussions are divided into three main perspectives: balance sheet management (BL), money supply controlling capacity (MS) and the degree of technical application in the policy formulation (TA).

The two proxy variables concerning the legal aspect are taken from the index for central bank independence constructed by the Bank of England (in Mahadeva and Sterne, 2000) based on a survey over 93 central banks in 1998 with the main merit of large coverage.[7] The index for the degree of central bank independence (CBI) was calculated from five variables concerning the focus on price stability as a legal objective, independence in setting of policy target, independence in adjusting monetary policy instruments,

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[7] Although the contruction of the selected CBI index is less detailed, construction of the index following the method of Cukierman (1992) or Atchariyachanvanich (2003) is constrained by the limited number of central bank laws of the same period.

the extent of limits on financing the fiscal deficit, and length of the term of office of governor.[8] The degree of central bank independence implies the level of freedom that a central bank can choose a monetary policy path independently. The index for the degree of accountability (ACC) in the survey was calculated from four variables concerning existence of official publication of target, the role of the government in setting target, existence of any procedures when the target is missed, and existence of monitoring legislature.[9] The high degree of accountability ensures the responsibility of monetary authority in the process of a monetary instrument selection and the policy implementation toward achieving the announced target. For both indices, the raw data was available in Mahadeva and Sterne (2000, Tables A.5 and A.6 in Appendix 1).

The structure of a balance sheet (BL) of the monetary authority gives indirect information about how flexible the monetary policy authority is in manipulating the monetary base. Such flexibility is expected to be high when the size of non-traditional assets (Ass), claims on central governments (Cg), and central government deposits (Gd) are low; and when foreign assets (Fra), securities of the central bank and the money market instrument and bond (Cbs) are high. Looking at the share of a particular item in total assets helps comparing the size of these items. Instead of setting equal ranges, it is more appropriate to set progressing ranges. For example, when the size of non-traditional assets is more than 50% of total assets it is considered as a very large share, no matter whether it is 51% or 90%. On the other hand, when the size grows beyond 10%, it starts to call for special attention by policymakers. The data to calculate each ratio is available in annual report of the *International Financial Statistics* (IFS), under the sector for monetary authorities (Lines 11 to 17r).

Regarding the money supply controlling capacity (MS), effectiveness of legal reserve requirement ratio (Rr) and powerfulness of monetary base (Mb) are chosen as proxy variables. As the legal reserve requirement ratio (Rr) has been claimed as the most powerful monetary instrument, its effectiveness deserves a review. In order to compare the legal reserve requirement ratio with the actual ratio, there are three possible cases to consider: identical, a small difference, and a significant difference. The first case means that commercial banks maintain a reserve ratio just to meet the legal requirements. The response to a change on the legal reserve requirements can be expected to be faster and more predictable than in other cases. Any difference between the actual reserve ratio and the legal reserve requirement ratios implies ineffectiveness in the reserve requirement as a monetary policy instrument. While the information regarding the legal reserve requirement ratio can be drawn from literatures or central banks' websites, the actual reserve ratio can be

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[8] See details of scores and weights assignments in Mahadeva and Sterne (2000, Table 4.4, pp. 70-71).

[9] See details of scores and weights assignments in Mahadeva and Sterne (2000, Table 4.5, p.77).

roughly calculated by dividing the Reserves of Deposit Money Banks (IFS, Line 20) by the summation of Demand Deposits (IFS, Line 24) and Time and Savings Deposits (IFS, Line 25)

The powerfulness of monetary base (Mb) can be determined in terms of the size of the money multiplier in the money creation process. The higher the actual money multiplier indicates the more powerful the monetary base is in the money creation process. The money multiplier which is significantly below one, on the other hand, means there are leakages in money creation process implying limited role of money base as a monetary instrument. In order to describe the powerfulness of the monetary base, size of the M1 multiplier is chosen. It can be calculated by dividing Money (IFS, Line 34) by Reserve Money (IFS, Line 14).

The degree of technical applications in the policy formulation (TA) is chosen as another determinant that indicates the technical capacity in formulating monetary policy. The index for this determinant follows the one constructed by the Bank of England to measure six variables regarding the use of models and forecast by individual central banks under the survey. These variables include the use of a model with at least ten behavioral equations, frequency of using structural macroeconomic models and forecast, frequency of using VAR-based models and forecasts, frequency of using other agencies' models and forecast, frequency of using short-term off-model data-based forecast, and frequency of using theory-based models and forecasts.[10]

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[10] See details of scores and weights assignments in Mahadeva and Sterne (2000, Table 4.9, p. 84).

Table 1: Coding of Institutional Determinants of Monetary Policy Framework

Group		Variable and Definition	Level and meaning	Score
CBI		Degree of central bank independence	Follow Mahadeva and Sterne (2000)'s Table 4.4: Measures of central bank independence	
ACC		Degree of accountability of the central bank	Follow Mahadeva and Sterne (2000)'s Table 4.5: Accountability of the central bank to government	
BL	Fra	Size of foreign assets out of total assets in monetary authority's balance sheet	1. More than 50%	1
			2. More than 20% but less than 50%	0.75
			3. More than 10% but less than 20%	0.50
			4. More than 5% but less than 10%	0.25
			5. Less than 5%	0
	Ass	Size of non-traditional assets out of total assets in monetary authority's balance sheet	1. Less than 5%	1
			2. More than 5% but less than 10%	0.75
			3. More than 10% but less than 20%	0.50
			4. More than 20% but less than 50%	0.25
			5. More than 50%	0
	Cg	Size of claims on central government in monetary authority's balance	1. Less than 5%	1
			2. More than 5% but less than 10%	0.75
			3. More than 10% but less than 20%	0.50
			4. More than 20% but less than 50%	0.25
			5. More than 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 50%	1
			2. More than 20% but less than 50%	0.75
			3. More than 10% but less than 20%	0.50
			4. More than 5% but less than 10%	0.25
			5. Less than 5%	0
	Gd	Size of government deposits out of total liabilities in monetary authority's balance sheet.	1. Less than 5%	1
			2. More than 5% but less than 10%	0.75
			3. More than 10% but less than 20%	0.50
			4. More than 20% but less than 50%	0.25
			5. More than 50%	0
MS	Rr	Effectiveness of legal reserve requirement ratio	1. Actual reserve ratio is between the legal reserve ratio $\pm$ 0.5	1
			2. Actual reserve ratio is a little below or above the legal reserve ratio $\pm$ 0.5	0.50
			3. Actual reserve ratio is obviously below or above the legal reserve ratio or there is no legal reserve requirement	0
	Mb	Powerfulness of monetary base measured in terms of size of M1 multiplier	1. More than 1.5 times	1
			2. Between 0.5 to 1.5 times	0.50
			3. Less than 0.5 time	0
TA		Degree of technical application in the policy formulation	Follow Mehadeva and Sterne (2000)'s tables 4.9: Measures of use of models and forecasts	

Source: Author's construction.

