

# FINANCIAL LIBERALIZATION, WEIGHTED MONETARY AGGREGATES AND INCOME IN NEPAL: AN EMPIRICAL INVESTIGATION

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## 1. Introduction

This paper investigates the long-run relationships between monetary aggregates and income in Nepal. Apart from the traditional "Simple-sum" monetary aggregates defined and published by the Nepal Rastra Bank (NRB, Central Bank of Nepal), we proposed alternative "weighted" monetary aggregates as potential intermediate indicators for the purpose of monetary policy actions. The weighted monetary aggregate in question is the Divisia aggregate introduced by Barnett (1980). Barnett argues that the Divisia aggregate is an appropriate measurement for monetary services of a nation. Empirical studies using Divisia aggregates in the developed countries support the superiority of this aggregate compared to its counterpart, the Simple-sum, in terms of its predictability with key macroeconomic variables.

Despite the theoretical implication of the Divisia approach as an appropriate measurement of monetary services, the investigation has been mostly limited to developed countries. An empirical testing of the performance of Divisia aggregates in developing countries, therefore, can be useful in ascertaining the robustness of the conclusion derived for the developed countries. As yet there has been no attempt to address this issue, particularly for developing countries that have undergone rapid financial liberalization. This study intends to fill that gap in the literature.

The plan of the paper is as follows. Section II discusses the relevance of the Divisia aggregate in a "deregulated" Nepalese economy and follows with discussions on the computation of the Divisia aggregate. In Section III, we present the results of the long-run relationship between income and alternative monetary aggregates using the Johansen approach. The last section contains our main conclusions.

## 2. The Relevance of Divisia Money in Nepal

It has been observed that there has been a lack of empirical research in determining the role of Divisia monetary aggregates in developing economies<sup>1</sup>. One

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<sup>1</sup> Except studies by Huang *et al.* (1992) for Taiwan, and Subrahmanyam and Swami (1991) for India.

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of the probable reasons is that the Divisia money works well in developed market-oriented financial system economies. Even there, it has been found that the Divisia money aggregate does not perform better than the Simple-sum aggregate in some of the developed countries<sup>2</sup>. Thus, why should this deter research in developing countries? Judd and Scadding (1982) have pointed that the construction of a Divisia monetary aggregate depends critically on the measurement of user costs of the relevant monetary components. Judd and Scadding (1982, p. 1011-1012) argue that, 'The Divisia approach is perhaps most useful for a world in which interest rates on monetary assets are unregulated so that reliable measures of user costs are easily calculated. Hence it promises to become increasingly important if the current trend towards interest rate deregulation continues.'

However, since late 1970s and early 1980s, developing countries in the Asian region, in particular Nepal, have witnessed a significant financial deepening and disintermediation in the financial system. With changes in financial markets of the developing countries, including the deregulation of financial institutions and innovations in financial instruments, the new development in the theory and practice of monetary aggregation pioneered by Barnett and his colleagues may have some relevance for the developing Asian countries.

There are new developments in the financial system of Nepal that qualify for the rationale for the use of Divisia monetary aggregate. In mid-1980s, NRB takes a major step towards deregulating the financial system in Nepal. Adhikary (1989) points out three reasons that have prompted NRB towards deregulating the financial system. First, financial resources have been unevenly distributed among the financial institutions whereby some have abundance of resources while others face scarcity of the same resources. The rigidity in interest rate on deposits restricted the institutions lacking resources to attract funds by offering higher interest rates<sup>3</sup>. Second, there is the widening between deposit and lending rates. This situation is unwarranted in order

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<sup>2</sup> For example, see Thornton and Yue (1992) and Issing *et al.* (1993).

<sup>3</sup> According to a study on Nepal by Yadav *et al.* (1992), regulated interest rates in the formal sector have also led to credit rationing that favours farm household with collateral. Borrowers without collateral are excluded and hence have to rely on the informal credit market.

