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International Differences in the Relative Monetary-Fiscal Influence on Economic Stabilization

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Abstract

This paper assesses the relative monetary-fiscal influence on macroeconomic variables in twelve countries during the 1990s. The results showed no specific consensus across the countries. While the overall impact of monetary-fiscal policy was inversely related with the degree of openness in developing counties, the impact was very limited in relatively closed industrialized countries like the United State and Australia. In high-debt industrialized countries, increasing budget balance was related with reduction in inflation rate. But this price effect was so mild and there was no positive effect on output growth to confirm the existence of expansionary fiscal contraction in these countries.

Keywords: monetary policy, fiscal policy, economic stabilization

1. Introduction

Since the late 1960s, discussions on the relative monetary-fiscal influence on macroeconomic variables have emerged as an issue for economists. While there have been debates on the analytical framework proposed in Andersen and Jordan (1968), many studies up until the late 1980s agreed upon the inferiority of fiscal policy to monetary policy, at least in the United States, in terms of magnitude, predictability, and lag of the influence. However, during the last two decades there have been several developments that are related to both monetary and fiscal policies. Regarding monetary policy, beyond monetary aggregate targeting there have been other alternatives of monetary policy framework such as inflation targeting, exchange rate anchor and the Single Monetary Policy (SMP). Another important development was the revolution in information technology that integrated hardware, software and communication devices to promote economic development. On the one hand, the revolution has complicated the relationship between monetary and real economic variables particularly because it has created new forms of financial innovations such as asset-backed securities and electronic money. On the other hand, the revolution provided both monetary and fiscal authorities new facilities for policy planning and implementing. Several fiscal developments also have occurred in each country. One of the developments was the application of rule-based fiscal policy in many countries that had experienced high external debt and continual deficits in their budgets.

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Such examples led to a presumption that in each country the magnitudes of the influence of each policy should have changed along with the developments. Still, it remains skeptical whether any common characteristics of the relative influence of monetary-fiscal policy exist across countries. In particular, considering the different phases of economic development among countries, the characteristics of relative monetary-fiscal influence may vary from a monetary-policy-dominated economy to a fiscal-policy-dominated economy. This hypothesis implies that a failure can occur when one country directly adopts a successful policy mix from another country of opposite extremes of relative monetary-fiscal influence.

This paper investigates and illustrates international differences in the relative monetary-fiscal influence in order to provide a source of empirical reference, based on the argument that a good monetary-fiscal policy mix should focus on the relative capacity in achieving individual target variables, if the authority would like to maintain its long-term credibility.

Subsequent sections are organized as follows: Section 2 discusses issues concerning the measurement of the relative monetary-fiscal influence on the economic stabilization; Section 3 explains the methodological framework and variable selections for an empirical study; Section 4 provides sources of data; Section 5 discusses the results of estimations; and Section 6 concludes with the main findings, implications, and remarks.

2. Measurement of the Relative Monetary-Fiscal Influence

In conducting a comparative study across different countries, data and time limitations are the main constraints. An approach selected has to be simple yet reliable. Among quantitative approaches, the simplest one that allows discussions on monetary and fiscal policies at once is the one first proposed by Andersen and Jordan (A-J) (1968). The approach employs only macroeconomic variables and does not require construction of macroeconomic models.[1]

The A-J Equation (so called, St. Louis Equation) illustrates the relative importance of monetary and fiscal actions on economic activities as follow:

$$\Delta GNP_t = \alpha + \sum_{i=0}^{4} \beta_i \Delta M_{t-i} + \sum_{i=0}^{4} \lambda_i \Delta G_{t-i} + u_t \qquad (1)$$

where GNP, M and G refers to level of nominal GNP, monetary aggregate, and high-employment government expenditure, respectively; Δ indicates changes in value; α represents constant term; β and λ are coefficients of their corresponding variables; i and t denote number of period and time period, respectively; and u is the error term.[2] The estimation of Equation (1) employed the Polynomial Distribution Lags (PDL) technique as a way to reduce the number of parameters in dealing with short time-series. In particular, the coefficients of each lagged variable in the equation were constrained to lie on the fourth degree polynomial with a constraint set as zero on both ends (Batten and Thornton, 1983).

Up until the late 1980s, there existed a continued debate on the validity of the A-J Equation. Batten and Thornton (1986) divided criticisms on the A-J Equation into three main aspects: misspecification due to exclusion of some important exogenous variables; possible simultaneous bias due to the use of the Ordinary Least Squares (OLS) technique; and lack of

[1] For example, the alternative approach proposed by Blinder and Goldfeld (1976) was not considered because it required a macroeconomic model.

[2] The high-employment government expenditure refers to hypothetical government spending at certain defined high-employment level. For further explanation, see Carlson 1967.

robustness of the equation. In defending the A-J Equation, they performed statistical tests together with citing supportive literature. They concluded that while there was no strong evidence that other more sophisticated equations were free from the first two criticisms, the A-J Equation proved its validity with the original data despite its simplicity.

Batten and Hafer (1983) applied the A-J approach to compare the relative monetary-fiscal influence among six industrialized countries namely Canada, France, Germany, Japan, the United Kingdom and the United States during the late 1960s to the early 1980s. They made three adjustments on the original A-J Equation. First, they viewed a growth-rate form of the variable as a more effective way than a first-difference form in dealing with heteroskedasticity among variables. Second, they included merchandise export as another independent variable to reflect possible influences from the openness of economy. Third, the lag lengths and degrees of polynomial were determined on a case-by-case basis rather than being fixed. The findings supported the argument that monetary policy was more influential than fiscal policy across countries.

Although the original A-J work and subsequent studies supported a similar conclusion that monetary influence on the economy was larger, more predictable, and faster than that of fiscal influence even in different periods and across countries;[3] Jordan (1986) recognized that financial deregulations and innovation of financial instruments could lead to erosion of the monetary influence. Still, he regarded the A-J approach as a valid methodology in assessing the relative monetary-fiscal influence.

There are two trends in international economic development that call for consideration before reapplying the A-J approach to assess the relative monetary-fiscal influence in the current era. First, present policymakers pay attention not only to the nominal output growth but also to the inflation rate as one of target variables for economic stabilization; therefore, it is necessary to measure monetary-fiscal influences on both output and price. Second, it becomes necessary to verify the types of monetary-fiscal instruments in order to reflect recent practices and academic issues.

Regarding monetary policy instruments, some countries such as New Zealand, Australia and the United Kingdom have completely shifted from monetary aggregate targeting to inflation targeting. Under this new monetary policy framework, short-term interest rates rather than monetary aggregate are employed as a monetary policy instrument. As for the European Union that is implementing the Single Monetary Policy, both the growth rate of monetary aggregate and the inflation rates are target variables implying the adoption of dual monetary policy instruments.

