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EVIDENCE ON THE DYNAMIC MONETARY CONDITIONS INDEX IN PHILIPPINES

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ABSTRACT

This main objective of this paper is to estimate and construct the augmented monetary conditions index (hereafter MCI) over the quarterly period 1982:1-2004:4 using bounds test approach for cointegration analysis as proposed by Pesaran et al., (2001). The bounds test reveals evidence of cointegration between the real output (y) and its determinants, namely short-term interest rate (r), long-term bond rate (BOND), real exchange rate (e), claims on private sectors (COPS), and share prices (SP) that address the key transmission mechanisms channels, i.e., interest rate, exchange rate, credit, and asset price channels. This has verified the stability of Philippines output demand function which is then used to construct the augmented MCI. Positive relation is revealed for e, BOND and COPS; while SP and r yield a negative coefficient in relation to LRGDP. Hence, if the Bangko Sentral ng Pilipinas's (BSP) boosts up the short-term interest rate continuously and the bond rate continues to fall, the BSP may expose with the disaster of recession. Meanwhile, an explanation of the different behaviour of the Filipino GDP with respect to share price suggests that the asset price channel in influencing the conduct of monetary policy could be argued to be slim. Monetary conditions during the study periods is found to be reflected in the BSP reaction to the prevailing economic situation, implying augmented MCI tracks the inverse movements of the real GDP plausibly well after 1990s, except during the onset of Asian financial crisis.

Keywords*: cointegration, MCI, monetary policy, ARDL, Philippines*

1. INTRODUCTION

Before the onset of Asian financial crisis in 1997, monetary conditions were viewed on the basis of a narrow range of indicator; in particular, M3 was the indicator of domestic monetary policy stance. The peso was relatively stable at the beginning of 1997. On 12 July 1997, however, peso was depreciated by more than 50 per cent at the end of the year (see Bayangos, 2000). The rise in interest rates did not help the peso, which eventually made monetary targeting a less reliable indicator for monetary policy. The monetary authorities have to broaden measure of domestic monetary conditions since the traditional framework of anchoring on monetary aggregates to achieve its primary objective of price stability in Philippines is insufficient.

The key transmission mechanism of monetary policy includes both the interest rate and exchange rate channels are not uncommon (see Freedman, 1994 and 1995). Interest rate affects aggregate demand (AD) through their impact on the intertemporal consumption and saving decisions of households, as well as the intertemporal investment decisions of firms. Meanwhile

exchange rate influences AD through its impact on the relative price of domestic-versus foreign-produced goods. For credit channel, on the supply side of the credit market, tight monetary policy reduces loanable funds by the banks as tightening of monetary policy reduces bank reserves and the quantity of customer deposits that banks accept. On the demand side of the credit market, tight monetary policy makes borrowers less creditworthy and less eligible for loans (see Abel and Bernanke, 2005; BIS, 1997; Bernanke and Gertler, 1995; Azali, 2001). The fluctuation of stock and property prices have raised concerned the interest of the role of asset prices channel in the monetary transmission mechanism. Large changes in asset prices disrupt economic activity, price stability, and lead to financial fragility (Gertler *et al*., 1998:1).

1.1 Monetary Conditions Index (MCI)

MCI is defined as the weighted sum of the percentage points change in short-term real interest rate relative to their values in a base period and the per cent change in the real exchange rate relative to the base period (See Freedman, 1995; Batini and Turnbull, 2002). MCI is featured eminently as an operational target, as an indicator of monetary policy stance, or as an instrument in monetary policy rule (Batini and Turnbull, 2002). When MCI is used as a policy indicator, the MCI aims to keep track on both interest rate and exchange rate movements and their effects on AD. According to Freedman (1995), MCI acts as an operational target indicator within an administration of monetary policy, it offers information about the level of policy stance, indicates the degree of tightening of the monetary conditions (Frochen, 1996; Stevens, 1998; Peng, 2000). MCI also serves as an informative indicator for liquidity conditions in the financial system, as well as provides information on monetary policy stance by comparing the effects of interest rate and exchange rate on the inflation rate (Hanson and Lindberg, 1994).