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to foster healthy and competitive financial markets. And finally, with the establishment of foreign banks (joint venture with local investors) in Nepal, the government is obliged to offer a more competitive financial environment for the commercial banking activities. Furthermore, with financial deregulation, the interest rate gap between the formal and informal sectors of the financial system would be reduced. Thus, in November 1984 financial institutions in Nepal were granted autonomy to offer higher interest rates on savings (up to 1.5 percent) and on time deposits (1 percent) than the prevailing interest rates as prescribed by the central bank<sup>4</sup>. In May 1986 financial institutions have been authorized to fix their own interest rates on both deposits and loans subject to a minimum rate on saving deposits and minimum lending rate on priority sector as prescribed by the central bank. However, effective from July 1989, interest rates were completely liberalized and financial institutions were free to determine their own deposit and lending rates. As a result of financial liberalization, the Nepalese financial sector grows at a rate faster than the real sector of the economy. Financial liberalization in Nepal in recent years has resulted in depth and sophistication of the banking system. A study by Demetriades and Luintel (1996) suggests that financial deepening has enhanced economic growth in Nepal for the period 1960-1992.

Our question is: Does financial liberalization resulted in the breakdown between money and income in Nepal? A study by Tseng and Corker (1993, p. 63-64) on Nepal and eight other Asian developing countries concludes that, 'Financial liberalization brought many new challenges for the monetary authorities of these countries, many of which remain as reforms continue to be implemented. The liberalization of interest rates and other financial reforms have promoted financial deepening and have contributed to improving resource allocation, the mobilization of financial savings and the efficiency of investment. In particular, financial liberalization has altered the relationship between money, income and interest rates, complicating the interpretation of developments in the monetary aggregates.' This result has important implication for the monetary policy action. If money is to have a useful role in the Central Bank's policy process, at least two fundamental questions must be answered.

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<sup>4</sup> For further discussions on financial reforms in Nepal, see Adhikary (1989), Demetriades and Luintel (1996) and Talib (1993).

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First, how close is the relationship between money and national income in the economy? If money growth is to be a good predictor of economic activity (measured by income), there must be a stable relationship between the monetary aggregates and the national income. Without such a close relationship, the Central Bank cannot determine the level of growth in monetary aggregates that is consistent with sustainable economic growth. Second, insofar as money remains a useful predictor of income, which measure of money should receive the most attention? The issue of the measurement of money to be used as policy guide has not only been centered on narrow versus broad money but also between other "weighted" monetary aggregates as potential intermediate or information variable<sup>5</sup>.

Barnett and his colleagues<sup>6</sup> have argued that the recent instability between money and income was the result of measurement error in measuring the nation's monetary aggregate. Barnett (1980) proposes the use of the Divisia aggregate for measuring monetary services. Instead of adding together all the asset components and treating each component with equal weights to form an aggregate, the Divisia aggregate uses the basic monetary components' user costs to calculate their contributions to the consistent monetary aggregates. These user costs measure the marginal money services yielded by each asset component. The share of each component's user cost in total user cost is used to weight that component's growth rate, and the sum of these weighted growth rates equals the change in the total Divisia aggregate.

More recently, Chrystal and MacDonald (1994) have investigated the role of Divisia aggregates for the United States, United Kingdom, Australia, Germany, Switzerland, Canada and Japan. They found support for the Divisia aggregate as opposed to the Simple-sum aggregate in these developed countries, even during the financial innovation era. They questioned the conclusion derived from previous influential studies that financial innovation causes the breakdown of the relationship between money and income. Instead they pointed to inappropriate measurement of

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<sup>5</sup> The more popular "weighted" monetary aggregate is the one proposed by Barnett (1980).

<sup>6</sup> See for example Barnett (1980) and Barnett *et al.* (1984). Judd and Scadding (1982) and Stone and Thornton (1987) have also highlighted the potential problems using Simple-sum aggregate as opposed to the Divisia aggregate.