Sources of raw data: Tables A.5, A.6 and 10 in Appendix 1 of Mahadeva and Sterne (2000), *International Financial Statistics,* and literature reviews as well as information about legal reserve requirement ratios available in central banks' websites

3.3 Indexation of Monetary Structural Determinants

This subsection explains the construction of an aggregate index to represent the monetary structural determinants. Considering the issue that there is no specific requirement so far to determine the potential successful application of inflation targeting as the monetary policy framework, the determinants in this subsection are to reflect only the qualifications of a particular economy in applying monetary aggregate targeting. A higher score, therefore, signifies monetary condition that meets underlying assumptions of monetary aggregate targeting. Explicit assumptions include constant velocity of money and stable demand for money function. Implicitly, monetary aggregates and their relationships with monetary objective(s) should be predictable.

Here monetary structural determinants for pursuing monetary aggregate targeting are divided into five aspects. The first one is the structure of the financial system (FS). The second and the third aspects concern the predictability of money multiplier (PM) and velocity (PV). The fourth aspect focuses on the relationship between monetary aggregates and selected economy variables (ME). Long-term stability of demand for money (DM) represents the last aspect.

The successfulness of a monetary policy rule requires a supportive financial structure (FS) in which the monetary authority can manipulate monetary instruments effectively. Three proxy variables, namely degree of financial intermediation (Fi), degree of capital market development (Cm) and degree of electronic money deepening (Em) are selected to reflect an overview of the significance of monetary aggregates in an economy. As the monetary authority has a more powerful control over bank loans than over corporate stocks and bonds, being a bank-based economy is a supportive factor in promoting the effectiveness of monetary policy. The ratio of M2 to GDP is a common variable to represent the relative size of financial intermediation. Since the main alternative source of financing apart from commercial banks is securities markets, degree of capital market development deserves including.[11] The ratio of stock traded volume to GDP is used as the indicator. Data for both ratios are available in World Development Indicator's database. Rather identifying whether financial structure of an economy is bank-based or market-based, the two variables are presented independently. This is to allow the cases in which the sizes of both sources of private financing are equally large or equally small. As for the degree of electronic money deepening (Em), it is included as additional variable as it represents a potential source of erosion of the role of monetary aggregates in monetary policy formulation. However, the development of electronic money remains disparate across countries. There is no

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[11] Due to limited public data as well as limited role as a source of private financing, development of corporate bond markets is excluded from this analysis.

international statistics regarding the volume. The scoring of this variable, therefore, is based on descriptive inference from the survey of Bank for International Settlements (BIS, 2004).

Predictable movement of monetary aggregates is an underlying assumption in pursuing monetary aggregate targeting. The predictability can be discussed in terms of money multipliers (PM) and velocities of money (PV) for both M1 and M2. While the former explains the extent of controllability the money supply, the latter gives information about stability of the relationship between money supply and output. The predictability for both variables can be determined in terms of statistical stationarity of their time-series. The design of monetary policy rule based on the quantity theory is less complicated when the money multiplier and velocity of money are level-stationary. In such a situation, the authorities can pay more attention to the relationship between the monetary aggregate and monetary objective(s). If either money multipliers or velocity is trend-stationary, more considerations on how to control money supply to adjust output are required. On the other extreme, it is possible that both money multipliers are non-stationary. In such a case, the monetary authority can neither control the money supply quantitatively through adjusting the monetary base nor can it accurately estimate the impact of monetary policy on output. In order to capture the characteristics of the movements of money multipliers and velocities, it is necessary to conduct unit-root tests on time-series of quarterly data of M1 and M2 which can be drawn from IFS. In particular, Money in Line 34 represents M1. M2 can be considered as the summation of Lines 34 and 35. Time-series of money multipliers can be generated by dividing the two aggregate moneys by Reserves in Line 14 which represents monetary base. Time-series of velocities of money can be derived by dividing GDP (IFS, line 99B) by corresponding type of monetary aggregates. As for specifications in unit-root tests, constant term is included only in the test for level-stationary. Augmented-Dicky-Fuller (ADF) test is applied with the number of lags based on the results of Akaike's information criterion (AIC). To reject a certain hypothesis, 5% degree of siginicance is used as the criterion.

An effective intermediate target variable should be the one that has a strong influence with short delay on monetary objective variable. The Assessment on the relationships between monetary aggregates and real economic variables (ME) can be divided into four cases as there are two types of monetary aggregates and two dependent variables which are inflation rate and GDP growth rate. The two variables represent the main alternatives for monetary policy objective mostly discussed in monetary economic literature. For each pair of variables, dependent variable (e.g. inflation rate) is regressed on current value of independent value (e.g. the growth rate of M1) and its lagged values up to eight lags, based on quarterly data. Observing the results of *F*-test with 5% degree of siginicance as the criterion enables the preliminary evaluation on the existence of the significant relationship between the two variables. How delayed the monetary effects on the

dependent varaible are can be inferred from the number of lags that results in the minimum value of Akaike's information criterion (AIC) among all the signicant relationships.

The last qualification to be tested is the stability of long-term demand for money functions. Johansen's Cointegration tests can be applied for this purpose. The variables in a long-term demand function basically include the real money demand, scale variable, interest rate on money itself, and some variables representing opportunity costs. The ratios of monetary aggregates to consumer price index (CPI) (IFS, Line 64) are used as proxy variables for demand for money. GDP is commonly employed as the scale variable in money demand function. Deposit rate (IFS, Line 60L) is selected to represent the interest rate on money. Concerning the opportunity costs, inflation rate and degreciations in exchange rate are selected.[12] The first one is generated by calculating the changes in CPI across period. The second one is included to reflect openness of the economy. Its time-series can be derived by calculating the changes in average market exchange rate (IFS, Line rf) across period. In order to cope with the possiblity of heteroscedasticity, data for all time-series, except for interest rate, are taken logarithm. Due to the fact that the conclusions on the existance of cointegrated relationship among variables vary with the specifications regarding lag interval and determinstic trend assumptions, it would be too subjective to apply a set of standardized specifications to all cases and would be too tedious to search for the best set of specifications for each case. A solution is to focus on summary results of all possible cases.[13] Although the results from different cointegration models may show conflicting conclusions about number of cointegrating relations among the variables, it remains reasonable to claim the existence of stable long-term relationshiop among variables as long as there is no evidence of no cointegrating relation found in any model of different specifications.