Gerlach and Smets (1996) explain the rationale behind conducting monetary policy with the help of MCI. The idea of using MCI as approximate measure of the state of the overall monetary conditions was pioneered by the Bank of Canada in the late 1980s (Gerlach and Smets, 2000, p.1680), followed by New Zealand in December 1996. For Canada, steadily loosen monetary policy since 1991 was pursued and inflation target was introduced in February 1991, while inflation targets were introduced by Reserve Bank of New Zealand in 1990.

The central bank constantly reassesses the level of monetary conditions to achieve its inflation-control targets. Intuitively, an increase in MCI reflects tightening, while a decrease in MCI signifies easing of monetary conditions. Monetary conditions can be tightened by an increase in the domestic short-term interest rate that would induce capital inflows, and consequently lead to an appreciation of the domestic exchange rate. Exchange rate appreciation makes the current account worse-off, and brings contradiction effect to the economy. Hence, tighten of monetary conditions serves to dampen AD, *vice versa*. If a lessening of inflationary pressure relative to what had been expected, the desired path for monetary conditions is revised downwards. However, if inflation pressures have increased relative to earlier expectations, then desired monetary conditions are adjusted upwards (Bank of Canada, 1995). The question of the relative effects between interest rates and exchange rate to the economy becomes pertinent, i.e., how much the exchange rate would appreciate if interest rate were one percentage point higher.

The weight is derived from an estimation of the AD on price function. It represents the elasticity of output with respect to the real interest rate and the real exchange rate on AD. It is

rationale to measure the weight average of these variables base on the relative importance on demand (see Duguay, 1994; Longworth and Poloz, 1995; and Gerlach and Smets, 2000).

However, following innovation, previous studies have questioned the appropriate weight of MCI. The main question is whether MCI could be useful short-run indicators of the domestic monetary conditions for the Philippines in facing a more liberalize economy. The present study aims to estimate the elasticities of the deterministic variables with respect to the real GDP. These elasticities will be used to calculate the augmented MCI index. The weights of MCIs are estimated according to the relationship among the variables using a single equation based econometric approach (Ozer and Mutluer, 2005) using Autoregressive Distributed Lag (ARDL) bounds test approach (Pesaran *et al*., 2001) to determine the long-run cointegration between real GDP, long- and short-term interest rate, exchange rate, claims on private sector, and share prices over the quarterly period 1982: 1-2004: 4.

1.2 The Philippines

The Philippines economy was unstable, erratic and brutally hounded by some political shocks, such as *coup d'etat* attempted in the Aquino administration (1989 November), fiscal deficit due to presidential elections (1992 May), Marcos overthrown (1986 February), coup attempted and bombings of business in Makati (1987 August). Other forms of financial events that have hit the Philippines economy, among other, were banking crisis (1981-1987), deregulation (1993 March), and the Asian financial crisis (1997 July), transformed to floating exchange rate regime (1984 October), where effective exchange rate was determined by market forces with periodic Central Bank intervention, and bank debt restructuring agreement at commercial banks and the government lifted all foreign exchange restrictions allowing foreign investors to freely repatriate their capital (1992 July). Therefore, on the monetary front, these changes of financial environment may entail implications for the stability of the transmission mechanism.

Until the early 1980s, the BSP (Central Bank of the Philippines) set the interest rates on both bank deposits and loans to adjust for inflation. The dependence of the banking system on funds from the BSP at low interest rates has contributed to financial chaos in the 1980s besides Marcos cronies to obtain loans and bailouts. Recognizing this, the Philippines embarked on comprehensive financial sector deregulation in 1981-1983. Among those reforms were: 1) Investors were allowed to purchase foreign exchange up to $1 million annually from the banking system for investment abroad, without prior approval from BSP; 2) all limits on repatriation of capital or remittances of dividends from FDI were removed; 3) foreign banks were permitted to grant short-term foreign currency loans to eligible borrowers, and commercial banks were allowed to extend both short- and long-term foreign currency loans without prior approval from the BSP. However, due to economic and political crises, reforms were not taking-off well until the latter half of the 1980s.