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money as being the main reason for instability in the link between money and income. This point has been stressed by Chrystal and MacDonald (1994, p. 74) that, 'There has been a major measurement error in virtually all of the previous literature on money. Instability in empirical relationships has been primarily due to the fact that Simple-sum measures of money are not admissible aggregates on index-theoretic grounds. This error has been especially important in a period when characteristics of components which are added together have been changing.' Chrystal and MacDonald (1994, p. 76) further conclude that, 'this suggests that the problems with tests of money in the economy in recent years may be more due to bad measurement theory rather than to an instability in the link between the true money and the economy. Rather than a problem associated with the Lucas Critique, it could instead be a problem stemming from the "Barnett Critique".'

As a matter of fact, recent studies discovered that using Divisia as opposed to Simple-sum aggregate alters significantly the conclusions reached by previous influential studies<sup>7</sup>. As a result, Belongia (1996) asserts that many of the monetary puzzles of the 1980s would have been resolved if Divisia monetary aggregate had been used. Belongia (1996, p. 1082) argues that, 'the results show that basic inferences about the direction, magnitude, and significance of money growth on economic activity can depend crucially on the chosen measure. Because simple-sum indexes violate basic theoretical principles, the sensitivity of empirical results illustrated here offers practical evidence against further use of the reported simple-sum monetary aggregates'.

In view of these new developments, is there a role for Divisia monetary aggregates in a changing financial environment or "deregulated" Nepalese economy as predicted by Judd and Scadding (1982)? Nevertheless, a study by Subrahmanyam and Swami (1991) for India, found that although the Indian economy experienced a significant financial deepening and disintermediation, Simple-sum monetary aggregates were more informative than the Divisia aggregates. On the other hand, Huang *et al.*'s 1992 study of the Taiwanese economy suggest that there are potential roles for Divisia

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<sup>7</sup> Barnett *et al.* (1992) provide evidence from other developed countries which support the superiority of Divisia aggregate compared to the Simple-sum aggregate



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money as a useful aggregate for monetary policy purposes. Therefore, given a new financial environment, the feasibility and usefulness of the Divisia monetary aggregates need to be examined rigorously in the context of developing Asian countries.

### 2.1 The Construction of Divisia Monetary Aggregate

According to Barnett (1980), a Divisia monetary aggregate is constructed in the following manner: Let  $q_{it}$  and  $p_{it}$  represent the quantities and user costs of each asset to be included in the aggregate at time  $t$ . The expenditure share on the services of monetary asset  $i$  in period  $t$  is:

$$s_{it} = p_{it}q_{it} / \sum_j p_{jt}q_{jt} \quad [1]$$

The user cost (see Barnett, 1978) of each asset is measured as:

$$p_{it} = (R_t - r_{i,t}) / (1 + R_t) \quad [2]$$

where  $R_t$  is the benchmark rate, the maximum  $[r_j, r_i; i=1,2,\dots,n, j=1,2,\dots,k, i \neq j]$ . The growth rate of a Divisia aggregate then can be written as

$$G(Q_t) = \sum_{i=1}^n s_{it}^* G(q_{it}) \quad [3]$$

where  $s_{it}^* = 0.5(s_{it} + s_{it-1})$  and  $n$  is the number of assets in the aggregate. Single period changes, beginning with a base period can be cumulated to determine the level of the Divisia aggregate in each succeeding period.

The computation of a user cost depends on the choice of the benchmark asset. As Goldfeld (1982) points out, the benchmark asset is not easily defined or may not even exist. As a result, the value and quality of the Divisia monetary aggregate is influenced by the chosen benchmark asset. According to Barnett and Spindt (1982), the benchmark asset is the one that is held only for accumulating and transferring