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[12] Although international interest rate is normally employed as another type of opportunity costs to reflect the openness, defining a formula and assigning weights are problematic. Excluding it also helps limiting number of variables in performing cointegration tests.

[13] Stistical computer program such as EViews provides summaring results of Johansen's Cointegrating Test with five sets of different deterministic trend assumption.

Table 2: Coding of Monetary Structural Determinants of Monetary Policy Framework

Group		Variable and Definition	Level and meaning	Score
FS	Fi	Degree of financial intermediation in terms of M2 to GDP	1. More than 100%	1
			2. Less than 100% but more than 50%	0.66
			3. Less than 50% but more than 25%	0.33
			4. Less than 25%	0
	Cm	Degree of capital market development in terms of value traded to GDP	1. Less than 25%	1
			2. More than 25% but less than 50%	0.66
			3. More than 50% but less than 100%	0.33
			4. More than 100%	0
	Em	Degree of electronic money deepening	1. No significant development	1
			2. Limited used	0.66
			3. Used nationwide as a substitute for cash with reserve requirements	0.33
			4. Used nationwide as a substitute for cash without reserve requirements	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
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	Is long-term demand for M1 stable under cointegration tests?	1. No evidence of no cointegrated relationship	1
			2. Some evidence of no cointegrated relationship	0
	Dm2	Is long-term demand for M2 stable under cointegration tests?	1. No evidence of no cointegrated relationship	1
			2. Some evidence of no cointegrated relationship	0

Source: Author's construction.

Suggested sources of raw data: World Development Indicators' database, Bank for International Settlements (2004), and *International Financial Statistics*

3.4 Indexation of Other Determinants

Beyond the institutional and financial structural determinants, there are other determinants that have implications on monetary policy framework. These other determinants can be classified into five main groups. The first group is fiscal influence (FIS). The second group is size of the economy and its degree of openness (S&O). Under a context of an opened economy, it is necessary to consider external vulnerabilities (EXV) as the third, and foreign exchange rate regime (ERG) as the fourth groups, while the last is the influence from the IMF (IMF). Considering other determinants as sources of uncertainties to the effectiveness of monetary policy implementation, for each variable, the higher score reflects a lower degree of uncertainty that the respective determinant can cause.

The higher the degree of fiscal influence (FIS) is, the higher degree of uncertainty will be because unanticipated fiscal shocks can lead to target missing in monetary policy implementation. The degree of fiscal influence can be inferred from the situation of fiscal balance (Fb), and the size of the central government's debt (Cdg). Proxy variables are the ratios of fiscal surplus or deficit to GDP and the value of central government's debt to GDP. Both ratios are available in World Development Indicator's database. For fiscal balance, the most favorable case is when the government maintains balanced budget. 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.[14] For the size of the central government's debt, it has been believed that the lower the debt is, the lesser need for unanticipated financing from a central bank will be.

Considering empirical studies that show disparity in the relative monetary-fiscal influences on real economic variables, assessments on the degree of fiscal influence on price and GDP are included as additional proxy variables. The first step of each analysis is to regress the percentage change of each dependent variable on the percentage change of government spending (IFS, Line 82) and its lagged values up to eight lags to primarily check the relationship between the two variables.[15] If any relationship is found at 5% degree of significance, it implies that the government spending has an influence on the investigated dependent variable. The fiscal influence is considered stronger than monetary influence without further investigation when the growth rate of M1 and M2 are found not significantly related with the dependent

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[14] This is true when there is an escape clause in the central bank law that allows central government financing for the case of emergency.

[15] Although budget balance and tax revenue have been considered as potential independent variables in some studies, they are not included here because of less availability of data and theoretically lower magnitude of influence compared to government spending.

variables. However, if both influences are found significant, the next task of investigation is necessary. Polynomial Distribution Lags (PDL) technique is employed as a way to reduce number of parameters for short-term series. The appropriate lag length for each independent variable is the one that results in the distributed lag model of which F-statistic is statistically significant at 1% level, and the value for Akaike's information criterion (AIC) is the minimum. Once the appropriate lag length for each independent is derived, the next step is to regress repeatedly the dependent variable on selected distributed lags of all significant independent variables using the PDL technique without constraining the endpoints.[16] While the degree of PDL for one independent variable varies from 1 to its selected lag length, the degrees of PDL for the other variables are set at their selected lag lengths. The appropriate degrees of PDL for each independent variable are selected based on the same criteria used in selecting the lag length. The last step is to estimate each equation by using the PDL technique with the lag lengths and degrees selected. Comparing the absolute value of accumulated coefficient of each independent variable reflect the relative monetary-fiscal influence is possible by comparing the absolute value of accumulated coefficient of each independent variable.[17]

Regarding the size of economy and its degree of openness (S&O), monetary policy implementation in a small-open economy has to confront higher degree of the uncertainties due to uncontrollable foreign variables such as changes in interest rate, inflation and exchange rates in trade-partner foreign countries as well as the trend of globalization shared by all opened countries. The size of the economy (Size) is measured in terms of Gross National Income (GNI), using Atlas method. The degree of openness is measured by the size of trade relative to GDP. Both types of data are available in World Development Indicator's database. In addition to these two proxy variables, it is worth including a proxy that indicates that degree of capital control in order to reflect the potential speed of capital movements. An index for the degree of capital control can be calculated based on the method proposed by Miniane (2004). For simplicity, the construction of the index employs information from the matrix of Summary Features of Exchange Arrangements and Regulatory Framework for Current and Capital Transactions in Member Countries of the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*. The index is simply an unweighted average of capital controls on thirteen types of capital transactions.

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[16] Most modern statistic textbooks do not recommend imposing constraints on endpoints as it cause the coefficients to lie just within a range without giving outside information.

[17] The approach in analyzing relative moentary-fiscal influence was originally introduced in Andersen and Jordan (1968). The explanation in this paper is based on the modified version in Atchariyachanvanich (2005a)

In an open economy, the existence of external vulnerabilities (EXV) via trade and investment can cause balance of payment problems that may call for a revision on monetary objective setting. The monetary authority has to pay more attention on the movements of the real exchange rate when the external vulnerabilities are high. This is because the unanticipated balance of payment problems such as capital flights and jumps in value to foreign debts due to exchange rate depreciation may inevitably call for foreign exchange intervention. The intervention, in turn, can affect the path towards achieving monetary targets. In order to access the degree of external vulnerabilities, there are four proxy variables: 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). The first two variables represent the stage of balance of payment problem in the short-term. A positive balance and low level of short-term debt create less pressure on the monetary authority. The level of foreign debts reflected by the degree of indebtedness implies how necessary the real exchange rate movements have to be monitored. With high foreign debts, the monetary authority cannot completely allow free movement in foreign exchange market. The level of indebtedness of each country follows the World Bank's classification. The availability of foreign reserves to meet short-term obligations is another indicator for the degree of vulnerability. It can be measured in terms of months of imports. The data can be drawn from the World Development Indicator's database.