Following debt crisis in 1983, the monetary policy framework has been anchored on monetary aggregates to achieve price stability. However, the absence of a pick up in inflation from the relatively high rates of liquidity growth marked a break in the past. For instance, a rise in M3 from 1993-1995 has not fed into higher inflation (Bayangos, 2000). Money supply growth has been expanded during economic and political turmoil and contracted when the

Philippines tried to meet IMF requirements. The flooding with money prior to the 1986 elections was one reason why the newly installed Aquino administration chose to scrap the existing standby arrangement with the IMF in early 1986. The Central Bank released funds to stabilize the financial situation three times (in early 1981, late 1983, and 1989).The money was then repurchased by the Treasury and the Central Bank-the so-called Jobo bills, at high interest rates (i.e., as high as 43 per cent in October 1984). The interest paid on this debt even greater than borrowing. By contrast, in 1984 and 1985, in order to regain access to external capital, tight money supply was pursued and led to a steep fall in output and high unemployment. Subsequently, it was then moved to a floating exchange rate regime in October 1984.

With the adoption of IMF loan program, BSP has conducted monetary policy by targeting monetary aggregates to control inflation based on the Quantity Theory of Money. In January 2000, the Monetary Board (the BSP's policy-makers) has shifted to an inflation-targeting framework (Salas, 2004). Recognizing substantial inflationary pressures in the economy, the appropriate monetary policy is vital to ensure liquidity requirements of growth, while constraining the rate of inflation to the minimum level possible. Several central banks have attempted to estimate the elasticities of the real output by incorporating the interest rate and exchange rate channels into the benchmark model for the construction of MCI.

The remaining of the paper is organized as follows. Section II outlines the empirical model framework, variables selection and data sources for investigation. Section III analyzes the empirical results. Section IV depicts the estimated MCIs under consideration. Finally, Section V offers conclusions and policy implications.

2. METHODOLOGY

2.1 Model Specification and Data

Following Stevens (1998) and Peng (2000), the conventional benchmark formulation of MCI was computed base on equation (1).

$$y_t = \Omega r_t + \Phi e_t + \text{“}other\ variables\text{”} \quad (1)$$

where *y* is the real seasonally adjusted Gross Domestic Product (GDP). A consideration of common evident when using quarterly data is its seasonality effect. The GDP is calculated by the ratio of nominal GDP on per cent of consumer price index (CPI) (2000=100). Census X12 seasonal adjustment options is used to seasonally adjust the series. Census X11 is the standard methods used by the U.S. Bureau of Census to seasonally adjust publicly released data. Meanwhile, *r* denotes real interest rates [following Batini and Turnbull (2002) and OECD (1996), the *exante* short-term real interest rate is measured by the difference between 3-month Treasury bill rate and actual inflation rate]; *e* denotes the natural logarithm of real exchange rate. The parameter Ù and Ö are the coefficients terms on interest and exchange rate in the demand equation that use to derive the weights of the augmented MCI.

"Other variables" are included to account for other possible channels in the transmission mechanisms, *BOND* for long-term interest rate channel, *SP* as proxy for asset prices channel, and *COPS* for credit channel. The details of "other variables" are as follow: Time deposits rate more than 2-Year is used as proxy for long-term interest rate (*BOND*) [following Peng and Leung (2005), calculated by time deposit rate minus CPI]; real stock price index (*SP*) [following

Mayes and Viren (2001), the real stock price is calculated by the Philippines Stock Exchange Index (PSE) deflated by the CPI]; real claims on private sectors (*COPS*) [calculated as the *COPS*/CPI%]. All variables with the exception of the interest rate are expressed in logarithms (Guender, 2001; Burger and Knedlik, 2003) and expressed in real terms. Time deposit is collected from *SEACEN Financial Statistics*, and other data are obtained from the *International Financial Statistics*.

Following Steven (1998), Ericsson *et al.* (1998), Batini and Turnbull (2002), and Ozer and Mutluer (2005), the simple transmission process of monetary policy can be depicted in the conventional MCI at time *t* as:

$$MCI_t \equiv \alpha(r_t - r_b) + \beta(e_t - e_b) \quad , \alpha + \beta = 1 \tag{2}$$

Subscript *t* is a time index, the subscript *b* is the base period, r_t and e_t are the real interest rate and the exchange rate at current period respectively. r_b and e_b are the real domestic interest rate and the natural logarithm of the real exchange rate at base period (2000 = 100) respectively. Meanwhile, α and β are denoted respective weights, where $\alpha = \Omega/(\Omega + \Phi)$, $\beta = \Phi/(\Omega + \Phi)$. The weight of MCI was estimated using major two variables, i.e., *r* and *e*.