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wealth across time and its rate of return should be the highest in the economy. The benchmark asset is a non-monetary asset, and thus provides no transaction services. Although Barnett and Spindt (1982) suggest that human capital is the "best" to represent the benchmark asset, its data availability is the major constraint. Nevertheless, the majority of studies of Divisia aggregates utilised the highest available rate of return on a given set of monetary assets. Barnett *et al.* (1992, p. 2105) agreed on this point and further noted that, 'The role of the benchmark asset is to establish a nonmonetary alternative. It is acceptable for this to be a different asset in each period, since the maximization is repeated each period. In theory, any measurement of  $R_t$  could be viewed as a proxy for the unknown rate of return on human capital.' In practice, however, the benchmark rate is defined in such a way that the user costs for the monetary assets are positive and this method of selecting the benchmark rate will avoid the problem of negative user cost. Therefore, it is for this reason that the benchmark rate is made to dominate all rates of return of monetary asset components.

In this study, we compute the Divisia monetary aggregates for Nepal using the method proposed by Barnett (1980). For computation, we employed both the narrow money M1 and broader money M2. Details of the monetary components and their respective user costs are presented in Table 1. From Table 1, we can observe that the rate of return on currency is assumed to be zero since it is a perfectly liquid asset. On the other hand, although the explicit rate of return on demand deposits is also zero, Offenbacher (1980) and Barnett *et al.* (1981) strongly argued that an implicit rate of return must be imputed to demand deposits, if the substitutability between currency and demand deposits is to be estimable. Barnett (1982, p. 699) proposes that, 'In some cases implicit rates of return must be used in computing the interest rates in the formula  $p_t$ , especially when the own rate of return on an asset is subject to governmental rate regulation. An implicit imputation is also used in the measurement of  $R$ . The Divisia quantity index has been found to be robust to those imputations within the plausible ranges of error in the imputation'.

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**Table 1: Information Used To Construct Divisia Aggregates for Nepal**

Money	Asset Components	Rate of Returns
Divisia M1	Currency in circulation	Zero
	Demand deposits	Implicit rate of return. Using Klein's (1974) method. The basic formula for computing Demand deposit rate of return (DDr) is as follows; $DDr = r_L \cdot (1 - RRDD)$ , where $r_L$ is commercial bank's lending rate on Industry loans (percent p.a.), and RRDD is reserve requirement on demand deposits.
Divisia M2	Saving deposits	Saving deposit rate (SDr) in percent p.a.
	Fixed deposits	Fixed deposit rate (FDr). $FDr = \max \{ (r_i) \}$ , where $i=3, 6, 12, 24$ months maturity (percent p.a.).
	Margin deposits	Margin deposit rate (MDr). Proxied with - Mdr = Export bill rate less saving deposit rate
	Benchmark asset	Maximum available rate. $Max = \{ [DDr, SDr, FDr, MDr, r_i] + 0.1 \}$ , where $i$ =Treasury bills, National savings certificate, Development bonds and Nepal Rastra Bank Bonds.

However, the proper implicit rate imputation to demand deposits remains an open issue. Following Offenbacher (1980), the approach taken in this study is to compute an implicit rate using Klein's (1974) methodology. The formula used for constructing the implicit rate on demand deposits (DDr) is given as follows

$$DDr = r_L [1 - (BR/DD)] \quad [4]$$

where  $r_L$  is the rate of return on bank's earning assets and BR is bank reserves. Using the envelope approach, a series of benchmark rates is formed by selecting that benchmark rate which is higher than the rate of return of each monetary component. This will ensure that  $p_i \geq 0$  (see Mullineux, 1996). Furthermore, Binner (1990) proposes adding 0.10 points to the benchmark rate to ensure that this rate will be non-zero.

