



# NRB Working Paper

## **Interest Rate Pass-Through in Nepal**

**(An Examination over the Period of FY 1990:1 – FY 2009:4)**

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**Abstract**

The paper examines the interest rate pass through of the policy interest rate to the market interest rate in Nepal. The span of the empirical exercise covers the phase of interest rate liberalization commencing from the first quarter of 1989/1990 to the final quarter of 2008/2009. The result suggests that there is a significant long run elasticity coefficient of the policy rate (taken to be the bank rate) to the different market rates (e.g. 1 yr fixed deposit, lending rate and saving rate), but there is only one error correcting relationship between the bank rate and the lending rate in the short run. However, the speed of adjustment, i.e. the adaptation coefficient, indicates a weaker adjustment of the short-term dynamics to the long run equilibrium. Looking at the sub-sample, which coincides with the promulgation of the NRB Act 2002, the period starting from the third quarter of 2001/2002 to the final quarter of 2008/2009, suggests that there is insignificant elasticity coefficient between the policy rate and two of the above-mentioned market rates. Paradoxically, while the elasticity coefficient between the policy rate and lending rate is found to be significant, it is negative! Overall, the situation indicates that at present, the bank rate in Nepal is ineffective in influencing the market rates and suggests that there are other factors at play. The paper ends by recommending introduction of a more effective indicator of monetary stance, greater awareness of external factors when making monetary policy, and enhancing and guiding the development of the domestic financial sector for equitable financial development and growth.

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## I. Background and Stylized Facts

Nepal is a landlocked least developed country in south Asia with a per capita national income of US\$484 in 2008 (Central Bureau of Statistics, Government of Nepal (GON), 2009). The country is surrounded by two Asian emerging giant economies; Republic of India in South, East and west and People's Republic of China in the North (Figure 1). While the country has an ideal location, still 31% of the population is under the poverty line (Government of Nepal, 2004). Presently, the country is politically transformed to a Federal Democratic Republic, and is in the process of transforming the structure of the state in this regard.

Figure 1: Map of Nepal



Source: <http://ncthakur.itgo.com/map.htm>

The political transformation was initiated after reaching in the 2006 Broad Peace Agreement. Before internal political conflict which encompassed over a decade seriously affected Nepalese economic and social environment. This was picked up in 2001 (Acharya, 2005). It is estimated that Nepal had annually lost 2.1% GDP during the conflict (Ra S. and Singh B, 2005). During this period, a large number of domestic financial institutions retreated from remote and rural areas of the country due to security concerns, which led to magnify inequality for accessing financial services. The country has now entered a period of New Nepal, and is striving to meet the people's heightened expectation in this new context.

There are many issues related to economic growth. One important aspect is for policy makers to be aware of the effectiveness of monetary policy (e.g. macro-financial linkages). In this regard, the broad objective of the paper is to examine the effectiveness of the policy rate, i.e. interest rate pass-through, in Nepal. The specific objectives are: (1) to discuss domestic interest rate policy and financial development; (2) to assess interest rate pass through in Nepal; and (3) to provide policy recommendations, if necessary.

## II. Overview of Interest Rate Policy and Financial Development

Interest rates, in general, reflect the cost of funds - the interest rate can be viewed as the rental price for money, or alternatively can be viewed as the opportunity cost for money where the cost of not using money is its next best alternative. The policy rate is the rate by which the monetary authority signals the cost of borrowing from the central bank. The effect of policy rate to the market interest rates however depends on the structure of interest rates and the level of financial development.<sup>1</sup> In this regard, it is difficult to examine interest rate policy in Nepal without understanding the level of financial development (FD).

<sup>1</sup> For a nice textbook discussion see Kaufman (1992).

- **Pre Interest Rate Phase (pre-1955):** Prior to 1955, the domestic financial system was underdeveloped - it was dominated by unorganized/informal financial system generally driven by private individuals, *Shahus* (merchants) and landlords (Pant, 1964). To provide financial services, Nepal Bank Limited (NBL) which is the first commercial bank in the country, was established in 1937, and reflects the start of the formal financial system.<sup>2</sup> Despite this beginning, the Nepalese financial system remained in an embryonic stage which can be seen through some comparative ratios of Nepal, UK and India at that time: Nepal had 400,000 persons per bank branch while it was 4,000 and 70,000 for UK and India respectively; further the per capita deposit at that time in Nepal was NRs. 8, or less than a dollar, compared to 367 US dollar for UK and 9 US dollar for India (NRB, 1961). During that time, the country's monetary system was characterized as being a dual currency system - financial transactions were dominated by the use of Indian currency (IC) with there being a volatile exchange rate between the IC and NC and a very low level of monetization in the country. Therefore, in the initial period, the primary responsibility for Nepal Rastra Bank was to bring the monetary system under its control - this was reflected in the preamble of the Nepal Rastra Bank Act of 1955.
  