2.2 Method

The bounds test proposed by Pesaran *et al*. (2001) is applied to examine the cointegration relation between output and the determinant variables. This approach is based on the estimation of an unrestricted error-correction model (UECM). This estimation strategy is called Autoregressive Distributed Lag (ARDL) approach. The bounds test procedure has several advantages compared to Engle and Granger (1987), Johansen (1988) and Johansen and Juselius (1990): (i) bounds test enables testing the long-run relationship with *I(0)* and *I(1)* regressors (i.e., irrespective of whether the variables are I(0) or I(1)); (ii) estimation is possible under this approach even with the problems of endogenous regressors; and (iii) ARDL technique has the advantage of not acquiring a precise identification of the order of the underlying data (Hsiao, 1997; Pesaran *et al*., 2001).

Bounds test involves two valid asymptotic inferences that use the ordinary least square (OLS) estimates, with two asymptotic critical value bounds. If the test statistics exceeds their respective upper critical values, there is evidence of a long-run relationship, and reject the null hypothesis of no cointegration regardless of the order of integration of the variables. If below the bound, the null hypothesis of no cointegration cannot be rejected, and if it lies between the bounds, inference is inconclusive.

Based on the outline theoretical arguments above, a general function of the real GDP in the equation (1) can be written as: $y_t = f(r_t, e_t, BOND_t, COPS_t, SP_t)$. Hence, the log-linear model is specified as below:

$$\Delta y_t = \beta_0 + \beta_1 r_t + \beta_2 e_t + \beta_3 RBOND_t + \beta_4 COPS_t + \beta_5 SP_t + \beta_6 TIME_t + \beta_8 Dum844_t + \varepsilon_t \tag{3}$$

Several coup attempts have affected political instability in Philippine, with the extreme volatile movements in the PSE during the second half of 1980s in particular, has led to higher volatility and great stock market sensitivities on economic output in Philippine. Dummy variable - *Dum844* (with 1 on 1984Q4 and 0 for others) to account for changes to floating exchange

rate regime, and effective exchange rate was determined by market forces with periodic Central Bank intervention, and *TIME* trend for innovations.

To test for the cointegration among output and the key determinants, equation (3) is converted into a set of UECMs form in equation (4) with lags length, $p = 4$, imposed on each first differenced term in the ARDL model, considering the common practice of using quarterly data for the maximum order of the lags in the ARDL model (Pesaran and Pesaran, 1997: 304). Hence, the UECM model for Philippines is:

$$\Delta y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 r_{t-1} + \beta_3 e_{t-1} + \beta_4 ROND_{t-1} + \beta_5 COPS_{t-1} + \beta_6 SP_{t-1} + \beta_7 TIME + \beta_8 Dum844$$
$$+ \sum_{i=1}^{p} \beta_{9i} \Delta y_{t-i} + \sum_{i=0}^{p} \beta_{10i} r_{t-i} + \sum_{i=0}^{p} \beta_{11i} \Delta e_{t-i} + \sum_{i=0}^{p} \beta_{12i} \Delta BOND_{t-i} + \sum_{i=0}^{p} \beta_{13i} \Delta COPS_{t-i} + \sum_{i=0}^{p} \beta_{14i} \Delta SP_{t-i} + \varepsilon_{1t} \quad (4)$$

where β_0 is an intercept term, Δ is difference operator, and ε_1 is the random error terms. The long-run relationship between *y* and its determinants is tested by imposing restriction on the jointly significant of estimated parameters for cointegrating test (Pesaran *et al*., 2001), with H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$ (no cointegration) vs. H_1 : at least one $\beta_i \neq 0$, $i = 1,2,....,6$. (cointegration).

All the five explanatory variables are used to account for different transmission mechanism channels. The general UECM in equation (4) is tested downwards sequentially using general-to-specific strategy (Hendry and Ericsson, 1991) to arrive at a parsimonious equation by dropping the insignificant first differenced variables by considering the lowest *t*-ratio in absolute term (see Pattichis, 1999). General-to-specific method has been employed by Peng (2000) to calculate the MCI for Hong Kong using 4 lags for each explanatory variable; and Gerlach and Smets (2000) have also used it to estimate the responses of the central banks to exchange rate changes using data of Australia, Canada and New Zealand from 1992:1 to 1997: 2.