The degree of responsibility in the monetary authority in controlling exchange rates depends on the exchange rate regime (ERG) adopted by the country. Only under an independently floating exchange rate regime can the monetary authority be free from such responsibility. The exchange rate regime, which reflects such responsibility, follows the IMF's classification. The information is available in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*.

Accepting financial assistance from the IMF entitles a country to accept conditionality, which in turn, limits the freedom in choosing a monetary policy framework. Based on the assumption that the lower level of the liabilities is, the less influence is expected, the degree of influence from the IMF (IMF) on a country can be inferred from the ratio of liabilities of the country relative (IFS, Line 2tl) to its quota in the IMF (IFS, Line 2f.s).

Table 3: Coding of Other Determinants of Monetary Policy Framework

Group		Variable and Definition	Level and meaning	Score
FIS	Fb	Fiscal surplus or deficit as share of GDP	1. Less than 2%	1
			2. More than 2% but less than 5%	0.75
			3. More than 5% but less than 10%	0.50
			4. More than 10% but less than 20%	0.25
			5. More than 20%	0
	Cgd	Size of central government's debt as share of GDP	1. Less than 5%	1
			2. More than 5% but less than 10%	0.75
			3. More than 10% but less than 20%	0.50
			4. More than 20% but less than 50%	0.25
			5. More than 50%	0
	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
S&O	Size	Size of economy measured by GNI, Atlas method	1. More than 1,000,000 millions of US dollars	1
			2. Between 100,000 to 1,000,000 millions of US dollars	0.66
			3. Between 10,000 to 100,000 millions of US dollars	0.33
			4. Low 10,000 millions of US dollar	0
	Open	Size of imports plus exports as share of GDP	1. Less than 50%	1
			2. 50% to 99%	0.5
			3. More than 100%	0
	Cc	Degree of capital control	Miniane (2004)'s index	
EXV	Ca	Current account balance	1. Positive balance	1
			2. Zero balance (between ± 1% of GDP)	0.5
			3. Negative balance	0
	Sd	Share of short-term debt to total external debt	1. Less than 5%	1
			2. More than 5% but less than 10%	0.75
			3. More than 10% but less than 20%	0.50
			4. More than 20% but less than 50%	0.25
			5. More than 50%	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 2 months	1
			2. Around 2 months	0.5
			3. Less than 2 months	0
ERG		Exchange rate regime according to the IMF's classification	1. Independently floating	1
			2. Managed floating with no preannounced 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
IMF		Size of outstanding liabilities to the IMF, as percentage of quota	1. Less than 5%	1
			2. More than 5% but less than 50%	0.75
			3. More than 50% but less than 100%	0.50
			4. More than 100% but less than 200%	0.25
			5. More than 200%	0

Source: Author's construction.

Suggested sources of data: World Development Indicators' database, Bank for International Settlements (2004), *International Financial Statistics*, and *Annual Report on Exchange Arrangements and Exchange Restrictions*.

3.5 Applications of the Model

The previous subsections explain types of determinants and their proxy variables together with classifications for indexation. Aggregate index for each dimension of the determinants can be 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.

The first dimension which is institutional determinants tells the capacity of the monetary authority. A perfect overall score in this dimension means a monetary authority is legally and operationally independent from political influence in designing a monetary policy framework. At the same time, its ability to control the monetary base is the most effective theoretically. In order to ensure the accountability of monetary authority, a clear monetary objective has to be set at the initial stage with an agreement of the government. The selected objective and corresponding target can be announced explicitly to the public to ensure transparency and accountability of the monetary authority. The lower score, on the other hand, reflects the lower capacity of the monetary authority. An insufficient degree of independence and/or a lack of operational capacity may constrain the monetary authority in trying to achieve a concrete monetary objective. The institutional determinants, therefore, have an implication on the confidence in adopting an implicit or explicit monetary policy framework.

The second dimension concerns the monetary structure of the economy. The overall score of the monetary structural determinants depends on realistic applicability of the quantity theory. It requires the predictable relationship between quantity of money and real economic variable(s), the existence of long-run demand for money and the constant money multipliers as well as velocities. A perfect overall score in this dimension reflects the most pleasant monetary structure that eases the conduct of monetary aggregate targeting which relies on the quantity theory. This also means that a low score is evidence for the ineffectiveness of applying monetary aggregate targeting. However, the low score does not directly mean that inflation targeting is recommended. It requires further steps of investigation.

Other determinants constitute the third dimension of the determinants. The index explains the degree of uncertainties that a monetary policy authority must consider in conducting monetary policy. The perfect overall score of this dimension replicates the situation in which: the degree of fiscal influence on monetary policy formulation is low; the size of economy is not so small and so open that it cannot resist external shocks; the current degree of external vulnerabilities is low; the exchange rate is independently determined by the market; and, the economy is free from any influence from international institution, particularly the IMF, in designing its own monetary policy framework. When the degree of uncertainties is high (i.e. low overall score of other determinants), it is expected that some target missing will occur during the monetary policy

path. Therefore, in order to preserve monetary policy credibility, a flexible or range target is more suitable than a strict or point target format.

In order to describe the overall characteristics of the environment of monetary policy framework, the three dimensions of determinants are integrated into a three-dimensional diagram, shown below as Figure 2. The range of scale for each index is from zero to one.