- **Controlled Interest Rate Phase (1956 - 1983):** The establishment of Nepal Rastra Bank (NRB) in 1956 coincided with the period of planning (such as the first development plan from 1956 – 1960; GON (1956)). At the initial stage, the financial system was still rudimentary and described as "predominantly a cash-economy" (NRB, 1965); however the further effort by GON of formalizing the financial system was reflected in the establishment of i) Nepal Industrial Development Corporation (NIDC) in 1959<sup>3</sup>; ii) Rastriya Banijya Bank (RBB) 1966<sup>4</sup>; and iii) Agriculture Development Bank in 1968<sup>5</sup>; these institutions facilitated the elimination of the dual currency system in 1967, which predominated in Nepal (NRB, 1996). In that year, NRB also adopted a controlled interest rate determination regime, where the Bank used to fix deposit and lending rates of the commercial banks. Different rates were fixed for different instruments and purpose of the loan. As the market based monetary policy instruments were not developed, determination of interest rate was one of the few options left for the NRB at that time. Also, at that time there was a lack of competition in the domestic financial system due to the limited number of banks operating in the country. Before 1983, there were only two commercial banks operating in the country (e.g. NBL and RBB) which controlled the lion's share of the resources.
  
- **Transitional Interest Rate Phase (1984 - 1989):** In early 1980s, Nepal experienced a series of BOP problem. To control the depletion of international

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<sup>2</sup> The *Tejarath Adda* had been established in 1880 however, as it had been only a credit institution, it did not play the essential role of financial intermediation.

<sup>3</sup> This was established under Nepal Industrial Development Cooperation Act, 1959 with the objectives of mobilizing capital to industrial sector and facilitating industrial development in private sector

<sup>4</sup> This was established under Rastriya Banijya Bank Act, 1965 with the objective of providing banking services throughout Nepal and contributing to the socio economic development of the country

<sup>5</sup> This was established under Agriculture Development Bank Act, 1967 with the objective of providing credit to agriculture sector throughout the country

reserve Nepal adopted the International Monetary Fund's (IMF) supported economic stabilization program in 1985, and subsequently entered into IMF's Structural Adjustment Facility; this presaged gradual reform measures in the financial sector (Thornton, 1987). In this regard, on November 16, 1984 NRB initiated a limited flexibility to commercial banks to fix the interest rates. Commercial banks were then allowed to offer interest rate on savings and time deposits to the extent of 1.5 and 1.0 percentage point above the minimum level. This form of limited deregulation on interest rate helped increase the competitiveness among banks and financial institutions. In this liberalizing environment, three joint venture commercial banks were established during 1984-1987. Effective May 29, 1986, interest rates for deposit and lending were further liberalized except for the priority sector lending, in which banks were not allowed to charge interest rate more than 15%. The objective of gradual deregulation of interest rates was to create competitiveness in the banking sector thereby increasing efficiency, effective mobilization and allocation of resources.

- **Liberalized Interest Rate Phase (1990 - present):** Controlled interest rate regime was completely abolished on August 31, 1989. Banks and financial institutions were now given full autonomy to determine their interest rates on deposits and lending. This coincided with the period of economic liberalization, which saw a huge spurt in the number of banks and financial institutions as shown in the table below. The number of institutions expanded tremendously from 7 banks and financial institutions in the last phase to 244 in the current phase - an increase by over 33 times! Although the NRB has given the autonomy to determine the interest rate, the Bank has been forced to intermittently issue directives in regard to anomalies in the interest rate determination as there had existed a high interest rate spread between deposit and lending rates. Therefore, the objective of interest rate deregulation to lower the financial intermediation cost was not met. The promulgation of Nepal Rastra Bank Act 2002 attempted to address development in the financial market. But, the continuing high level of interest rate spread suggested that greater financial sector development (FD) had not brought efficiency in the financial system. To address this, NRB attempted to maintain the interest rate spread of commercial banks at a desired level through using moral suasion only. Additionally, in the spirit of interest rate deregulation, the provision of interest rate spread of 5.5% was withdrawn by the NRB in 2003. Since then no such direct or indirect restriction is implied as far as determination of interest rate is concerned, although NRB has shown intermittent concern regarding interest rates.

The gradual liberalization of the interest rate via the four phases is taken in perspective of the growth in banks and financial institutions under NRB supervisory purview, which is shown below.