The long-run elasticity can be derived from UECM, that is the estimated coefficient of the one-lagged explanatory variables (multiplied with a negative sign), divided by the estimated coefficient of the one lagged dependent variable (Bardsen, 1989). Meanwhile, the estimated coefficient of the first differenced variable in UECM is the short-run elasticity.

3. EMPIRICAL RESULTS

The estimated UECM model in equation (4) is adequate when the model satisfies the assumption of the classical linear regression model. Results in Table 1 show a parsimonious UECM passes a battery of diagnostic tests. The estimated residuals show no significant evidence of serial correlation (LM test), Jarque-Bera test confirms residual normality (H_o: a normal distributed), autoregressive conditional heteroscedasticity effect (ARCH test (1)) rejects the presence of heteroscedasticity in the disturbance term (H_o: no ARCH up to order *q* in the residuals), and the presence of a general specification error is rejected based on the Ramsey RESET(1) test (H_o: no general specification error).

Moreover, all the lag-one regressors are statistically significant at 5 per cent level with R^2 of 0.791, a reasonable sense of 12.65 of *F*-statistic, and the presence of the significant individual *t*-statistics (see Pindyck and Rubinfeld, 1998, p.97-98). It indicates a possible

Table 1
Real GDP Functions–UECM

Regressor	*Coefficient*	*t-statistic*
Dependent variable: "$LRGDP_t$		
Constant	1.4077	3.1963***
$\Delta LRGDP_{t-1}$	-0.3921	-4.6073***
$\Delta RBOND$	0.0013	2.8080***
$\Delta RBOND_{t-1}$	0.0012	2.5852***
$\Delta RBOND_{t-4}$	0.0060	1.4899
$\Delta LRER_{t-1}$	-0.0932	-3.0578***
$\Delta LRER_{t-4}$	0.0709	2.8624***
$\Delta LRCOPS$	0.2363	7.1974***
$\Delta LRCOPS_{t-1}$	0.0553	1.5887
$\Delta LRCOPS_{t-2}$	0.0537	1.8450*
$\Delta LRSP_{t-1}$	0.0263	4.1101***
$\Delta LRSP_{t-2}$	0.0232	3.3005***
$\Delta LRSP_{t-4}$	0.0304	4.3041***
$LRGDP_{t-1}$	-0.1464	-3.7289***
RIR_{t-1}	-0.0034	-4.9737***
$RBOND_{t-1}$	0.0042	4.4854***
$LRER_{t-1}$	0.0672	2.7633***
$LRCOPS_{t-1}$	0.0222	2.5932**
$LRSP_{t-1}$	-0.0070	-2.2918**
TIME	0.0070	3.0193***
DUM844	-0.0346	-2.0901**

Notes: Sample (adjusted): 1983Q1 to 2004Q4 (88 observations). *LRGDP* is the seasonally adjusted log real GDP. R-squared: 0.7906; adjusted R bar-squared: 0.7281; Standard Error of Regression: 0.0115; residual sum of squares: 0.0088; F-statistic (P-value): 12.6534 (0.000); Durbin-Watson statistic: 2.1554; Breusch-Godfrey lagrange multiplier test [4]: 1.8907 (0.756); and autoregressive conditional heteroskedasticity ARCH test[1]: 0.4640 (0.496); Ramsey RESET functional test: 0.2517 (0.616), Jarque-Bera normality test [2]: 0.2662 (0.875). Figure in brackets (.) is p-values. Asterisks (*, ** and ***) denote statistically significant at 10%, 5% and 1% level respectively.

absence of multicollinearity problems. This has overwhelmed the worry of visibly multicollinerity problem for the use of both short-term and long-term interest rate in the right-hand side regressors.

For investigating the presence of a cointegrating relationship among the variables of Philippino GDP function, a joint significance *F*-test is performed. The computed *F*-statistics, $F(y|r,e,BOND,COPS,SP)=11$ exceeds the upper critical value *I(1)* band of 5.23 at 1 per cent level. The result of the inference shows the null hypothesis of no cointegration is rejected, indicating real GDP, exchange rate, short- and long-term interest rate, claim on private sectors, and share price are cointegrated in the long-run. Bounds test for cointegration analysis are reported in Table 2.