### 3. Testing Long-Run Relationship: The Johansen Procedure

Since our interest is to determine the long-run relationships between monetary



aggregates and nominal income, the first step is to verify the order of integration of each of the series involved<sup>8</sup>. The standard procedure for determining the order of integration of a time series is the application of augmented Dickey-Fuller test (Dickey and Fuller, 1981) which requires regressing  $\Delta y_t$  on a constant, a time trend,  $y_{t-1}$  and several lags of the dependent variables to render the disturbance term white-noise. Table 2 presents the augmented Dickey-Fuller (ADF) tests for all series involved in the analysis in logarithmic form in levels and first-differences. Our results indicate that non-stationarity cannot be rejected for the levels at the 5 percent significance level base on the ADF test. When the series are differences, non-stationarity can be rejected for all series. The ADF statistic suggest that all five series are integrated of order one, whereas the first-differences are integrated of order zero. Therefore, all series is best characterized as difference-stationary process instead of trend-stationary process, and in our case each series need to be differenced once to achieve stationarity.

**Table 2: Results of Integration Tests**

Series	Series in Levels			Series in First-Differences		
	$t_{ADF}$	Lags	LM(4)	$t_{ADF}$	Lags	LM(4)
Simple-sum M1	-1.58	8	6.52	-11.46*	2	8.79
Simple-sum M2	-1.53	8	8.83	-3.37*	3	5.36
Divisia M1	-1.63	9	7.26	-3.87*	3	8.88
Divisia M2	-1.01	8	7.10	-4.53*	3	5.85
Nominal Income	-2.82	9	3.53	-8.67*	2	4.35

Notes: The relevant tests are derived from the OLS estimation of the following augmented Dickey-Fuller (ADF) regression:

$$\Delta y_t = a + bt + \beta y_{t-1} + \sum_{i=1}^n d_i \Delta y_{t-i} + v_t$$

where  $\Delta$  is the difference operator,  $t$  is a linear time trend and  $v_t$  is the disturbance term. The hypothesis that a series contains a unit root is tested by  $H_0: \beta = 0$  while the hypothesis that the series is non-stationary with a stochastic trend rather than a deterministic time trend is tested by  $H_0: b = -\beta$ . Rejection of the latter hypothesis suggests the existence of a deterministic trend.  $t_\beta$  is the  $t$ -statistic for testing the significance of  $\beta$  when a time trend is included in the above equation while  $t_b$  when time trend is excluded. The lag length  $n$ , is determined using Perron's (1989) liberal approach. LM(4) is the Breusch and Godfrey's Lagrange Multiplier test for residual serial correlation of the fourth-order process. The calculated statistics are those computed in MacKinnon (1991). The critical values at 5 percent for  $T = 50$  is -3.49 and -2.91 for  $t_\beta$  and  $t_b$  respectively. The LM Chi-square statistic for serial correlation with four lags, with four degree of freedom at the 5 percent level is 9.48.

Asterisk (\*) denotes statistically significant at the five percent level.

After determining that the series are of the same order of integration, we test whether the linear combination of the series that are non-stationary in levels are cointegrated. It has been a standard practice to use the Engle and Granger (1987) two-step procedure to test for cointegration. However, more recently the Engle-Granger estimation procedure has been criticized for being static and suffering from several econometric problems. First, Banerjee *et al.* (1986) noted that even though the two-step procedure produces super-consistent parameter estimates, for small sample, the bias on the parameter estimates can be quite severe. Second, when cointegration between variables is not unique, the Engle-Granger two-step procedure is less satisfactory. The estimates are not invariant to the chosen normalization, that is which variable to be used as regressor and which to be used as regressand. Finally, using OLS estimates, as regressing integrated series will invalidate statistical inferences (see Perman, 1991).

As an alternative to the Engle-Granger two-step procedure, the Johansen (1988) maximum likelihood estimation procedure for cointegration is appropriate and does not suffer from any of the above mentioned problems. Detailed discussion of the Johansen technique has been discussed in Dickey *et al.* (1991), Cuthbertson *et al.* (1992) and Charemza and Deadman (1992). However, a brief discussion of the Johansen technique is as follows. We begin with the following  $k$ -lag vector autoregressive (VAR) representation:

$$X_t = \alpha + \Pi_1 X_{t-1} + \Pi_2 X_{t-2} + \dots + \Pi_k X_{t-k} + \mu_t \quad (t=1, 2, \dots, T) \quad [5]$$

where  $X_t$  is a  $px1$  vector of nonstationary  $I(1)$  variables,  $\alpha$  is a  $px1$  vector of constant terms,  $\Pi_1, \Pi_2, \dots, \Pi_k$  are  $pxq$  coefficient matrices and  $\mu_t$  is a  $px1$  vector of white Gaussian noises with mean zero and finite variance. Equation [5] can be reparameterised as

$$\Delta X_t = \alpha + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \dots + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi_k X_{t-k} + \mu_t \quad [6]$$