Financial Institutions	Pre-interest Rate Before 1955	Controlled 1956-1983	Transition 1984-1989	Liberalized 1990-present	
				1990-2002	2003 to present
Commercial Banks	1	2 (1)	5 (3)	16 (11)	26 (10)
Development Banks		2	2 (0)	10 (8)	63 (53)
Finance Companies			-	51	78 (27)
Micro Finance Development Bank			-	11	15 (4)
Cooperatives/NGOs				59	62 (3)

\* Note: The number is cumulative, with that in parenthesis being the additional in the relevant phase. Apart from these, 25 Insurance Companies, one Citizen Investment Trust and one Employee Provident Fund are also in operations under the regulatory purview of the Government of Nepal. Source: Nepal Rastra Bank

Table 1 suggests that there has been a large growth in the number of banks and financial institutions during the liberalized period. FD indicators are also examined to corroborate this observation. The paper uses two common indicators for FD: (1) M2/GDP, which measures the monetization in the economy and indicates the proportion use of money in national income; and (2) Currency/M2 which indicates the use of banking facilities (vis-à-vis hard currency) in financial transactions. For the prior case, increase level of M2/GDP suggests greater FD while decreasing level of Currency/M2 suggests lower propensity to use currency and thus indicates greater FD. Both indicators of FD are provided below in terms of the four phases.

Sn	Phase	Period	M2/GDP		Currency/M2	
			Average	End	Average	End
1	Pre Interest Rate	Pre-1955	NA	NA	NA	NA
2	Controlled	1956 - 1983	17.5	27.3	48.4	29.8
3	Transition	1984 - 1989	27.5	29.8	31.0	29.9
4	Liberalized	1990 - present	43.5	60.5	27.5	20.2

Both indicators indicate that there has been increasing FD in the country. This is suggested by the increasing trend of M2/GDP as well as decreasing trend of Currency/M2. More importantly, both average and period end indicators are in increasing trend.

*Data definition and Trend in Interest Rate:* The time period used for this study covers the liberalized interest rate phase - since it is felt that the market interest rates during this period are more responsive to supply and demand forces; this period starts from 1989/1990<sup>6</sup> Q1 and ends in 2008/2009 Q4 - a total of 80 data points. Four interest time series are taken: The first is the bank rate (BANK), which is taken as policy rates of NRB. This is the rate charged by the Bank to counterparties when they resort to Bank funds; i.e. as Lender of Last Resort (LOLR). The bank rate is used to indicate the ex ante monetary policy stance of the NRB. Likewise three market rates are considered namely one year fixed deposit (FD1YR), lending (LEND) and savings (SAV) rate. As each commercial bank offers different rates for deposits and lending, the average rate is calculated from the minimum and maximum offered rate by the banks as mentioned.

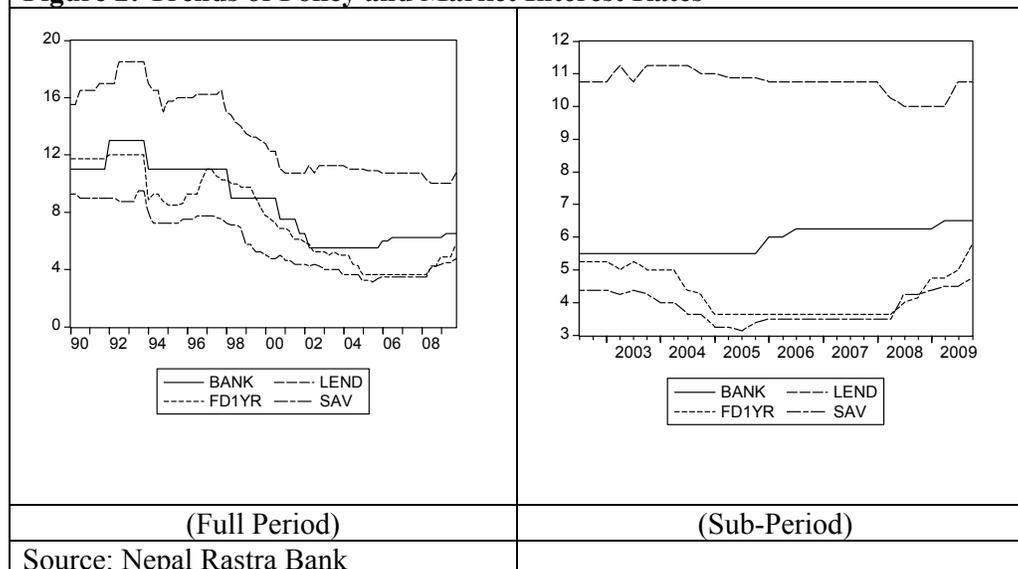
<sup>6</sup> Each year represents a fiscal year used by the Government of Nepal; the FY is denoted as 1989/1990 but for short simply as 1990. The Nepalese fiscal year ends on July 15, so FY 1990:4 which is May 15 to July 15, 2009.