Table 2
Results of the Bound Tests for Cointegration Analysis

Computed F-statistics (Wald test): (H0 : $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$)		*F(8, 67)= 11.0017****
Asymptotic critical values bounds	Lower bound, *I(0)*	Upper bound, *I(1)*
1% level	3.93	5.23

Notes: The reported critical values are from Pesaran *et al*. (2001) Table CI (v) Case V: Unrestricted intercept and unrestricted trend (page 301) for *F*-statistic (*k*=5).

Table 3
Results of Likelihood Ratio Exclusion Test

Variables	*y*	*r*	*e*	*BOND*	*COPS*	*SP*
$\times^2$-statistics	13.9047 (0.000)***	24.7374 (0.000)***	7.6358 (0.006)***	20.119 (0.000)***	6.7247 (0.010)***	5.2522 (0.022)**

Notes: Asterisks (** and ***) denote statistically significant at 5% and 1% level respectively. Figure in parentheses are the p-value.

Table 4
Estimated Short-Run and Long-Run Elasticity of Real GDP

Variable	*Long-run*
r	- 0.0238***
e	0.4590***
BOND	0.0288***
COPS	0.1520**
SP	- 0.0481**
C	9.6101***

Note: Asterisks (** and ***) denote statistically significant at 5% and 1% level respectively. The structural form long-run coefficient for *r*, *e*, *BOND*, *COPS* and *SP* are derived as (β_2/β_1), (β_3/β_1), (β_4/β_1), (β_5/β_1), and (β_6/β_1) respectively from the estimated equation UECM. The short-run elasticity is captured by the estimated coefficients of the first-difference variable in UECM. Sample adjusted: 88 observations used for estimation from 1983Q1 to 2004Q4. Dependent variable is *LRGDP_SA*.

Moreover, the results of the likelihood ratio exclusion test (Table 3) affirm that all explanatory series are statistically significant at 5 per cent level and should not be excluded from the model. The estimated long-run elasticities are derived from UECM based on Bardsen (1989) (Table 4). In the long-run, the estimated long-run coefficients of the *r*, *e*, and *COPS* are correctly sign as expected, except for *BOND* and *SP*.

Positive sign of *e* implies that an increase in the exchange rate promotes AD, or depreciation brings expansionary effect on the Philippines output. In addition, the response of foreign exchange earnings on devaluation follow a J-curve that first decline and then rising as the current account improve as a result of improve net exports and import substitutes are found. Apparently, share price is negatively related to *GDP* in Philippines. Several coup attempts and political instability have contributed to higher volatility and perhaps, have led to stock market sensitivities. This may suggest that the stock market may mostly preside over economically small-cap cyclical. Moreover, deregulation of the financial market may have weakened the

relationship between the share market and the economy. Bayangos (2000) also argues that stock market continues to be thin and suffers from insider trading and price manipulation in Philippines. Hence, market with more listed companies may offer more diversification opportunities, and reduce the overall expected volatility.

On the other hand, results signify a rise in the bond rate is associated with a fall in *GDP*. To justify this condition, when the central bank signals her intention to keep raising the short-term rate, the long-term interest rates will be incorporated with higher long-maturity interest rate. Therefore, if the households reduce the desire to spend, the equilibrium interest rate structure would have fallen. To prevent the interest rate structure from falling to its lower new equilibrium level, the AD will growth slow. Under this circumstance, falling long rate will be an indication of tighter monetary conditions, and lead to a reduction in AD. Since the sign for both short-rate and long-rate are opposite, if the BSP continues to boost up the short-term interest rate, the bond rate will continue to fall, the central bank might be exposed to the disaster of recession following the effect of deregulation of financial markets. This finding is consistent with Kasriel (2005)'s study who reveals that when the bond yield is combined with the short-term rate, a positive relationship is found between the bond yield and AD growth. Perhaps, bond market in Philippines is shallow and liquidity insufficient (Bayangos, 2000). It could be probably due to the domination of the bond market by the government securities, and the limited assortment on private bond issues.