As for fiscal policy instruments, in addition to the Keynesian expansionary effects of government spending, there are some studies that present empirical evidence that expansionary fiscal contractions promote output growth in some countries. Baldacci et al (2003) list out prior studies showing the evidence of expansionary fiscal contraction in high-income countries. This evidence agrees with Gupta et al (2002) that expansionary fiscal contractions also exist in low-income countries where budget deficits financed domestically are reduced. However, Hemming, Mahfouz and Schimmelpfennig (2002) do not agree with prior studies as they could not find an evidence of expansionary fiscal contraction in industrialized countries during recessionary periods. Thus, the debate on the existence of the non-Keynesian effect remains unsettled. In order to take part in providing empirical evidence on this debate, it becomes interesting to include a variable representing such expansionary fiscal contraction as

[3] See Carlson (1975, and 1978), Batten and Thornton (1983), and Batten and Hafer (1983).

another fiscal policy instrument into the analysis.

3. Methodological Framework

In order to assess the relative monetary-fiscal influence in each country, this paper follows the concept of the A-J approach under which the change in each key economic variable is regressed on distributed lagged variables representing instruments of monetary and fiscal policies. Some adjustments are made on both sides of the equation to accommodate the issues discussed in the previous section as well as to deal with data limitation.

Regarding the dependent variable, instead of using GNP as the proxy variable of output, this paper uses GDP because of its wide availability in being used in current economic studies. In addition to the nominal output, real output and price index are recognized as possible alternatives of dependent variable. Based on the concept that nominal output is the product of the two variables, GDP deflator (*DFT*) is used as the price index in deriving real GDP (*RGDP*). Consumer Price Index (*CPI*) is also employed as an alternative of price index because its change frequently represents the target variable of inflation targeting in many countries. In total, there are four standard equations to be estimated for each country.

As for the independent variables on the right hand side of each equation, two policy variables are introduced to the original A-J Equation.[4] These variables are policy rate (Int) and government budget balance (B). While the former independent variable reflects the increasingly adoption of setting operating target on specific short-term interest rate, the latter one represents a proxy for expansionary fiscal contraction. In order to mitigate the effects of heteroskedasticity among variables and to ease the comparison, the growth rate in percentage is used for every variable, except for interest rate that is not transformed.

Mathematically, the four standard equations can be written as follows:

$$\dot{GDP}_t = \alpha_{GDP} + \sum_{i=0}^{A1}\beta_{GDP,i}\dot{M}_{t-i} + \sum_{i=0}^{B1}\delta_{GDP,i}\Delta Int_{t-i} + \sum_{i=0}^{C1}\gamma_{GDP,i}\dot{B}_{t-i} + \sum_{i=0}^{D1}\lambda_{GDP,i}\dot{G}_{t-i} + u_{GDP,t} \quad (2)$$

$$\dot{RGDP}_t = \alpha_{RGDP} + \sum_{i=0}^{A2}\beta_{RGDP,i}\dot{M}_{t-i} + \sum_{i=0}^{B2}\delta_{RGDP,i}\Delta Int_{t-i} + \sum_{i=0}^{C2}\gamma_{RGDP,i}\dot{B}_{t-i} + \sum_{i=0}^{D2}\lambda_{RGDP,i}\dot{G}_{t-i} + u_{RGDP,t} \quad (3)$$

$$\dot{DFT}_t = \alpha_{DFT} + \sum_{i=0}^{A3}\beta_{DFT,i}\dot{M}_{t-i} + \sum_{i=0}^{B3}\delta_{DFT,i}\Delta Int_{t-i} + \sum_{i=0}^{C3}\gamma_{DFT,i}\dot{B}_{t-i} + \sum_{i=0}^{D3}\lambda_{DFT,i}\dot{G}_{t-i} + u_{DFT,t} \quad (4)$$

$$\dot{CPI}_t = \alpha_{CPI} + \sum_{i=0}^{A4}\beta_{CPI,i}\dot{M}_{t-i} + \sum_{i=0}^{B4}\delta_{CPI,i}\Delta Int_{t-i} + \sum_{i=0}^{C4}\gamma_{CPI,i}\dot{B}_{t-i} + \sum_{i=0}^{D4}\lambda_{CPI,i}\dot{G}_{t-i} + u_{CPI,t} \quad (5)$$

While the dots over each variable represent quarter-to-quarter percentage rate of change, Δs indicate change in value. In each equation α represents the constant term; βs, δs, γs, and λs refer to coefficients of their respective independent variables at different *i*th lag; and *u* refers to the error term. Each summation (Σ) refers to accumulated coefficient that provides information about the cumulative impact of its respective independent variable.

In estimating Equations (2) to (5), the appropriate lag length (*A*s, *B*s, *C*s, and *D*s) for each independent variable is examined separately before combining with the rest of the independent variables in order to search for an appropriate degree of PDL. Because there are four independent variables and the maximum lag for each of them is assumed to be 13 lags in

[4] This paper does not include export as an independent variable as proposed by Batten and Hafer (1983) with a purpose to discuss only direct influence of monetary and fiscal policy.

order to capture some significant but delayed effects, it becomes infeasible to follow the approach of Batten and Thornton (1983). Moreover, testing each independent variable separately helps to detect and exclude irrelevant variables before estimating multiple regressions.

Specifically, the first step toward deriving Equations (2) to (5) is to estimate the distributed lag (DL) models for all possible pairs of dependent and independent variables by regressing repeatedly a dependent variable, e.g. *GDP*, on the distributed lagged variables of an independent variable, e.g. *M*, from lag length equals to 0 to the maximum lag length of 13 by using the OLS technique. The appropriate lag length 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 independent variable on selected distributed lags of all significant independent variables using the PDL technique without constraining the endpoints.[5] While the degree of PDL for the 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.

4. Data for Analysis

This paper utilizes quarterly data from the International Financial Statistics (IFS) covering the period from early the 1990s to the year 2004 to generate Equations (2) and (5) by the method explained in the previous section. After examining data of individual member countries of the International Monetary Fund (IMF), it was found that there were only 12 countries that had a complete set of needed variables with sufficient length of time-series.[6] These countries include Australia, Brazil, Mexico, the Netherlands, Peru, the Philippines, South Africa, Spain, Sweden, Switzerland, Thailand, and the United States. The sources of data are explained below.

Regarding the dependent variables, data for nominal GDP, GDP deflator, and consumer price index were from lines 99b, 99bip, and 64 in the IFS, respectively. Based on the first two time-series, a time-series of real GDP was generated.