The rates are provided in the Bank's publication of the Quarterly Economic Bulletin, with the data series being provided in the first appendix. The above sample for the full period is broken down to a smaller sub-period starting from the commencement of the NRB Act of 2002 taken as from 2001/2002 Q3 to 2008/2009 Q4. It is felt that with the enactment of the NRB Act, 2002 the financial system will be more effective. The act requires an annual release of Monetary Policy, which enhances transparency and better communication strategy of the Bank. This sub-sample has a total of 30 data points.

Some simple statistical analyses of the four indicators are provided for both full period as well as sub-period, along with graphs of the four trends:

	Full Period (1990:1 - 2009:4)				Sub-Period (2002:3 - 2009:4)			
	BANK	FD1YR	LEND	SAV	BANK	FD1YR	LEND	SAV
Mean	8.68	7.67	13.76	6.12	5.91	4.29	10.75	3.86
Median	9.00	8.07	13.75	6.32	6.00	4.07	10.75	3.63
Maximum	13.00	12.00	18.50	9.50	6.50	5.75	11.25	4.75
Minimum	5.50	3.63	10.00	3.13	5.50	3.63	10.00	3.13
Std. Dev.	2.63	3.08	2.84	2.11	0.40	0.72	0.37	0.47
Observations	80.00	80.00	80.00	80.00	30.00	30.00	30.00	30.00

**Figure 2: Trends of Policy and Market Interest Rates**



Eye-balling the trend of the statistics suggests that the different market interest rates move together with the policy rate, however this relationship is less so for the sub-sample. The correlation coefficient during the full sample period between BANK and FD1YR, LEND and SAV is 0.936, 0.971 and 0.940 respectively; but for the sub-sample it is -0.243, -0.645 and 0.104 respectively. Running significance test suggest that the correlation of the BANK with FD1YR, LEND and SAV is all significant at more that the one percent level; while for the sub-period all are insignificant except for BANK with LEND which is significant at more that the one percent level of significant, but

with a negative sign - a paradoxical result!<sup>7</sup> The empirical exercise of the sub-sample suggests that the policy rate and the market rates do not move together, of which one pair actually moving in an opposite direction.

### III. Estimating Model

There is a vast literature measuring the interest rate pass-through from the policy rate to market rates. In this regard, there are different estimating methodologies. One methodology is to use a dynamic multiplier method, which involves estimating a simple dynamic model in which the relevant retail rate is regressed on lagged values of itself and a policy market rate. One example of this is Disyatat & Vongsinsirikul, 2002 who look at the case of Thailand. However, one drawback of such a specification is the loss of long-run information about the level of the variables.

Presently authors have addressed this deficiency and incorporated both short-term and long-term information by employing an error-correction framework.

The relation between the market and policy rates can be described by

$$i^m = \alpha + \beta \cdot i^p, \quad (1)$$

where  $i^m$  is the market rate,  $i^p$  is the policy rate,  $\alpha$  is a mark up, and  $\beta$  reflects the demand elasticity of market rates with respect to policy rates. With perfect competition in the loan market an elasticity of  $\beta$  greater than 1 suggests that there is competition in the loan markets. Relatively elastic demand would signal that bank credit is not rationed. In such a setting, banks would want to lend money to both low- and high-risk borrowers, equalizing returns on both types of lending by charging risk-adjusted rates to the high-risk borrowers. Hence, the risk adjustment in the rate might on average cause market rates to react more than one-to-one to changes in the policy rate. On the other hand, relatively inelastic demand (an elasticity  $\beta$  lower than 1) is likely to be found when banks have substantial market power, either because no close substitutes for bank loans exists, i.e., when capital markets are underdeveloped, or because of the structure of the market for bank loans (De Bondt, 2002 as cited in Tieman, 2004).<sup>8</sup> Relationship (1) is a standard representation used by many authors to examine the relationship between the market and policy rates.<sup>9</sup>

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<sup>7</sup> The formula  $Z = \frac{1}{2} \sqrt{N-3} \{ \ln[(1+r)(1-\rho) / (1-r)(1+\rho)] \}$ , is utilized from Romano (1977, pp.156-160) with  $H_0: \rho = 0$  versus  $H_A: \rho \neq 0$  and using  $\alpha = 0.05, 0.01$  thus the rejection region is  $Z = \frac{1}{2} \sqrt{N-3} \{ \ln[(1+r) / (1-r)] \} > 1.96, 2.58$ ; by inputting the produced coefficients of correlation (r) with an N of 80 for the full sample and N of 30 for the sub-sample statistics of greater than 0.30 and 0.45 respectively are required for significance at the 1 % level of confidence.

<sup>8</sup> A wide range of factors influence the structure of the market, such as the degree of state ownership of the banking sector, and the degree and form of regulation, including market entry restrictions and menu costs.