4. ESTIMATED MCI

Identifying the long-run component is an important aid to economic policymaking. This study focuses on its long-run relationship by considering the point of view from policy implication. The estimated long-run cointegrating equation is written as equation (5). The associated weights of MCI index, α and β, are -0.054 and 1.054 respectively. The augmented MCI derived from the estimated AD function is shown in equation (6a) and If the equation is scaled and *LRER* is transformed, the derived MCI would be shown as equation (6b).

$$Y = -0.023\, r + 0.459\, e + 0.028\, BOND + 0.152\, COPS - 0.048\, SP + 9.610 \quad (5)$$

$$MCI_t = -0.0546(\Delta r) + 1.0546(\Delta e) \quad (6a)$$

$$MCI_t = \Delta r - 19.286\, \Delta e - 1.210\, \Delta BOND - 6.391\, \Delta COPS + 2.021\, \Delta SP \quad (6b)$$

where Δ denotes the difference operator. The weight *e/r* is termed the MCI ratio. The relative estimated weight is –19.28 (or MCIs ratio of -0.05, equivalently to the weight of the interest rate over the weight of the exchange rate). The results suggest that a one-percentage point rise in the real interest rate has about the same effect on GDP to a 0.05-percentage drop in real exchange rate. In other words, the results suggest that a one-percentage-drop in real exchange rate has the same effect on MCI as a 19.3 per cent point increase in real interest rate, *ceteris paribus* (Duguay, 1994; Bayangos, 2000), or roughly equivalent to a 1.2-percentage reduce in real bond rate, a 6.4-percentage drop in real claims on private sector, or a 2.02-percentage rise in real share prices.

The results give a much lower weight to the real interest rate than the real exchange rate, implying a one per cent point change in the real interest rate has relatively lower effect on output than one per cent change in the real exchange rate. As Peng (2000) claims that there are

generally smaller estimate ratios of real interest rate against real exchange rate for small open Asian economies.

Do the constructed augmented MCIs match with the monetary policies implemented by the BSP? Inspect virtually (Figure 1), easing monetary policy was implemented for a year until 1984Q1. Tight monetary stance was employed, reaching its peak in 1985Q2. Easing stance was pursued thereafter, reaching its trough in 1988Q1. A tight monetary condition was then followed until 1990Q4. Moderation of monetary conditions was executed during the period of 1991 until the onset of Asian financial crisis in 1997Q3. A short tight policy was imposed following the Asian crisis for four consecutive quarters until 1998Q1. Thereafter, monetary conditions were loosening almost monotonically till 2004.

Monetary conditions during the study periods is found to be reflected in the BSP's reaction to the prevailing economic situation, implying the augmented MCI tracks the inverse movements of *GDP* plausibly after 1990s (except in 1997 following the Asian financial crisis). This could be due to some adjusted events in 1990, among those, (i) the aftermath of the prescribed guidelines regarding the rescheduling of bank debts of the Philippines, (ii) the guidelines and implementing rules of the Central Bank governing foreign borrowings were revised, (iii) all government foreign loans would require the prior approval of the Central Bank, and (iv) revised guidelines relating to the Philippine Government's program for the conversion of external debt into equity investment in Philippine enterprises were issued.

Figure 2 depicts the real augmented MCI and contribution of each component. Overall, the interest rates correspond to the augmented MCI. Despite floating exchange rate regime was implemented in 1984 October and further liberalized exchange rate system in 1992 August, the volatility of exchange rates are relatively steady. However, it is noteworthy that augmented MCI shows a continuous tightening of monetary conditions in 1997 following the Asian financial crisis. The peso-dollar rates showed sustained appreciation while higher interest rates were jacked up to meet program targets with the IMF. Obviously, BSP has been capable of stabilizing peso exchange rate and control inflation by adjusting interest rate. For instance, BSP stabilized peso depreciation by adjusting interest rate, i.e., domestic liquidity (M3) expanded by only 3.3% in 2003 (9.5% in 2002). Hence, there is no scepticism for reason why the MCI ratio is much smaller weight.

Figure 1: The Real Augmented Mci and Real GDP Growth (Seasonally Adjusted)