As for the variable for monetary aggregate, M1 was chosen. Data of M1 as defined by particular country were from line 59. However, for Peru, the Philippines, Switzerland and Thailand, data from line 34 representing money according to the IMF's definition were used as a substitute because of the short or incomplete, and unavailable time-series of data for line 59. For the cases of the Netherlands and Spain which belong to the European Monetary Union (EMU), the summation currency issued and demand deposits as shown in line 34a and 34b was a solution for unpublished data for line 34 after the 1999.

The discount rates on the treasury bills or three-month discount notes (for Sweden) presented in line 60c were recognized as most qualified proxy for policy interest rate when consider the conventional practices of money market operations. However, when the time-series

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

[6] While many other countries provide only annual data on the budget balance, some countries just started to provide quarterly data in the mid of the 1990s on budget balance. Some member countries of the European Union have not updated the data during the transition of the adoption of the Euro currency.

were too short, other alternatives were considered as a substitute. For Australia, Brazil and Thailand money market rates presented in line 60b were selected. The Discount rate, line 60, was used for Peru and short-term lending rate, line 60p, was used for the Netherlands.

For the budget balance, data from line 80 was used for every case without exception.

Due to unavailability of published data on high-employment government expenditure on quarterly basis, gross government expenditure, line 82, was employed for every case except for the Netherlands and the United States that were published only on line 82z representing the total expenditures plus lending and minus repayment.[7]

Most time-series, apart from those of interest rates, were quoted in terms of domestic currency except for the Netherlands and Spain of which domestic currencies have been converted into Euro since 1999. The time-series for these two countries were converted into US dollars by using the average official exchange rate presented in line rf.

A dummy variable was introduced in order to reflect changes in the exchange rate regime observable from fluctuations in official exchange rate on line rf. For the case of Thailand, the variable was assigned the value of 1 for the data before the third quarter of 1997 when Thailand floated the Baht. For the cases of the Netherlands and Spain, the dummy variables were assigned the value of 1 for the data before the first quarter of 1999 when domestic currencies no longer were used.

5. Empirical Analysis

Table 1 summarizes accumulated coefficients of independent variables in equations (2) to (5) for each country. The results of industrialized countries are listed in the first half followed by those of developing countries. Within each group, the order of the country follows the degree of openness in terms of the average ratio of total import plus export to GDP during the 1990s from the lowest to the highest. Below the name of each country, the first line shows the degree of openness, the second line gives information about current foreign exchange rate regime, and the third line denotes the current monetary policy framework together with the year that it was officially adopted. For each country, the second column presents the type of dependent variable followed by the corresponding period of adjusted samples. The third column shows the value of constant term, followed by four columns containing details of each accumulated coefficient. Each parenthesis in front of its respective accumulated coefficient provides information about the lag length and degree of PDL selected. The next column contains coefficients of the dummy variable. The last three columns provide statistical information regarding the value of adjusted R^2, the Durbin-Watson statistic, and the probability of F-statistic. The analysis in this section was divided into three sections, beginning with the overview of public policy, followed by discussions on each public policy individually.

5.1 Overview of Public Policy

Before comparing the relative influence between monetary and fiscal policy, it is worth noticing the values of adjusted R^2 among the studied countries. The values imply overall influence of a monetary-fiscal policy mix on macroeconomic variables. For both output growth and inflation, it is clear that the values of adjusted R^2 in developing countries are generally

[7] Although the high-employment government expenditure can be estimated, the value is subjected to the definition of high employment.