<sup>9</sup> For example Tieman (2004) uses monthly data over the span January 1995 to February 2004 to examine the pass-through effect in Romania, Czech Republic, Hungary, Poland, the Slovak Republic, and Slovenia; Antão (2009) uses monthly data from 1990 to 2002 in Portugal while Charoenseang and Manakit (2007) use monthly date from June 2000 to July 2006 on Thailand.

Relationship (1), however, does not touch upon the issue of timing. Market interest rates will not react instantly to changes in the policy rate. Even though banks will quickly adapt their short-term lending rates, medium- and long-term rates will react more slowly, or not at all, as they are primarily guided by expectations of future short-term rates. Moreover, average lending rates will adapt only gradually, as new loans replace old ones. These considerations point to a gradual adjustment of market rates to the new policy rates. Therefore, equation (1) should be interpreted as valid only in the long run.

The long-run nature of equation (1) suggests a model in which equation (1) can be seen as a long-run equilibrium relationship, around which short-term dynamics abound. Such an approach is well-established in the literature. Engle and Granger (1987) suggest a two-step approach in which the long-run relationship is fitted in levels, while the second step involves regressing the first differences of the dependent variables on their lagged values and lagged deviations from the long-run equilibrium relationship. This approach is labeled error correction, but is warranted as long as the dependent and explanatory variables are cointegrated, i.e., both are non-stationary, but there exists a linear combination of these series which is stationary. In general, interest rates series would not be expected to be non-stationary, as they normally do not exhibit a long-term trend. In transition economies, however, one might expect interest rate series to exhibit a declining trend as the transition takes hold and the problem of inflation is reined in. This would imply these series to be integrated of order 1 (i.e. I(1)). To establish this hypothesis, the paper performs unit root tests on the series by applying the augmented Dickey-Fuller (1981) test on the individual series. In case both the policy rates and the market rates are I(1), the series might be cointegrated, which is subsequently tested using both standard EG as well as Johansen (1988, 1991) statistical tests. When a cointegrating relationship is found, the suggested interpretation of equation (1) as a long-run equilibrium relationship, around which short-term dynamics abound, is justified from a statistical point of view.

An error-correction model (ECM) of interest rate pass-through has been specified differently by different authors. For example, Tieman (2004) specifies his ECM as:

$$\Delta i_t^m = \gamma_1 + \gamma_2 \Delta i_{t-1}^m + \gamma_3 (i_{t-1}^m - \beta \cdot i_{t-1}^p - \alpha) + \eta_t \quad (2)$$

Here,  $\Delta$  is the difference operator, and the equation states that the first difference of market interest rates,  $\Delta i_t^m$ , depends on its own one-period lag,  $\Delta i_{t-1}^m$ , the deviation from the long-run relationship in the last period,  $i_{t-1}^m - \beta \cdot i_{t-1}^p - \alpha$ , and a constant,  $\gamma_1$ . In such an ECM, the coefficient  $\gamma_3$  indicates the speed of adjustment of the short-run dynamics to the long-run equilibrium relationship.

On the other hand, Charoenseang and Manakit (2007) specify their ECM as:

$$\Delta i_t^m = \gamma_1 + \gamma_2 \Delta i_t^p + \gamma_3 (i_{t-1}^m - \beta \cdot i_{t-1}^p - \alpha) + \eta_t \quad (3)$$

Here,  $\Delta$  is the difference operator, and the equation states that the first difference of market interest rates,  $\Delta i_t^m$ , depends on contemporaneous  $\Delta i_t^p$ , the deviation from the long-run relationship in the last period,  $i_{t-1}^m - \beta \cdot i_{t-1}^p - \alpha$ , and a constant,  $\gamma_1$ .

Likewise Antão (2009) specify her ECM as:

$$\Delta r_{i,t} = \alpha_i + \sum_{k=1}^p \alpha_{i,k} \Delta r_{i,t-k} + \sum_{l=0}^q \beta_{i,l} \Delta r_{s,t-l} + \gamma_i u_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

In her terminology,  $r_i$  is the retail rate and  $r_s$  is the market rate. As before, where  $u_{i,t-1}$  is the lagged residuals from individual cointegrating regressions, this would be  $r_{i,t-1} - \beta \cdot i_{s,t-1} - \alpha_i$ . The residuals  $\varepsilon_{i,t}$  are assumed to be iid(0,  $\sigma^2$ ). The term  $\gamma_i u_{i,t-1}$  captures the adjustment towards equilibrium and a significant negative  $\gamma_i$  is consistent with the series being cointegrated. The error correction parameter  $\gamma_i$  is the speed of adjustment and shows how much of the gap created by a change in the money market interest rate is closed in one month. In should be noted that in contrast to the above ECM formulations with a single lag, Antão(2009) determines the optimal lag length by utilizing the standard Schwarz Information Criterion (SIC).