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\* Detailed sources and description of data used in the analysis are presented in Data Appendix.

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where  $\Gamma_i = -I + \Pi_1 + \Pi_2 + \dots + \Pi_i$  ( $i=1, 2, \dots, k-1$ )

and  $\Pi$  is defined as

$$\Pi = -I + \Pi_1 + \Pi_2 + \dots + \Pi_k. \quad [7]$$

Johansen (1988) shows that the coefficient matrix  $\Pi_k$  contains the essential information about the cointegrating or equilibrium relationship between the variables in the data set. The rank of the matrix  $\Pi_k$  indicates the number of cointegrating relationships existing between the variables in  $X_t$ . In this study, for a two case variables,  $X_t = (\text{income and money})$  and so  $p=2$ . Therefore, the hypothesis of cointegrating between money and income is equivalent to the hypothesis that the rank of  $\Pi_k=1$ . If the rank=0, then the two variables are not cointegrated.

In estimating a two-variables case using the Johansen procedure, we begin with the following least square estimating regressions:

$$\Delta X_t = \alpha_1 + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \omega_{1t} \quad [8]$$

$$X_{t-k} = \alpha_2 + \sum_{i=1}^{k-1} \Gamma_i \Delta X_{t-i} + \omega_{2t} \quad [9]$$

Define the product moment matrices of the residuals as  $S_{ij} = T^{-1} \sum_{t=1}^T \omega_{it} \omega_{jt}'$  for  $i, j=1, 2$ . Johansen (1988) shows that the likelihood ratio test statistic for the hypothesis of at most  $r$  equilibrium relationships is given by

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$$-2\ln Q_r = -T \sum_{i=r+1}^p \ln(1-\lambda_i) \quad [10]$$

where  $\lambda_1 > \lambda_2 > \dots > \lambda_p$  are the eigenvalues that solve the following equation

$$|\lambda S_{22} - S_{21} S_{11}^{-1} S_{12}| = 0. \quad [11]$$

The eigenvalues are also called the squared canonical correlations of  $\varpi_{21}$  with respect to  $\varpi_{11}$ . The limiting distribution of the  $-2\ln Q_r$  statistic is given in terms of a  $p-r$  dimensional Brownian motion process, and the quantiles of the distribution are tabulated in Johansen (1988) for  $p-r = 1, \dots, 5$  and in Osterwald-Lenum (1992) for  $p-r = 1, \dots, 10$ .

Equation [10] is usually called the trace test statistic which can be rewritten as follows

$$L_{\text{trace}} = -T \sum_{i=r+1}^p \ln(1-\lambda_i) \quad [12]$$

where  $\lambda_{r+1}, \dots, \lambda_p$  are the  $p-r$  smallest squared canonical correlation or eigenvalue. The null hypothesis is at most  $r$  cointegrating vectors. The other test for cointegration is the maximal eigenvalue test based on the following statistic:

$$L_{\text{max}} = -T \ln(1-\lambda_{r+1}). \quad [13]$$

where  $\lambda_{r+1}$  is the  $(r+1)^{\text{th}}$  largest squared canonical correlation or eigenvalue. The null hypothesis is  $r$  cointegrating vectors, against the alternative of  $r+1$  cointegrating vectors.