Table 1: Results of Estimations

	Y	Adj. Sample	α		$\sum \beta$		$\sum \delta$		$\sum \gamma$		$\sum \lambda$	DUM	Adj. R^2	D.W.
1 United States (US)	$\dot{GDP}$	90:2-04:3	1.300 ***		-	(0,0)	0.366 ***		-		-	-	0.098	1.84
Open: 23.67%	$\dot{RGDP}$	90:2-04:4	0.791 ***		-	(0,0)	0.481 ***		-		-	-	0.121	1.65
Ex: Ind. Floating	$\dot{DFT}$	91:4-04:3	0.433 ***	(6,1)	0.046 **		-		-		-	-	0.190	2.03
MP: Implicit	$\dot{CPI}$	91:4-04:3	0.618 ***	(12,12)	-0.028		-		-		-	-	0.541	1.67
2 Australia (AU)	$\dot{GDP}$	90:1-02:2	1.367 ***		-	(0,0)	0.35 **		-		-	-	0.083	1.6
Open: 41.07%	$\dot{RGDP}$	91:3-02:2	1.561 ***		-	(0,0)	0.086	(5,2)	-0.00003	(4,4)	-0.334 ***	-	0.256	2.401
Ex: Ind. Floating	$\dot{DFT}$	91:4-03:1	0.449 ***		-		-	(6,4)	-0.00007 *		-	-	0.167	1.89
MP: IT (1993)	$\dot{CPI}$	91:1-02:2	0.722 ***		-	(3,1)	0.706 ***		-		-	-	0.255	1.91
3 Spain (ES)	$\dot{GDP}$	93:2-04:3	1.633	(12,10)	-0.009		-		-	(11,1)	-0.166	-0.85	0.755	1.37
Open: 51.81%	$\dot{RGDP}$	93:2-04:3	1.733 *	(12,9)	-0.122		-		-	(11,6)	0.253	-1.63	0.751	1.45
Ex: EURO (1999)	$\dot{DFT}$	90:2-04:3	0.924 ***		-		-	(0,0)	-0.0003 ***		-	0.181	0.088	2.4
MP: SMP (1999)	$\dot{CPI}$	93:3-04:3	0.589 ***		-	(4,1)	0.391 **	(13,12)	-0.0022 ***		-	0.181	0.349	2.99
4 Sweden (SE)	$\dot{GDP}$	96:3-04:3	5.978	(8,8)	-1.508		-		-	(9,9)	-1.47 *	-	0.904	2.49
Open: 75.15%	$\dot{RGDP}$	96:3-04:3	1.752	(4,1)	-0.602		-		-	(9,9)	-0.105	-	0.839	1.19
Ex: Ind. Floating	$\dot{DFT}$	96:3-04:3	0.396		-		-		-	(9,6)	-0.015	-	0.899	2.1
MP: IT (1993)	$\dot{CPI}$	94:4-04:3	0.223 *	(1,1)	-0.025		-		-	(2,1)	0.032 **	-	0.239	1.7
5 Switzerland (CH)	$\dot{GDP}$	94:2-04:2	0.194	(12,1)	0.144 *		-	(11,10)	0.00074		-	-	0.478	2.29
Open: 75.34%	$\dot{RGDP}$	92:2-04:2	0.157	(4,1)	0.061 *	(0,0)	0.196		-		-	-	0.14	1.6
Ex: Ind. Floating	$\dot{DFT}$	91:3-04:2	0.189 ***		-		-		-	(1,1)	0.0069 **	-	0.158	2.06
MP: Implicit	$\dot{CPI}$	92:2-04:3	0.195 ***		-		-	(4,3)	-0.0008	(2,1)	0.0096 *	-	0.145	2.15
6 Netherlands (NL)	$\dot{GDP}$	90:2-04:2	1.093		-		-		-	(0,0)	0.086 **	0.025	0.065	1.86
Open: 114.38%	$\dot{RGDP}$	90:2-04:2	0.325		-		-		-	(0,0)	0.083 **	0.296	0.061	1.81
Ex: EURO (1999)	$\dot{DFT}$	92:3-04:2	0.514 ***		-		-	(9,1)	-0.00038 *		-	-0.03	0.256	2.68
MP: SMP (1999)	$\dot{CPI}$	93:3-04:3	0.322 **	(13,1)	0.0045		-	(10,1)	-0.00045 **		-	0.199	0.295	2.43
7 Brazil (BR)	$\dot{GDP}$	93:3-04:1	-0.775	(9,9)	-0.083	(9,9)	0.059	(9,7)	0.0173 *	(3,2)	0.717 **	-	0.992	2.86
Open: 20.88%	$\dot{RGDP}$	93:3-03:4	-1.318	(1,1)	-0.022		-	(9,8)	0.0155	(8,6)	0.431 **	-	0.987	2.28
Ex: Ind. Floating	$\dot{DFT}$	93:2-03:4	0.276	(1,1)	0.984		-	(8,8)	0.070 ***	(8,2)	0.234	-	0.991	2.34
MP: IT (1999)	$\dot{CPI}$	93:3-04:1	0.245	(4,2)	0.444 ***	(9,3)	0.0325 ***	(9,1)	0.0219 ***		-	-	0.985	2.47
8 Peru (PE)	$\dot{GDP}$	93:3-04:3	0.41	(4,4)	0.02	(3,1)	-0.155		-	(13,13)	0.381 **	-	0.644	2.91
Open: 31.79%	$\dot{RGDP}$	93:3-04:3	0.036	(1,1)	0.162	(1,1)	-0.181		-	(13,9)	0.089	-	0.691	2.87
Ex: Ind. Floating	$\dot{DFT}$	93:2-04:3	1.2 *	(11,11)	-0.242	(10,10)	1.449 **		-	(12,12)	0.33 *	-	0.486	1.53
MP: IT (2002)	$\dot{CPI}$	92:4-04:3	0.236	(10,9)	0.109 ***	(10,9)	-0.112		-	(10,7)	0.109 ***	-	0.962	1.47
9 South Africa (ZA)	$\dot{GDP}$	90:4-04:4	-1.001	(2,2)	0.85 ***	(1,1)	-0.085		-	(1,1)	0.077	-	0.873	1.53
Open: 49.79%	$\dot{RGDP}$	90:4-04:4	-1.059 ***	(2,2)	0.365 ***	(0,0)	-0.196		-	(1,1)	0.022	-	0.834	1.53
Ex: Ind. Floating	$\dot{DFT}$	90:4-04:4	-1.17 *	(2,2)	0.749 ***	(0,0)	-0.649 *		-	(1,1)	0.057	-	0.871	1.44
MP: IT (2000)	$\dot{CPI}$	90:4-04:4	-1.224 **	(2,2)	0.707 ***	(0,0)	-0.076		-	(1,1)	0.06	-	0.852	1.53
10 Mexico (MX)	$\dot{GDP}$	91:1-04:3	2.023 ***	(3,3)	0.0235		-		-	(3,1)	0.332 ***	-	0.788	2.14
Open: 55.82%	$\dot{RGDP}$	92:1-04:3	-0.6	(7,5)	0.335 ***		-		-	(6,2)	-0.028	-	0.796	2.33
Ex: Ind. Floating	$\dot{DFT}$	90:4-04:3	2.748 ***	(0,0)	-0.015	(2,1)	0.425 ***		-	(2,1)	0.177 ***	-	0.417	1.4
MP: IT (1999)	$\dot{CPI}$	92:3-04:3	1 **		-	(9,8)	1.165 ***		-	(3,2)	0.378 ***	-	0.851	1.138
11 Philippines (PH)	$\dot{GDP}$	93:3-04:3	3.547	(13,13)	0.598	(1,1)	-0.391		-	(11,11)	-0.831	-	0.947	2.41
Open: 94.50%	$\dot{RGDP}$	93:3-04:3	2.977 *	(13,13)	0.142	(1,1)	-0.662 *		-	(11,8)	-0.671	-	0.962	2.53
Ex: Ind. Floating	$\dot{DFT}$	93:1-04:3	0.431	(4,1)	0.207 **	(3,1)	0.751 ***		-	(11,7)	0.225	-	0.347	2.07
MP: IT (2002)	$\dot{CPI}$	92:3-04:3	0.771 *	(9,1)	0.218 **	(3,1)	0.267 *		-		-	-	0.288	1.36
12 Thailand (TH)	$\dot{GDP}$	94:2-03:4	0.363	(4,2)	0.188 *		-		-	(2,2)	0.199 *	0.482	0.592	1.71
Open: 94.50%	$\dot{RGDP}$	93:4-03:4	-0.234	(2,1)	0.163		-		-	(2,2)	0.361 ***	-0.66	0.547	1.74
Ex: Managed Floating	$\dot{DFT}$	95:2-03:4	0.537		-	(2,1)	0.419 **		-	(8,1)	-0.011	0.208	0.323	2.17
MP: IT (2000)	$\dot{CPI}$	95:3-03:4	0.191		-	(2,1)	0.084	(0,0)	-0.000015	(9,3)	0.228 **	0.165	0.638	1.77

Notes: Below the name of each country, Open, Ex and MP refer to degree of openness, type of exchange rate regime and type of monetary policy regime, respectively. For Open, it is measured in terms of average ratio of import plus export divided by GDP. For Ex, there are independently floating, managed floating and flotation of EURO. For MP, there are inflation targeting (IT), the Single Monetary Policy (SMP) and implicit monetary policy framework under which there is no explicit anchor. Each parenthesis contains information about lag length and degree of polynomial of its corresponding independent variable. ***, **, and * refer to significance at 1%, 5% and 10%, respectively. DUM refers to dummy variable for a change in exchange rate regime inferable from degree of fluctuations in market exchange rate. Detailed results of estimations are provided upon request.

higher than those of industrialized countries. For instance, while the values of adjusted R^2 in South Africa and Brazil are above 80%, the values in the Netherlands, Australia, and the United States are mostly less than 30%. These observations illustrate differences in the degree of overall monetary-fiscal influence on macroeconomic variables between the two groups of countries.