Despite the difference in specification of ECM, the coefficient  $\gamma_3$  ( $\gamma_i$ ) has a similar interpretation and indicates the speed of adjustment of the short-run dynamics to the long-run equilibrium relationship. For all the cases, this coefficient hence can be interpreted to signal the effectiveness of the interest rate instrument of monetary policy: a higher value of the coefficient signals a faster market response (i.e. adaptation) and hence a more effective first step in the interest rate channel of monetary transmission.

Given the embryonic stage of financial development in Nepal, the paper employs the ECM formulated by Tieman (2004) to test the interest rate pass-through. However, the paper extends the empirical model of Tiemen (2002) by incorporating Antão (2009) who does not use a fixed single lag length but uses SIC to determine the optimal lag length. .

#### IV. Results, Analysis and Implications

The time series data of the policy and the market rates have been presented earlier. Testing the four time series for stationarity both during the full period and the sub-period using the standard ADF test, suggests that all time series in levels are I(1) and non-stationary. On the other hand, at first differences the ADF test suggests that the time series for the full period are stationary. While for the sub-period, the time series of FDIYR in first difference is still I(1) while the remaining time series are found stationary.

Running the time series pair wise test using the two standard tests for cointegration, EG and Johansen suggest that there are both agreement and disagreement for long-term relation in Nepal. For the full sample, both tests agree that BANK and FDIYR do not have a long term relationship, however there is disagreement in terms of a long-term relationship between BANK and LEND as well as BANK and SAV - EG finds that the residuals of the long term relationship is stationary, which point to a long-term relationship, but Johansen find no integrating equation. For the sub-sample, there is agreement between both tests that BANK and SAV do not have a long-term relationship however there is again disagreement between EG and Johansen in terms of a long-term relationship between BANK and LEND. Where there is disagreement among the

standard tests, the paper gives the benefit of doubt and takes this disagreement as indication of a long-term relationship.

OLS regressions on three pairs for the full sample and two pairs for the sub-sample are run with FD1YR excluded. The results of goodness of fit, R-squared (R-2), for the full sample suggest results are in the range of 88 to 94 percent. Similarly, the magnitude of the coefficient of c(2) is interpreted as the demand elasticity of market rates with respect to policy rates. In this regard the elasticity coefficient of both FD1YR and LEND with BANK, are highly significant and suggest the presence of a developed financial market; however for SAV the inelastic coefficient but again highly significant coefficient, suggests that there is an underdeveloped market. On the other hand, looking at the sub-sample for the two pairs portrays a different picture - R-2 is low: for LEND and SAV it is 0.42 and 0.01 respectively. The coefficient of c(2) also portrays a paradoxical picture - for LEND and SAV it is -0.59 and 0.12 respectively in both cases, suggesting that the sub-sample has an underdeveloped financial market. But, the later coefficient is not significant from zero but the prior coefficient of -0.59 is highly significant.

<b>Table 4: Long-Term Relations</b>									
MKT RATE	<b>MKT RATE = c(1) + c(2) * BANK</b>								
	Full Period					Sub-Period			
	Coeff	Est.	t-stat	R-2	Coint 1/ 2/	Est.	t-stat	R-2	Coint 1/ 2/
FD1YR	c(1)	-1.85	-4.38	0.88	No, No				
	c(2)	1.10	23.46						
LEND	c(1)	4.64	17.66	0.94	No, Yes	14.24	18.19	0.42	No, Yes
	c(2)	1.05	36.24			-0.59	-4.47		
SAV	c(1)	-0.49	-1.88	0.90	No, Yes	3.14	2.39	0.01	No, No
	c(2)	0.76	26.54			0.12	0.55		

1/ Using the standard Johansen Cointegration test 2/ standard EG test (SAV at 5% level; LEND at 1% level)

The above exercise shows two different pictures. For the full sample, there is mixed suggestion of a long-term relationship between the BANK and both the LEND and SAV rate but not with the FD1YR; the empirical results do not clearly point to a long-term relationship given the contrasting conclusion between EG and Johansen Cointegration test. These results are consistent with the earlier empirical analysis using simple correlations, benefit of the doubt is given where there is suggestion of a long-term relationship. In the sub-sample there is again mixed suggestion of a long-term relationship between the BANK and LEND but not with the SAV. These results are consistent with the earlier empirical analysis using simple correlations. While these results are consistent, their paradoxical result suggests that the bank rate is unable to affect the market interest rates in the sub-sample.

The above is followed by ECM exercise for the full sample only on the LEND and SAV pair as well as the sub-sample of LEND pair, with the lag length determined by SIC. The results of this exercise are provided below.