Figure 2: Three-Dimensional Determinants of Monetary Policy Framework
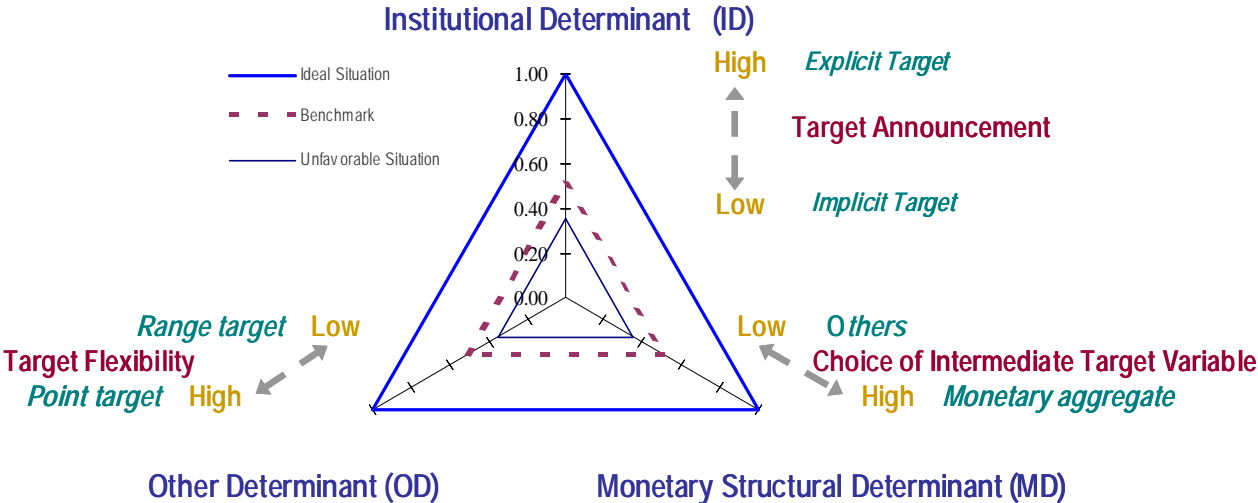
The size of the triangle is the largest when each dimension reaches its ideal situation. The monetary authority can effectively manipulate a monetary policy instrument according to its desired monetary policy rule that is based on the quantity theory. Uncertainties are minimal along the path towards attaining the selected monetary policy objective(s). Under such a situation, monetary aggregate targeting with point target can be announced explicitly with the least chance of objective missing. A smaller triangle, on the other hand, reflects an unfavorable situation of limited capacity of the monetary authorities in the monetary policy formulation, inapplicability of monetary aggregate targeting, and existence of high degree of uncertainties that have implications on monetary policy formulation.

In order to evaluate the overall determinants of an economy, a benchmark is necessary. The benchmark can be either a result of subjective values (e.g. 0.5) of each dimension or the one derived from average scores from a pool of samples, depending the purpose of evaluation.

4. Case Study of a Cross-country Analysis

In order to present the applicability of the proposed model, this section is devoted for a case study of a cross-country analysis on fourteen countries which covers both industrialized and developing countries. Under the group of industrialized countries, the selected countries include Australia (AUS), Canada (CAN), Denmark (DNK), Israel (ISR), New Zealand (NZL), the United Kingdom (GBR) and the United States (USA). As for developing countries, Argentina (ARG), Chile (CHL), Indonesia (IDN), Mexico (MEX), Peru (PER), South Africa (ZAF) and Thailand (THA) are selected. The period from 1996 to 2000 is chosen to ensure data availability. The results are shown in Table 4.

Table 4: Detailed Scores of the Determinants in 14 Countries

Country Code	Industrialized Countries							Developing Countries							All	
	AUS	CAN	DNK	ISR	NZL	GBR	USA	ARG	CHL	IDN	MEX	PER	ZAF	THA	Avg.	S.D.
ID	**0.65**	**0.78**	**0.69**	**0.58**	**0.78**	**0.74**	**0.82**	**0.53**	**0.68**	**0.64**	**0.66**	**0.70**	**0.70**	**0.62**	**0.68**	**0.08**
CBI	0.73	0.91	0.88	0.66	0.89	0.77	0.92	0.79	0.93	0.56	0.82	0.89	0.85	0.82	0.82	0.11
ACC	0.83	1.00	0.75	1.00	1.00	1.00	0.83	1.00	0.17	0.83	0.92	0.92	0.75	0.50	0.82	0.24
BL	0.60	0.60	0.75	0.55	0.50	0.75	0.45	0.60	0.75	0.55	0.50	0.65	0.60	0.70	0.61	0.10
Fra	1.00	1.00	1.00	1.00	1.00	0.75	0.50	1.00	1.00	0.75	1.00	1.00	1.00	1.00	0.93	0.15
Ass	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	1.00	1.00	1.00	0.95	0.20
Cg	0.25	0.25	0.75	0.50	0.25	0.00	0.00	0.25	0.25	0.25	1.00	1.00	0.25	0.75	0.41	0.33
Cbs	0.00	0.00	0.75	0.00	0.25	1.00	0.00	0.00	1.00	0.50	0.00	0.00	0.25	0.25	0.29	0.38
Gd	0.75	0.75	0.25	0.25	0.00	1.00	0.75	0.75	0.50	0.25	0.25	0.25	0.50	0.50	0.48	0.29
MS	0.75	0.50	0.50	0.00	0.50	0.25	1.00	0.25	1.00	0.25	0.50	0.25	0.50	0.25	0.46	0.29
RR	0.50	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.18	0.37
Mb	1.00	1.00	1.00	0.00	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50	1.00	0.50	0.75	0.33
TA	0.33	0.89	0.56	0.67	1.00	0.94	0.89	0.00	0.56	1.00	0.56	0.78	0.78	0.83	0.70	0.28
MD	**0.47**	**0.43**	**0.43**	**0.55**	**0.36**	**0.19**	**0.34**	**0.73**	**0.28**	**0.56**	**0.61**	**0.49**	**0.34**	**0.29**	**0.43**	**0.15**
FS	0.61	0.66	0.66	0.77	0.55	0.33	0.22	0.67	0.50	0.55	0.66	0.44	0.55	0.44	0.54	0.15
Fi	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.33	0.50	0.66	0.33	0.33	0.66	0.66	0.58	0.14
Cm	0.66	0.33	0.66	1.00	1.00	0.33	0.00	1.00	1.00	1.00	1.00	1.00	0.66	0.66	0.74	0.33
Em	0.50	1.00	NA	0.66	0.00	0.00	0.00	NA	0.00	0.00	0.66	0.00	0.33	0.00	0.26	0.36
PM	0.25	0.50	0.00	0.50	0.50	0.00	0.75	0.75	0.00	0.00	0.25	0.50	0.00	0.00	0.29	0.29
Pm1	0.50	0.00	0.00	1.00	1.00	0.00	0.50	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.43
Pm2	0.00	1.00	0.00	0.00	0.00	0.00	1.00	0.50	0.00	0.00	0.50	1.00	0.00	0.00	0.29	0.43
PV	0.50	0.50	0.00	0.00	0.50	0.25	0.25	0.50	0.00	0.25	0.50	0.00	0.00	0.00	0.23	0.23
V1	1.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.18	0.37
V2	0.00	1.00	0.00	0.00	1.00	0.50	0.00	1.00	0.00	0.50	0.00	0.00	0.00	0.00	0.29	0.43
ME	0.00	0.00	0.50	0.50	0.25	0.38	0.00	0.75	0.38	1.00	0.63	0.50	0.13	0.50	0.39	0.30
Mp1	0.00	0.00	1.00	0.00	1.00	0.00	0.00	0.50	0.50	1.00	1.00	0.50	0.50	0.00	0.43	0.43
Mp2	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	0.00	0.50	0.39	0.49
Mg1	0.00	0.00	1.00	1.00	0.00	1.00	0.00	0.50	1.00	1.00	0.50	0.00	0.00	1.00	0.50	0.48
Mg2	0.00	0.00	0.00	0.00	0.00	0.50	0.00	1.00	0.00	1.00	0.00	0.50	0.00	0.50	0.25	0.38
DM	1.00	0.50	1.00	1.00	0.00	0.00	0.50	1.00	0.50	1.00	1.00	1.00	1.00	0.50	0.71	0.38
Dm1	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.79	0.43
Dm2	1.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.64	0.50
OD	**0.77**	**0.68**	**0.59**	**0.69**	**0.70**	**0.69**	**0.78**	**0.31**	**0.70**	**0.58**	**0.48**	**0.54**	**0.75**	**0.49**	**0.63**	**0.13**
FIS	0.63	0.50	0.50	0.50	0.50	0.56	0.81	0.25	0.63	0.63	0.31	0.56	0.75	0.50	0.54	0.15
Fb	1.00	1.00	1.00	1.00	0.75	1.00	1.00	0.75	1.00	1.00	1.00	1.00	0.75	0.50	0.91	0.16
Cgd	0.50	0.00	0.00	0.00	0.25	0.25	0.25	NA	0.50	0.25	0.25	0.25	0.25	0.50	0.25	0.18
Gp	0.00	NA	NA	NA	NA	0.00	1.00	0.00	1.00	NA	0.00	1.00	1.00	1.00	0.56	0.53
Gg	1.00	NA	NA	NA	NA	1.00	1.00	0.00	0.00	NA	0.00	0.00	1.00	0.00	0.44	0.53
S&O	0.73	0.42	0.43	0.61	0.33	0.55	0.76	0.75	0.61	0.67	0.65	0.51	0.86	0.48	0.60	0.15
Size	0.66	0.66	0.66	0.66	0.33	1.00	1.00	0.66	0.33	0.66	0.66	0.33	0.66	0.66	0.64	0.21
Open	1.00	0.50	0.50	0.50	0.50	0.50	1.00	1.00	0.50	0.50	0.50	1.00	1.00	0.00	0.64	0.31
Cc	0.53	0.11	0.12	0.68	0.16	0.16	0.28	0.58	1.00	0.86	0.80	0.19	0.92	0.78	0.51	0.33
EXV	0.50	0.50	0.83	0.67	0.67	0.33	0.33	0.31	0.44	0.63	0.44	0.38	0.38	0.69	0.51	0.16
Ca	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.21	0.38
Sd	NA	NA	NA	NA	NA	NA	NA	0.25	0.25	0.50	0.50	0.50	0.25	0.25	0.36	0.13
Fd	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.50	0.00	0.75	0.00	0.75	0.50	0.68	0.41
Fr	0.50	0.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.50	1.00	0.50	1.00	0.68	0.42
ERG	1.00	1.00	0.20	0.68	1.00	1.00	1.00	0.00	0.84	0.96	1.00	1.00	1.00	0.76	0.82	0.32
IMF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.25	1.00	0.00	0.00	0.25	0.75	0.00	0.66	0.45