In the case of developing countries, the degree of openness tends to have an inverse relationship with the capacity of public policy. This corresponds to the presumption that the higher degree of openness implies a higher degree of uncertainties that creates shocks to policy implementation. However, the observation of such an inverse relationship is not so clear in the case of industrialized countries, particularly when looking at the United States and Australia. Although these two countries are relatively closed in terms of the ratio of trade to GDP, their values of adjusted R^2 for nearly all equations are exceptionally low. The phenomenon of the so called "New Economy" may be the main factor explaining the declining role of public policy in influencing the economy.[8] Concerning the case of the United States, Cecchetti (2002) argues that legislative-based fiscal stimulus programs represent an ineffective economic stabilizer because it has usually been implemented too late while the revolutions in information and communication technology (IT) can promote economic stabilization through the creation of new mechanisms such as asset-backed scurities and just-in-time inventory techniques that help reduce the amplitude of economic fluctuations.

Next, it is worth reviewing the conclusion of A-J by looking at only Equation (2) of each country where the nominal GDP exists as the independent variable. Although it remains true in the case of the United States that monetary policy tends to be more influential than fiscal policy, the growth rate of monetary aggregate no longer appears as a very influential variable.[9] Change in the policy rate becomes the only significant variable. The growth rate of monetary aggregate presents the most significant variable only in Switzerland and South Africa. In Thailand, where both monetary and fiscal policies are both significant, the magnitude of the latter seems to be mildly stronger. These findings supported the hypothesis that several but different developments among countries across decades led to divergence of the relative monetary-fiscal influence.

Look at every equation of each country and focus on independent variables of which their cumulative coefficients are statistically significant in Table 1. There is no particular consensus found across the selected countries in terms of magnitude, predictability, and speed of relative monetary-fiscal influence. The countries can be broadly divided into three main categories, namely monetary-policy-dominated, fiscal-policy-dominated, and monetary-fiscal-policies mixed countries. The United States, South Africa and the Philippines are classified as monetary-policy-dominated countries because no fiscal instrument is found statistically significant in any equation. With the same criterion, Sweden and the Netherlands are classified as fiscal-policy-dominated countries. The remaining countries are regarded as monetary-fiscal-policies-mixed countries. However, there is no particular consensus regarding the relative monetary-fiscal influence among these countries.

[8] Cecchetti (2002) and Cette and Pfister (2003) describe the "New Economy" as the one under which revolutions in information and communication technology have resulted in an increase in potential output and a slowdown of inflation.

[9] The same methodology was applied separately to the data of the United States for the period of the second quarter of 1962 to the first quarter of 1982. The results conform to the conclusion of Batten and Hafer (1983) that monetary policy was more powerful than the fiscal policy.

5.2 Monetary Policy

This subsection begins with discussion on the signs of the cumulative impact of each monetary policy instrument. This is followed by the observations on how the relative importance between the growth rate of monetary aggregate and policy rate as monetary policy instruments correspond to the current monetary policy framework adopted in each country.

The sign for the accumulated coefficient of the growth rate of monetary aggregate in Equation (2) ($\sum\beta_{GDP}$) is expected to be positive as based on the monetarist view. An increase in money supply is expected to help induce nominal spending. However, such an increase in the nominal income may be a result of real economic expansion or just because of inflation or dual effects. Therefore, the signs in the remaining equations ($\sum\beta_{RGDP}$, $\sum\beta_{DFT}$ *and* $\sum\beta_{CPI}$) are expected to be positive or zero, but not negative. Most results in Table 1 conform to these expectations although there are many cases under which $\sum\beta_{GDP}$ appears zero while some other accumulated coefficients are found positive. Only data from South Africa shows that the growth rate of monetary aggregate tends to induce nominal spending via promoting real output and causing inflation.

Although it is normally expected that real interest rates are negatively related with output growth and price, the signs of cumulative impact of policy interest rates ($\sum\delta$) can be either negative or positive. This is because the policy interest rate is not freely determined by the market but manipulated by monetary authority with an intention to influence market interest rates and inflation rate. The final outcomes depend on the response of the market participants as well as on the economic structure. At relatively high initial market interest rates and close-to-full production capacity levels, an increase in policy interest rate may discourage investment and result in economic contraction or deflation. On the other hand, at relatively low initial market interest rates and substantially-below-full production capacity level, such an increase in policy rate may improve funds mobilization as well as capital inflows resulting in nominal output growth. However, if the productivity does not improve along with the increase in investment, part of the growth may be also due to inflation and not only real output growth.

Focusing only on the equations of which $\sum\delta$ is statistically significant, the policy rate has a positive relationship with the macroeconomic variables, except for the case with real GDP in the Philippines that shows a negative sign. In particular, one per cent increase in the policy rate in the Philippines corresponds to 0.662% reduction in real GDP in the following period. On the contrary, one per cent increase in the policy rate tends to induce real GDP in the United States by 0.481%, and nominal GDP in Australia by 0.35%. For the remaining cases, the relationship can be seen only on the changes in the deflator and consumer price index.

It is interesting to notice that the statistically significant $\sum\delta_{DFT}$ and $\sum\delta_{CPI}$ in most countries are positive, except for the case of South Africa. These countries have set explicit targets for the inflation rate. A direct interpretation is that an increase in the policy rate will possibly lead to an increase in inflation. However, considering that the direction of the relationship can be the opposite, a positive sign also implies that the situation in which the monetary authorities in these countries have increased their policy rates in accordance with their inflation rate projection. If this is true, it leads to a question that whether nowadays monetary authorities are controlling or catching the inflation rate.

The monetary aggregate targeting is no longer adopted as an official monetary policy framework in any of the twelve countries. However, the use of the growth rate of monetary aggregate as a monetary policy instrument implicitly remains in the United States and

Switzerland where there is no explicit monetary policy framework. Also, under the SMP of the EMU, it is one of dual target variables together with inflation rate. In addition, the targets are applied to the growth rate of monetary aggregate of the whole EMU, not to monetary aggregates of individual member countries.

Looking at the first column of the accumulated coefficients ($\sum\beta$) in Table 1, the growth rate of the monetary aggregate appears significant in the United States and Switzerland, but not in Spain and the Netherlands. The insignificance in the latter two cases implies an ineffective role of domestic monetary aggregates in influencing macroeconomic variables. In the case of the Netherlands, and taking into consideration the insignificant change in the policy rate ($\sum\delta$), the situation implies that despite the official adoption the SMP in 1999, the monetary policy has been losing its effectiveness for the entire decade. On the contrary, in the case of Spain which implemented inflation targeting prior to the implementation of the SMP, the policy rate appears significant in explaining change in consumer price index. This implied that Spain had to abandon its effective monetary policy framework in order to adopt the SMP while the Netherlands might have perceived the SMP as a new potential monetary policy framework to succeed its ineffective one.