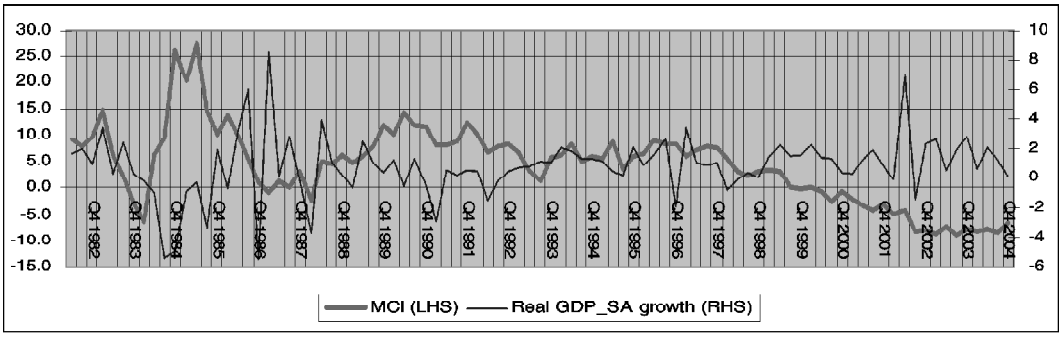
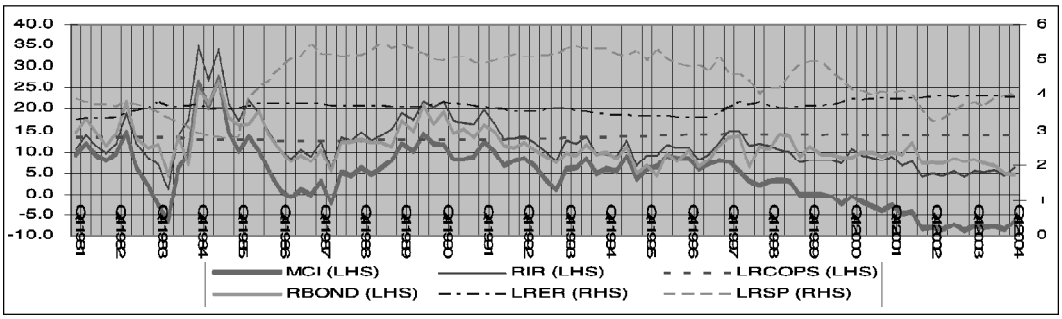


Figure 2: The Augmented Real MCI and Contribution of its Components



5. CONCLUSIONS AND POLICY IMPLICATIONS

This study investigates cointegration between the real *GDP* and its determinants to estimate the augmented MCIs using the bounds testing approach for quarterly period 1983:2-2004:4. It is evident that the real *GDP*, real exchange rate, short- and long-term real interest rates, real claims on private sectors, and real share price are cointegrated. This has verified the stability of Philippines output demand function which would be used to construct the augmented MCI. This study reveals that the policy implemented by the BSP is corresponding reasonably well to the augmented MCIs. Results reveal positive relation for *e*, *BOND* and *COPS*; while *SP* and *r* yield a negative coefficient in relation to *GDP*. A possible light of policy implication are drawn.

First, observation of the other key transmission mechanism channels would be a source of information to be incorporated into the construction of augmented MCI to set the operating target for the monetary policy instrument, apart from the interest and exchange rate of the conventional MCI model. Second, transmission of monetary policy to real sector through the short-term interest rate channel is competent. Meanwhile, for the long rate, a fall in bond yield represents an easing in monetary condition. So, if the BSP continues boosting up the short-term interest rate, the bond rate continues to fall, the central bank might be exposed to the disaster of recession. It is recommended to firmly establish its secondary bond market, focus on transparency and liquid issues, prudent regulations by the BSP, as well as open up the market for private sector. Third, credit channel *per se* is a significant concern of the BSP on output. Fourth, different behaviour of the Filipino GDP with respect to share price suggests that the asset price channel in influencing the conduct of monetary policy in the Philippines could be slim and thin that might be caused by heavy insider trading or perhaps the price is not in its true value.

The design of the prudential regulation plays an important role to economic growth. Supervision has to ensure comprehensive monitoring of all the potential threats to financial stability. Sufficient attention is vital to systemic issues, and identifies potential threats to financial stability arising from the risk of contagion effects. Separation supervisory authority and the BSP are alleged to evade conflict of interest between monetary policy and prudential supervision.

For the construction methodology, it is suggested to use potential output for getting the estimation weights of MCI. According to Ghatak *et al.* (1992), joining the peaks of the real *GDP* plot gives a measure of the trend line in productive potential. The rate of increase in the

real *GDP* from one peak to another indicates the growth rate of productive potential. When *GDP* rises, the resources will become more fully employed. By the time full employment conditions is achieved, the boom moves down into a recession. Thus, join the peaks over time shows the possible path to move along the full capacity.

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