In most cases the data from the sources suggested in previous section were utilized. Except for the variables that are based on the survey of the Bank of England in Mahadeva and Sterne (2000) and that of the BIS (2004), every variables that do not apply regression analyses employ average values of annual data. Time-series of quarterly data were used for such analyses. However, it should be noted that in the quarterly data of government spending is not available in Canada, Denmark, Israel, New Zealand and Indonesia. The scores for the group of fiscal influence (FIS) of these countries are calculated by excluding Gp and Gg variables. Similar solution is applied when data is not available (quoted as "NA"). Another remark concerns the evaluation on the effectiveness of legal reserve requirement ratio as a monetary policy instrument (Rr). When a country sets the legal reserve requirement ratio as zero, its effectiveness would be considered ineffective and assigned score as zero. The last remark is on the calculation of the index for capital control of the year 1996 which is available in the *Annual Report on Exchange Arrangements and Exchange Restrictions 1997*. Its calculation was based on twelve rather than thirteen categories of capital controls.

Table 5 summarizes the values of the three aggregate indices of each group of countries. Focusing on the average values, it is inferable that industrialized countries on average were superior to developing countries at large in terms of strong institutional capacity and lower degree of uncertainties. However, their monetary structures did not seem to support the applications of monetary aggregate targeting. In the selected developing countries, their monetary structures seemed more favorable on this respect but remained moderate.

Table 5: Comparisons of the Determinants between Industrialized and Developing Countries

Industrialized Countries	ID	MD	OD	Developing Countries	ID	MD	OD
AUS	0.65	0.47	0.77	ARG	0.53	0.73	0.31
CAN	0.78	0.43	0.68	CHL	0.68	0.28	0.70
DNK	0.69	0.43	0.59	IDN	0.64	0.56	0.58
ISR	0.58	0.55	0.69	MEX	0.66	0.61	0.48
NZL	0.78	0.36	0.70	PER	0.70	0.49	0.54
GBR	0.74	0.19	0.69	ZAF	0.70	0.34	0.75
USA	0.82	0.34	0.78	THA	0.62	0.29	0.49
Average	**0.72**	**0.40**	**0.70**	**Average**	**0.65**	**0.47**	**0.55**
S.D.	**0.09**	**0.12**	**0.06**	**S.D.**	**0.06**	**0.18**	**0.15**

Table 6 confines the focus on countries that were pursuing inflation targeting. Specifically, Denmark, the United States, Argentina and South Africa were excluded. The results show no different inference from the previous table. However, comparing the results in the two tables, there are two interesting observations. First, the values of all indices look quite similar for the case of industrialized countries. Second, the value of the index for monetary structural determinants of developing countries is lower in Table 6. Although ineffectiveness of the model, errors in score assignments and small number of observations are possible

reasons for these phenomena, the two observations pose two implications regarding the adoption of the inflation targeting. The first phenomenon implies that while the overall determinants were similar across industrialized countries, the inflation targeting was not equally perceived as a better alternative monetary policy framework. For instance, despite the fact that their determinants resemble those of New Zealand, the United States has remained focusing on monetary aggregate targeting. The perception seemed quite opposite in the case of developing countries as reflected by the second phenomena. The lower value of the aggregate index for monetary structural determinants implies that inflation targeting was adopted as a solution for unqualified monetary structures to use monetary aggregates as the intermediate target variable.