Table 3 presents the results of the cointegration tests, that is the trace test and the maximum eigenvalue test. Since the Johansen cointegration results can be sensitive to the lag specification in the VAR, we have chosen to present the cointegration tests

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for VAR lags of 4 and 8 for both Simple-sum and Divisia M1 and M2. Our cointegration results suggest that there is a long-run relationship between all monetary aggregates with income in Nepal for the period under study. Furthermore, the results appear to be reasonably robust between the two lags chosen. Only in the case of Divisia M1 that cointegration can be rejected when 8 lags was defined in the VAR specification. Nonetheless, in summary, the cointegration results suggest that during the financial liberalization period of 1981-1994, there was a long-run relationship between income and the Simple-sum and Divisia M1 and M2.

**Table 3: Johansen Cointegration Test Results for Nepal**

A. Simple-sum M1

Lags in VAR = 4			Lags in VAR = 8		
Vectors	Trace test	Max eigenvalue	Vectors	Trace test	Max eigenvalue
$r = 0$	16.34*	12.84	$r = 0$	19.33*	17.23*
$r \leq 1$	3.49	3.49	$r \leq 1$	2.10	2.10

B. Simple-sum M2

Lags in VAR = 4			Lags in VAR = 8		
Vectors	Trace test	Max eigenvalue	Vectors	Trace test	Max eigenvalue
$r = 0$	18.14*	15.54*	$r = 0$	18.24*	13.41
$r \leq 1$	2.59	2.59	$r \leq 1$	4.83*	4.83*

C. Divisia M1

Lags in VAR = 4			Lags in VAR = 8		
Vectors	Trace test	Max eigenvalue	Vectors	Trace test	Max eigenvalue
$r = 0$	17.50*	14.69*	$r = 0$	14.93	13.62
$r \leq 1$	2.80	2.80	$r \leq 1$	1.31	1.31

D. Divisia M2

Lags in VAR = 4			Lags in VAR = 8		
Vectors	Trace test	Max eigenvalue	Vectors	Trace test	Max eigenvalue
$r = 0$	20.73*	14.86*	$r = 0$	15.44*	12.25
$r \leq 1$	5.86*	5.86*	$r \leq 1$	3.20	3.20

Notes: The critical values are from Osterwald-Lenum (1992). The critical value at 5 percent level for trace and maximum eigenvalue tests are:

Null	$L_{TRACE}$	$L_{MAX}$
$r=0$	3.76	3.76
$r \leq 1$	15.41	14.07



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## Abstract

*This study attempts to investigate the role of monetary aggregates as intermediate indicators in Nepal using the Johansen cointegration approach. The major aim of this paper is to determine the long-run relationship between income and money on the basis of the financial liberalization era of 1981-94 in Nepal. In this study we introduced the Divisia monetary aggregates as alternative to the traditional Simple-sum aggregates. Our results suggest that there is long-run relationships between these monetary aggregates and income in Nepal despite the changing financial environment during the period under study. Furthermore, the Divisia monetary aggregates can play an important role as intermediate indicators for monetary policy purposes in the Nepalese economy.*

## LIBÉRALISATION FINANCIÈRE, AGRÉGATS MONÉTAIRES PONDÉRÉS ET REVENU AU NEPAL: UNE ÉTUDE EMPIRIQUE

### Résumé

*Cet étude essaie d'analyser le rôle des agrégats monétaires en tant qu'indicateurs intermédiaires au Nepal en utilisant l'approche de cointégration de Johansen. L'article se propose avant tout de déterminer le rapport de longue période entre le revenu et la monnaie en prenant comme base la période de la libéralisation financière 1981-94. Dans cette étude, on a introduit les agrégats monétaires Divisia comme alternative aux agrégats de somme simple. Les résultats semblent indiquer qu'au Nepal il y a, à la longue, un rapport entre ces agrégats monétaires et le revenu en dépit du changement qui a caractérisé le milieu financier pendant la période considérée. Encore, les agrégats monétaires Divisia pourraient avoir un rôle important dans l'économie du Nepal, en tant qu'indicateurs intermédiaires aux fins de la politique monétaire.*