Among the remaining countries implementing inflation targeting, only Australia and Sweden represent cases in which the growth rate of monetary aggregate does not show significant relationship with any macroeconomic variable. It is worth noticing that these two countries are industrialized countries and have implemented inflation targeting since 1993, while the other countries are developing countries and have just adopted the inflation targeting between 1999 and 2002. Most of these developing countries had experienced financial crisis and shifted from fixed-exchange rate regime to floating-exchange rate regime. Inflation targeting, which was claimed successful in pioneering countries such as New Zealand and Australia, was chosen as a new monetary policy framework.

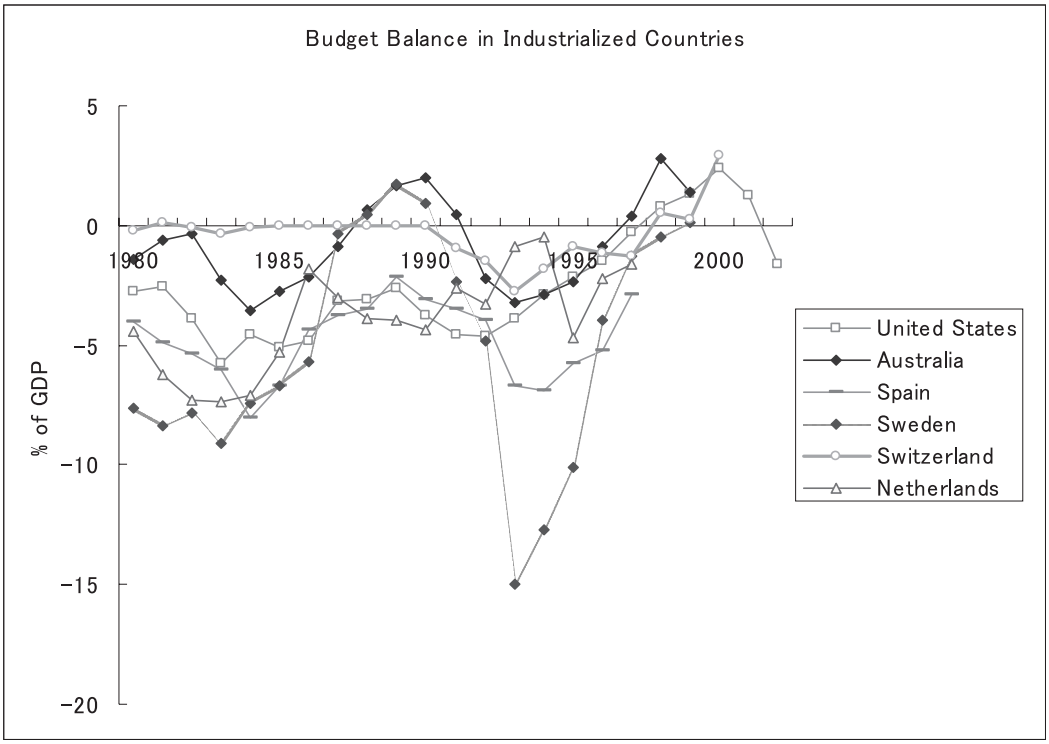
The significance of the growth rate on the monetary aggregate in developing countries indicates the potential of using monetary aggregate targeting as the succeeding monetary policy framework. There are two possible reasons for selecting the inflation targeting. First, for those countries that experienced hyperinflation such as Brazil and South Africa, adoption of inflation targeting together with increasing the degree of central bank independence was recommended by monetary economists. Second, in some countries such as the Philippines and Thailand introducing inflation targeting might be considered as a way to increase the credibility of the central banks as the chance to miss the target is low. In these countries the average inflation rates had not been excessive while the relationships between monetary aggregates and economic variables became less predictable.[10]

5.3 Fiscal Policy

This subsection discusses the remaining two accumulated coefficients $\sum\gamma$ and $\sum\lambda$ which represent cumulative impacts of fiscal policy instruments. It begins with a brief background of fiscal developments in these countries.

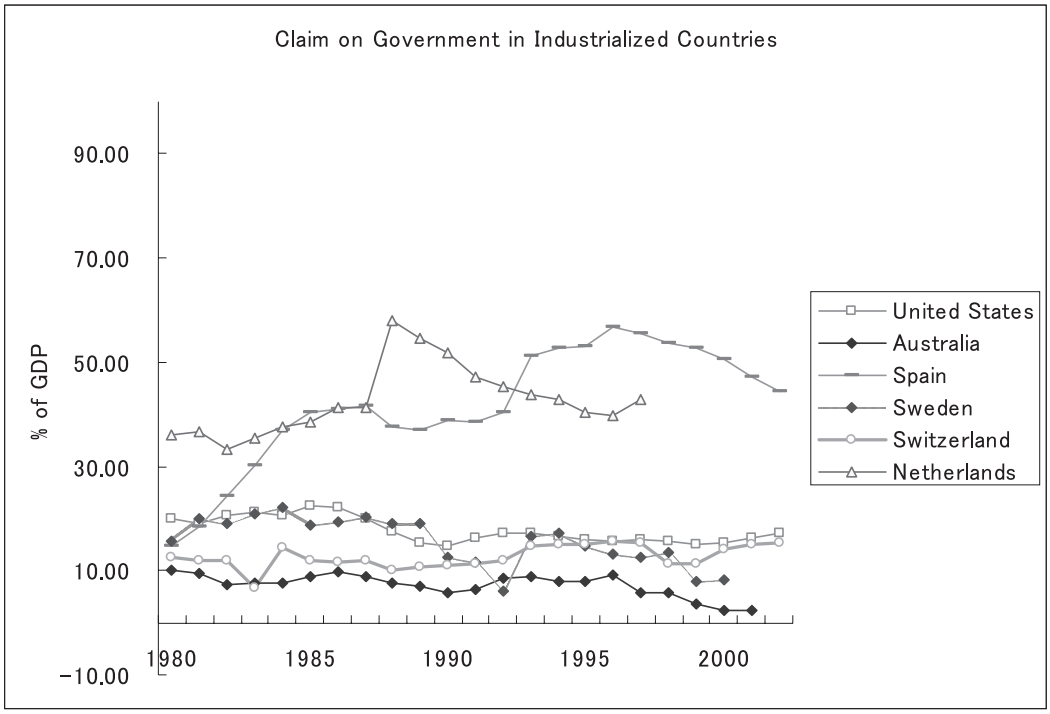
Figures 1 to 4 depict movements in the levels of budget balance and levels of claims on government in terms of the share of nominal GDP in the twelve countries during the 1980s to early 2000s. Focusing on Figures 1 and 3, levels of budget balance in both groups of countries have been negative until the late 1980s. In the 1990s, most of the industrialized countries

[10] However, it is beyond the scope of this paper to assess how the relationships between the growth rate of monetary aggregate and macroeconomic variables in these countries have been changed across decades.