Table 6: Comparisons of the Determinants among Countries pursing Inflation Targeting

Industrialized Countries	ID	MD	OD	Developing Countries	ID	MD	OD
AUS	0.65	0.47	0.77	CHL	0.68	0.28	0.70
CAN	0.78	0.43	0.68	IDN	0.64	0.56	0.58
ISR	0.58	0.55	0.69	MEX	0.66	0.61	0.48
NZL	0.78	0.36	0.70	PER	0.70	0.49	0.54
GBR	0.74	0.19	0.69	THA	0.62	0.29	0.49
Average	**0.71**	**0.40**	**0.71**	**Average**	**0.66**	**0.44**	**0.56**
S.D.	**0.09**	**0.14**	**0.04**	**S.D.**	**0.03**	**0.15**	**0.09**

Beyond the analyses on overall characteristics between groups of countries, the proposed three-dimensional model can be useful in describing the characteristics of individual countries. With a number of observations, the average values of the three aggregate indices constitute a triangle to be used as benchmark for evaluation. In this case study, the benchmark was derived from 14 observations. Figures 4 and 5 contain three-dimensional diagrams of each country.

The determinants of all industrialized countries, except for Israel, are quite uniformed in terms of the shape of the triangle that shows outstanding values of indices for institutional and other determinants. On the contrary, there are no clear common characteristics among developing countries replicating diversity of their economic structures. It is interesting to pay an attention on the cases of Indonesia and Mexico, the two countries that opted to the adoption of inflation targeting. Their three-dimensional diagrams indicate outstanding qualifications of their monetary structures in pursuing monetary aggregate targeting. This poses a question whether their adoption of inflation target was suitable or was just a result of political influence.[18] Relatively poor values in all dimension of Thailand imply a harder monetary policy design in the situation of limited institutional capacity, less predictable monetary conditions, and high level of uncertainties.

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[18] It is worth updating that in 2001, Indonesia has switched back to monetary aggregate targeting.

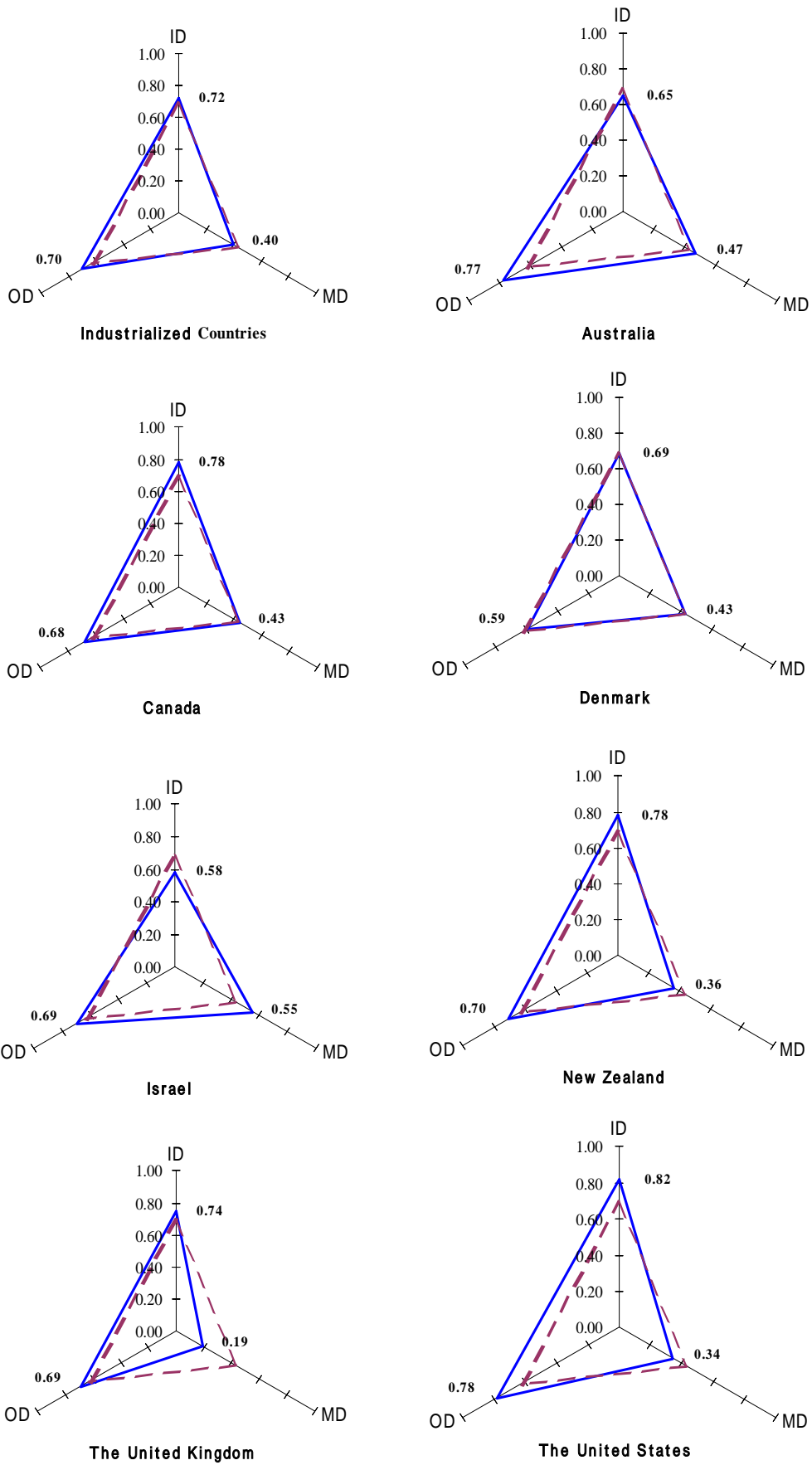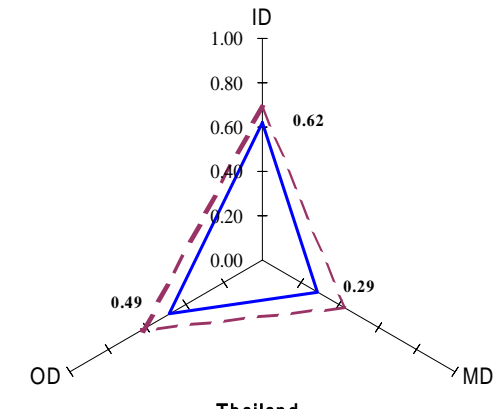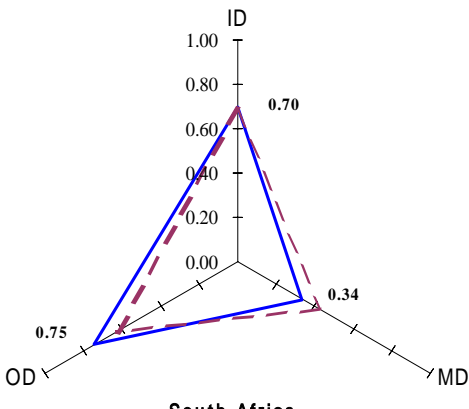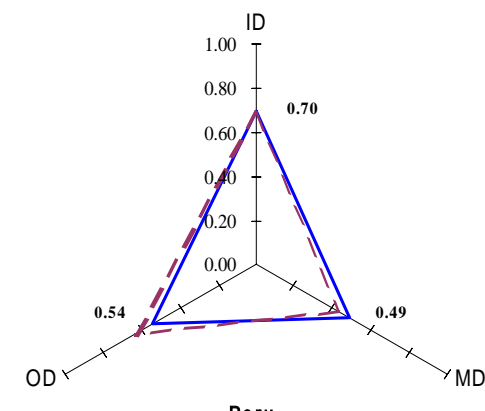**Figure 3: Illustrations of the Determinants of Industrialized Countries**