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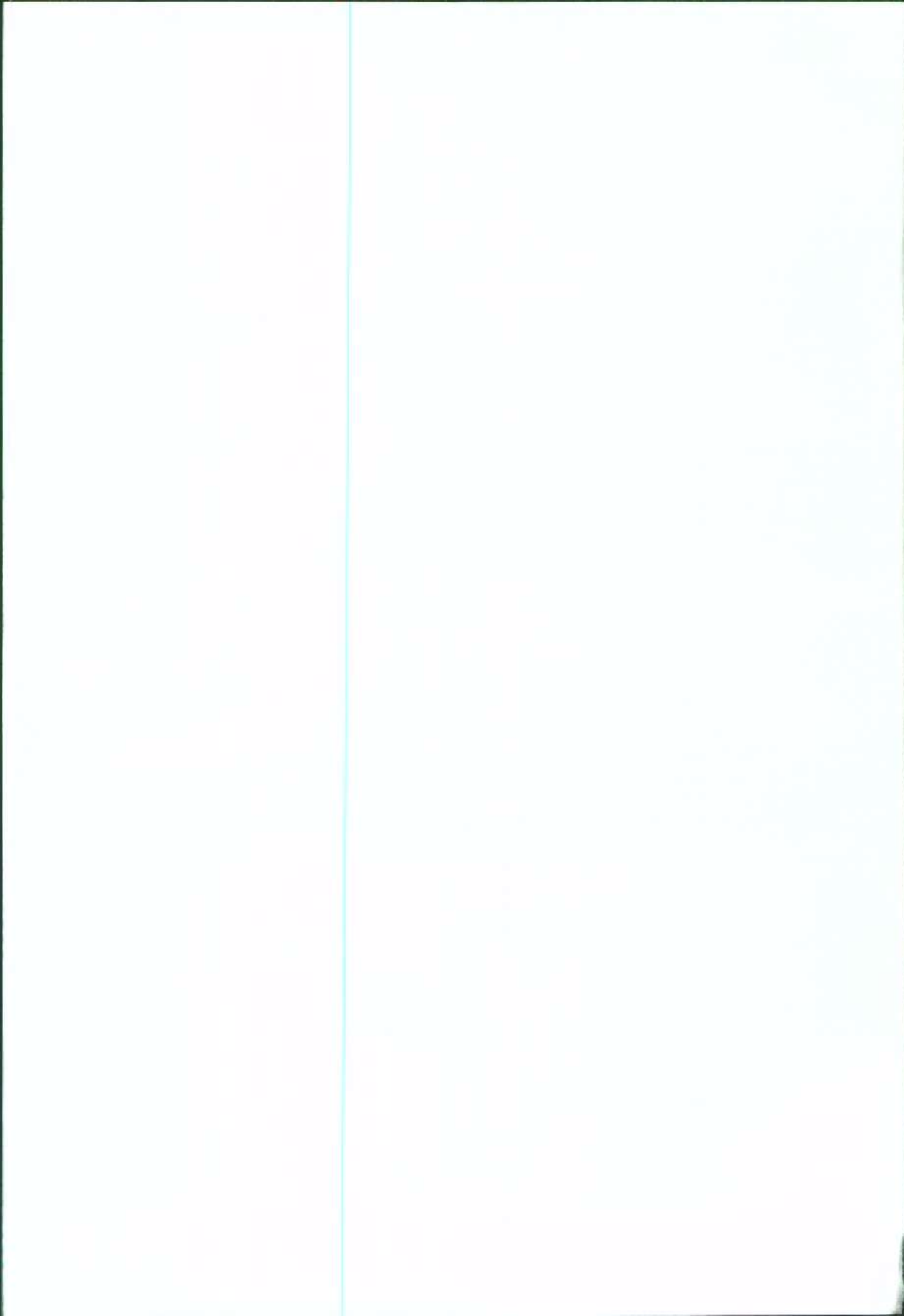
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