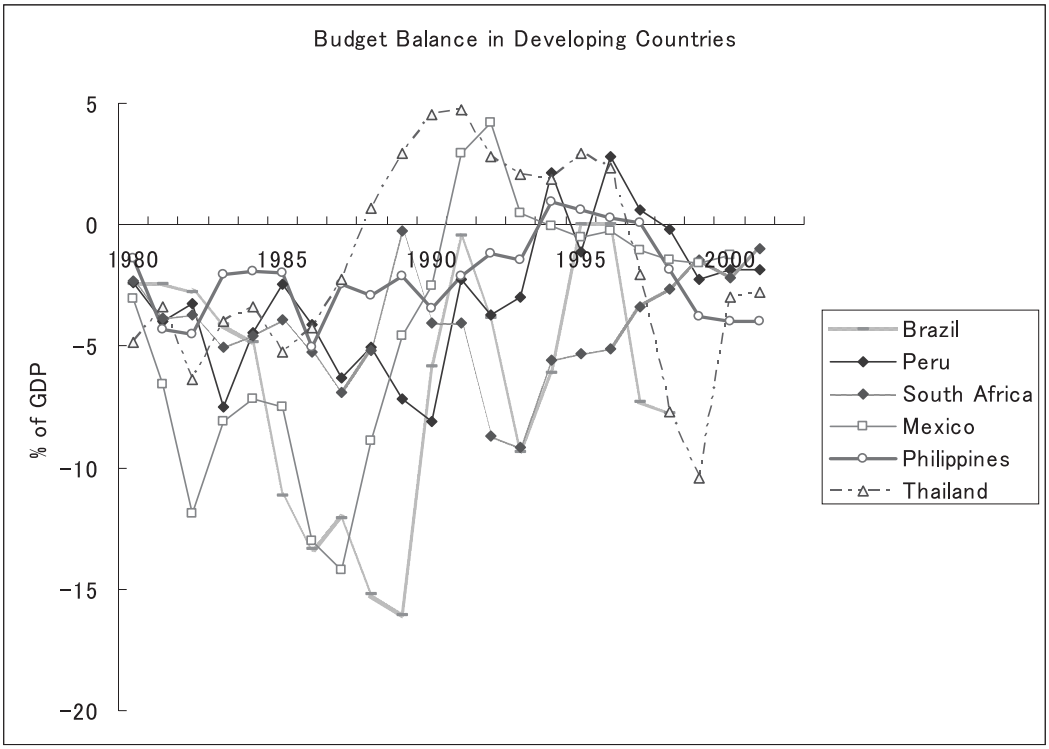
Source: World Development Indicator

Figure 1. Budget Balance in Industrialized Countries during 1980-2002



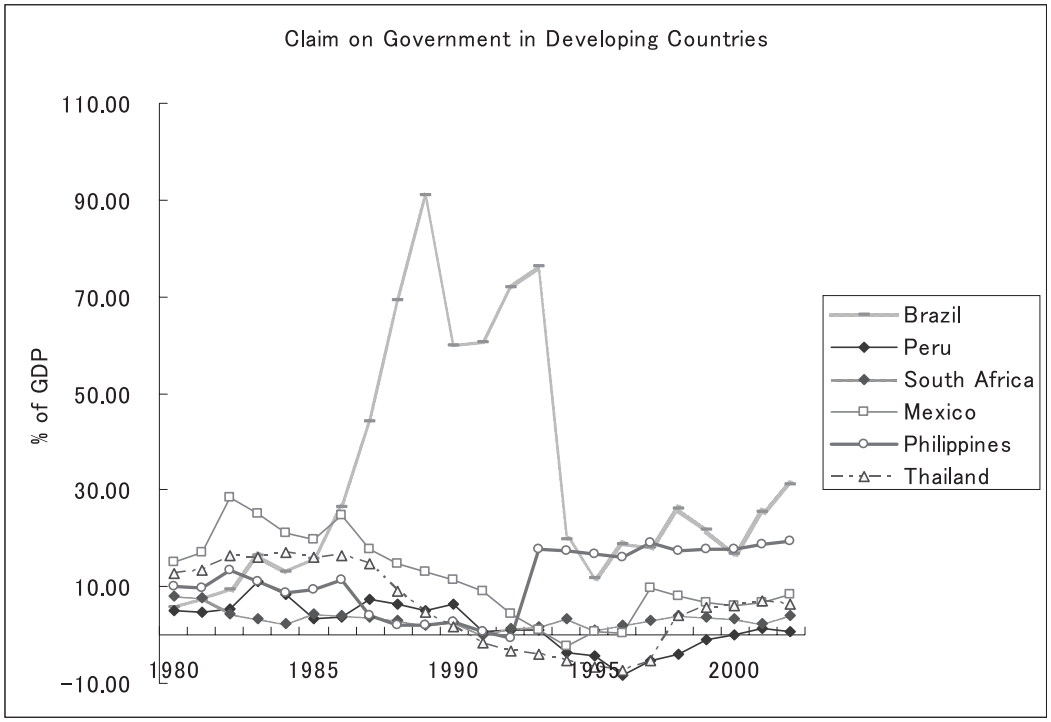
Source: World Development Indicator

Figure 2. Claim on Government in Industrialized Countries during 1980-2002



Source: World Development Indicator

Figure 3. Budget Balance in Developing Countries during 1980-2002



Source: World Development Indicator

Figure 4. Claim on Government in Industrialized Countries during 1980-2002

remained in net deficit positions while developing countries experienced high fluctuations in both zones of surplus and deficit. The range of fluctuations is generally lower in the first group. The levels of claim on the government illustrated in Figures 2 and 4 showed that most industrialized countries shared the same characteristics of being net borrowing countries for the entire period while Thailand and Peru had experienced being net lending countries many consecutive years in the 1990s. Still, developing countries, in general, have higher degrees of fluctuations. Among the twelve countries, Sweden, the Netherlands, Spain, and Brazil have experienced high budget deficits and high level of claim on government during the 1990s.