Industrialized Countries

Australia

Canada

Denmark

Israel

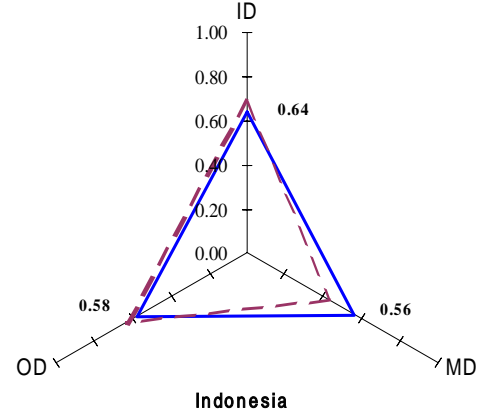New Zealand

The United Kingdom

The United States

Figure 4: Illustrations of the Determinants of Developing Countries

Developing Countries

Argentina

Chile

Indonesia

Maxico

Peru

South Africa

Thailand
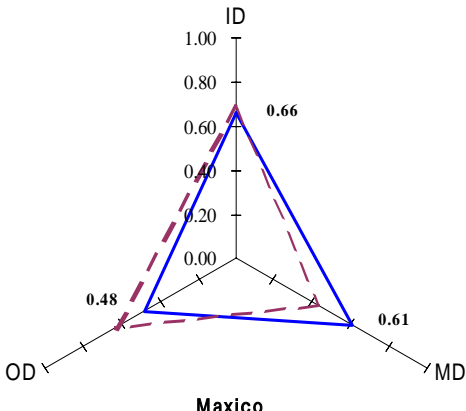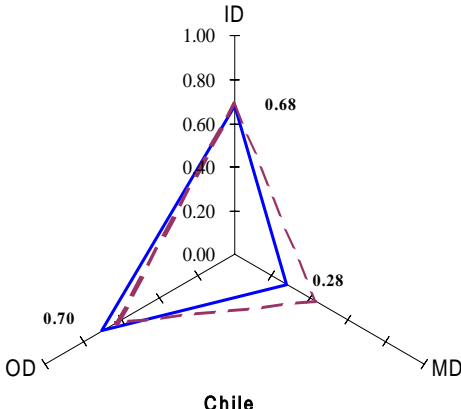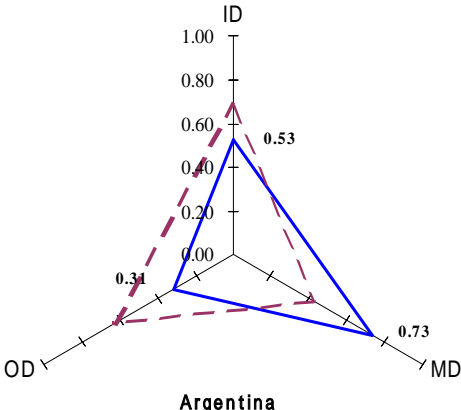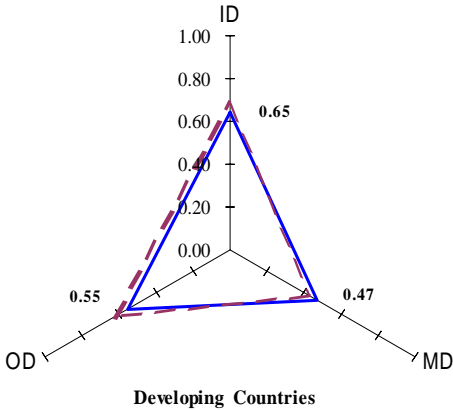
5. Conclusions and Remarks for Further Research

This paper proposed a new analytical framework in evaluating determinants of monetary policy framework by dividing the determinants into three dimensions according to the degree of endogeniety from the point of view of a central bank. In constructing an aggregate index representing each dimension, results of several partial analyses were translated into scores according to standardized coding criteria. In performing each partial analysis, publicly available data sources were recommended in order to promote further studies.

In order to demonstrate the applications of the proposed model, a case study of fourteen countries including both industrialized and developing countries was conducted. The model was found useful for cross-country analysis. Specifically, it enabled differentiating the characteristics of the determinants between the groups of industrialized and developing countries. Moreover, the benchmark derived from the average values of each dimension of the determinants could be used for evaluating the determinants of individual countries.

There are three main findings drawn from the case study regarding the situations in the period from 1996 to 2000. First, industrialized countries were generally superior to developing countries in terms of institutional determinants and degree of uncertainties to the conduct of monetary policy. However, their monetary structures less complied with the underlying assumptions of monetary aggregate targeting. Developing countries did relatively better on this aspect. Second, the perceptions of adopting inflation targeting between the groups of countries tended to be different. This was inferred from a contradicting observation that some industrialized countries (e.g. the United States) with poor monetary conditions did not opt to the inflation targeting; while some developing countries (e.g. Indonesia) with outstanding monetary conditions did. Third, the determinants were found more diverse in the group of developing countries.

Setting an index for each dimension was proposed in this paper as a way to reduce a ranking bias. However, as the benchmark is derived from average scores of a pool of samples, the reliability depends on appropriateness of proxy variables, scores and weight assignments, and sample size.

The case study showed only preliminary applications of the three-dimensional model without incorporating economic performances of each country. After some improvements, inclusion of larger number of examples and incorporation of the some economic indicators, the proposed analytical model is expected to be an effective tool in investigating significant differences among and within groups of countries in order to be a useful source of reference in assisting the policymakers of developing countries in adopting a monetary policy framework.

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