Table 5: ECM estimation results									
DMKT RATE = c(1) + c(2) DMKT RATE(-1) + c(3) DMKT RATE(-2) + c(4)*ECM(-1)									
MKT RATE	Full Period					Sub-Period			
RATE	Coeff	Est.	t-stat	R-2	D-W	Est.	t-stat	R-2	D-W
LEND	c(1)	0.00	-1.22	0.13	2.12	0.00	-0.16	0.15	2.03
	c(2)	0.02	0.19			-0.01	-0.07		
	c(3)	0.25	2.27			-0.03	-1.82		
	c(4)	-0.01	-2.70						
SAV	c(1)	-0.01	-1.50	0.01	2.01				
	c(2)	0.09	0.77						
	c(3)	0.00	-0.23						

After determining the optimal lag length by SIC, which is two for LEND but one for SAV for the full sample and one for LEND in the sub-sample, a test for ECM was run. For LEND, an ECM relationship is found. The ECM term is significant at the 1 percent level of confidence but is small, suggesting that speed of adjustment is quite slow. For the sub-sample, the exercise suggests that there is no ECM relationship; the coefficient for the ECM relationship is not statistically significant from zero. Apart from the measure of statistical significance, it is observed that in all three cases the magnitude suggests a slow speed of adjustment. This contrasts with other countries by a number of times – e.g. for the Romania case as presented by Tieman (2004) the ECM value differs from Nepal by a magnitude of 15 times!<sup>10</sup> Thus, the exercise suggests that there does appear to be a small short term corrective relationship for LEND during the full sample period while no such relationship occurs for the sub-period.

Despite the observation from "eye-balling" that there appears to be a co-movement, the above-empirical exercise has enriched and helped concretize this description.

On one hand, the results of the full sample are consistent with expectations – in general the empirical results suggest that there is a long-term relationship between the policy and market rates with there being an elastic demand of the market rates for the policy rates. However, there is absence of, or in only one case, the presence of a very retarded speed of the market interest rate adjustment mechanism. *There are three possible explanations for this result:*

1. *Policy Rate* - With easy window for liquidity, the policy rate may not be a good indicator to affect the market interest rates. In this regard, monetary policy of 2005/06 expressed concern about the bank rate, which had not been effective in the past. An elevated level of remittance inflows in the recent years has contributed for the excess liquidity in the economy, which have changed the scope and resources mobilization of banks. Because of these, it is felt that the policy rate only gives an indication of *ex ante* monetary stance– e.g. rising policy rate implies that commercial banks should expect that the Bank will more actively drain the liquidity from the market and vice versa.<sup>11</sup>

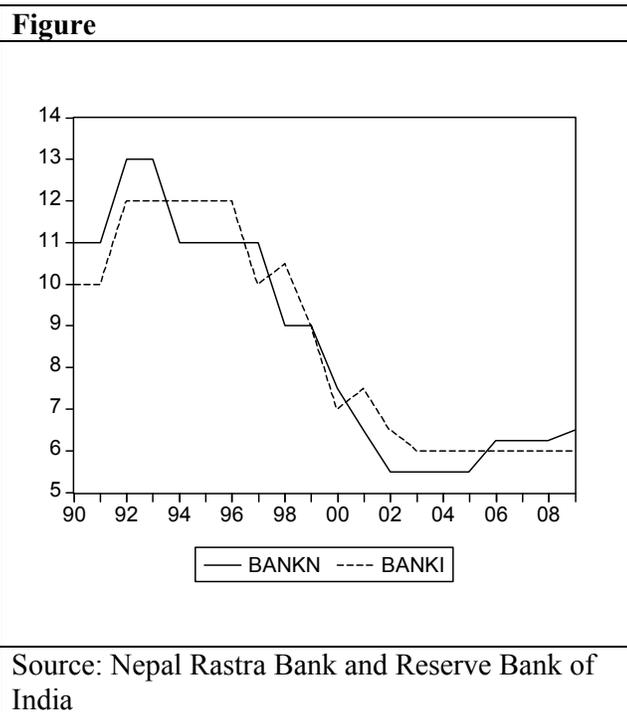
<sup>10</sup> This comparison has to be taken in perspective as Tiemen (2004) looks at monthly data while the study looks at quarterly data.

<sup>11</sup> OMO is conducted on volume basis not in interest rate basis.

Thus, the existing policy rate is not so effective for affecting market interest rates and is thus an ineffective indicator of policy stance.

## 2. Open Economy Factors -

Nepal and India share an 1100 km open border with each other. Being a small open economy in comparison to the Indian economy along with a rigid bilateral exchange rate, the economic policy in India has an influence on the formulation of economic policy for Nepal - for example, Maskay (2001) finds that the policy interest rate differential between India and Nepal heighten the probability of change in the bilateral exchange rate. This is a plausible conclusion because a substantial difference in the interest rate and a porous border shared by both countries influence the movement of capital which eventually



affects the monetary situation through the country's balance of payments. This influence has strengthened via the trade channel seen in growing concentration of merchandise trade with India over the past years, which is 58 percent in 2008/09. In this regard, examining the trend of both policy rates show that both share a close relationship: there exist a 94 percent coefficient of correlation and a near 1:1 relationship – the coefficient of the long term regression, (C(2), is 1.008!<sup>12</sup> Thus there is an apparent harmonization of domestic policy rate with the Indian policy rate but with the increase in FD suggests that the window for harmonization is becoming smaller.