In order to cope with high budget deficits, most of industrialized countries have adopted rule-based fiscal budgeting. Specifically, Australia enacted the Fiscal Responsibility Act in 1998; the Netherlands modified the Trend Based Fiscal Policy in 1998; Sweden introduced the Consolidation Program in 1994; Switzerland passed a constitutional amendment establishing an obligation to balance the federal budget in 1998; and the United States put into place the first Balanced Budget and Emergency Deficit Control Act in 1985 (Decressin et al, 2001). The Netherlands and Spain, which are member countries of the EMU, have to meet additional requirements under the Stability and Growth Pact (SGP) not to let their general government deficit exceed 3% of GDP and the gross general government debt exceed 60% of GDP. Within the boundaries, each member country still has freedom in pursuing their national framework for fiscal policy. As for the six developing countries, only Peru and Brazil have adopted formal rule-based fiscal budgeting. In Peru, the laws promulgated in 1999 set ceilings for the deficit of the central government and the growth of expenditure; while Brazil's Fiscal Responsibility Law enacted in 2000 applies fiscal discipline to all levels of government (Mihaljek and Tissot, 2003).

Eken et al (1997) assert that large and growing budget deficit financing affect the growth negatively as it can cause relative price distortion leading to inefficient resources allocation for the case of inflationary financing, and it can also cause a crowding-out effect under the case of non-inflationary financing. Baldacci et al (2003) assert the other way around that sustained reductions in budget deficits, which implied declining reliance on inflation financing, helped to promote private consumption and public investment through wealth effect. Based on this argument, the cumulative impact of the growth rate of budget balance $\sum\gamma_{GDP}$ is expected to be positive if the expansionary fiscal contraction exists.

According to the results in Table 1, Brazil represents the only case that its $\sum\gamma_{GDP}$ is positive. However, the potential increase in nominal GDP in Brazil tends to be due to the increase in inflation rate, as its $\sum\gamma_{DFT}$ and $\sum\gamma_{CPI}$ are positive while $\sum\gamma_{RGDP}$ is insignificant. As for the remaining developing countries, the similar phenomenon of negative relationship on inflation rate is not found at all. In Peru, South Africa, Mexico and the Philippines, $\sum\gamma$ is totally excluded from every equation. The insignificant $\sum\gamma_{GDP}$ in any industrialized countries, on the one hand, convinces none existence of expansionary fiscal contraction in these countries. On the one hand, the negative cumulative impact of increasing a budget balance on the inflation rate in Australia, Spain and the Netherlands supports the argument that continual reductions in budget deficits, particularly in highly indebted high-income countries, help reduce inflation pressure. However, the effect seems to be too small to induce any output growth.

The simplest Keynesian model suggests the cumulative impact of the growth rate of government spending on the growth rate of nominal GDP ($\sum\lambda_{GDP}$) to be positive. However, $\sum\gamma_{GDP}$ is insignificant in the United States, Australia, Switzerland, South Africa and the Philippines. Moreover, none of the statistically significant cumulative coefficients in any country is more than one. Although these results obviously contradict the general perceptions of the role of

government spending, Hemming, Kell and Mahfouz (2002) explain that the fiscal multiplier can be small or even negative due to a large crowding-out effect and being rational and forward-looking of both households and investors in forming their expectations against increased government spending, while the country has debt sustainability problem. Budget misallocation can be another reason for a negative relationship between government spending and output growth (Eken et al, 1997).

Despite the above contradicting results, it is observable that in Brazil, Peru, Mexico, Thailand and the Netherlands the values of $\sum\lambda_{GDP}$ are significant and positive, although less than one. The order of the country ranked by the value of $\sum\lambda_{GDP}$ has inverse relationship with the degree of openness. This observation conforms to the general perception that fiscal policy is more effective in closed economies than in open economies.

Among the twelve countries, the Netherlands and Brazil present cases in which the cumulative impact of increased government spending leads to an increase in the growth rate of real GDP. On the contrary, in Sweden, Switzerland and Peru it seems to result in inflation without positive impact on the growth rate of real GPD. Both effects are observable in the case of Thailand.

6. Conclusions

Since the late 1960s, the discussions on the relative influence of monetary and fiscal policy on macroeconomic variables have emerged. After much debate, many studies up until the late 1980s agreed upon the inferior characteristics of fiscal policy to monetary policy, at least in the United States, in terms of magnitude, predictability, and lag of the influence. However, during the last two decades there have been several developments in both monetary and fiscal practices. In order to assess the relative monetary-fiscal influence in this current era, this paper followed the essence of the St. Louis Equation with adjustments made on both sides of the equation concerning new types of macroeconomic variables, types of monetary and fiscal instruments, and specifications on lag lengths and the degree of polynomial.

The results from empirical studies on quarterly data during the 1990s to 2004 of twelve countries covering six industrialized and six developing countries (Australia, Brazil, Mexico, the Netherlands, Peru, the Philippines, South Africa, Spain, Sweden, Switzerland, Thailand, and the United States) showed no specific consensus across these countries regarding the relative monetary-fiscal influence. The countries could be broadly divided into three main categories, namely monetary-policy-dominated, fiscal-policy-dominated, and monetary-fiscal-policies-mixed countries. Even within monetary-fiscal-policies-mixed countries, there were no clearly distinguished roles of monetary and fiscal policies in influencing output growth and inflation rate. The situation appears to be country-specific, rather than identical across countries.

Between the groups of industrialized countries and developing countries, four main implications can be drawn. First, while it was clear in developing countries that the higher degree of openness results in the lower effectiveness of public policy, the evidence was not clear in industrialized countries. The phenomenon of the "New Economy" could be a reason to explain why public policies had very limited impact in relatively closed countries like the United State and Australia.

Second, the growth rate of the monetary aggregate was no longer significant as a monetary policy instrument in industrialized countries that adopted inflation-targeting, while it still

appeared significant in developing countries that just adopted the framework. This implies different situations in adopting the inflation targeting.

Third, the growth rate of budget balance had negative cumulative impact on inflation rates only in industrialized countries that had experienced high public debt and continual budget deficits. By adding the information that these countries have implemented rule-based fiscal policy, the findings imply that investors and households in industrialized countries may be more forward-looking and have higher confidence on fiscal discipline than in developing countries. However, beyond the very mild price effect, the existence of expansionary fiscal contraction was not clear in the industrialized countries.

Fourth, according to the samples, government spending tended to be more influential in developing countries than in industrialized countries.

Despite several differences across groups of countries, one interesting observation is that in countries that set explicit targets on the inflation rate (the countries that adopt inflation targeting and the Single Monetary Policy) their cumulative change on policy rate had a positive relationship with the inflation rate. This observation led to a question whether they are controlling or forecasting future inflation rates.

Finally, it should be remarked here that the statistical analysis in this study captures only the quantifiable relative impact of selected policy instruments. The results do not imply the relative importance between the authorities regarding their qualitative actions towards economic stabilization.

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