3. Domestic Financial Development and Macro-Financial Linkage – As mentioned earlier, the rate of pass through of the policy interest rate depends in large part on the development of the banking system. The nature of macro financial linkages imply that monetary policy management should be fine-tuned around this empirical relationship. The growth in FD suggests that there may be alternative sources<sup>13</sup> of financing from direct sources, such as capital markets, remittances etc. (Pandit, 2009). An implication of this is that there is a weakening of the traditional macroeconomic and financial

<sup>12</sup> Similarly Johansen test suggests both series have a long term relationship, while EG otherwise.

<sup>13</sup> One source of alternative financing is through the existing IC market in Nepal. While the period of dual currency has been eliminated in 1967, there is some suggestion that there is still a vestige of IC in circulation and, as put by Maskay (2002), a feeling of *déjà vu*. For example, Sharma (1998) has estimated the presence of IC to be 40.72 percent of the overall business transaction in Nepal. While there is no credible estimate, NRB monetary policy for 2009/2010 has stated that a study will be done in that regard to estimate the source and use of IC in circulation.

linkage (e.g. the policy interest rate)<sup>14</sup>. Thus this result is an indication that the present definition and understanding of the FD has to be expanded in line with the macro-financial link of Nepal.

On the other hand, the results of the sub-period suggest paradoxically that there is a weakening, if not reversal, between the relationship of policy rate and the market rate; this result is more paradoxical as this period covers the period of the promulgation of the new NRB Act 2002.

The possible explanations for the paradoxical result of the sub-period, however they build upon the above three explanations; they are:

1. As mentioned above, greater liquidity in the form of remittance flows in the domestic market, may have circumvented the influence of the domestic policy rate. This was exacerbated in the sub-period with the introduction of the standing liquidity facility (SLF) in 2004/05, which provides liquidity, upto 90 percent of collateral for maximum of 5 days. Although the SLF is for a short period, the interest rate for using liquidity under SLF is not linked up with the policy rate. Thus the policy rate determined by the NRB could be insufficient in the face of growing liquidity in the country. Additionally, the utilization of the bank rate is quite low, this would mean that the bank rate has become less effective<sup>15</sup>
2. During the sub-period, there has been non-similarity in the inflation performance of Nepal and India – in FY 2008/2009 annual inflation in Nepal was double digit, while in India it was officially single digit, if not in negative territory. This situation necessitated asymmetric response where the policy rate for India is constant at 6 percent while the bank rate for Nepal is increasing year by-year from 5.5 percent at the start of the sub-period to 6.5 percent presently. This differential movement of the different country policy rates may contribute to the paradoxical performance of Nepalese policy rate with the market rates, which may suggest that the movement of market rates is more similar with by the Indian policy rate vis-à-vis the domestic policy rate.
3. During the sub-period there is a high growth of other players for indirect financing such as development banks and finance companies in the sub-period vis-à-vis the previous etc. - as well as sources of alternative financing. However, this period also saw worsening of domestic security situation and a flight of financial institutions to market centers, as well as deterioration in the currency distribution network. Both these factors may have contributed to weakening of the elasticity coefficient of the market rates during the sub-period.

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<sup>14</sup> Goswami, Jobst, and Long (2009) show that increasing securitization in the US has strengthened the transmission of the policy interest rate to the market rates.

<sup>15</sup> Monetary policy of 2005/06 concerned about the bank rate, which has not been effective. In the same year, the NRB tried to link up bank rate to repo rate. But the weakness of this policy is that the repo rate should have been linked up with the ex-ante monetary policy stance.

## V. Summary, conclusion and recommendations

The paper examines the interest rate pass through of the policy interest rate to the market interest rate in Nepal. The span of the empirical exercise covers the phase of interest liberalization commencing from the first quarter of 1989/1990 to the final quarter of 2008/2009. The results suggest that there is a significant long run elasticity coefficient of the policy rate (taken to be the bank rate) to the different market rates (e.g. 1 yr fixed deposit, lending rate and saving rate), but there is only one error correcting relationship between the bank rate and the lending rate in the short run. However, the speed of adjustment, i.e. the adaptation coefficient, indicates a weaker adjustment of the short term dynamics to the long run equilibrium. Looking at the sub-sample which coincides with the promulgation of the NRB Act 2002, the period starting from the third quarter of 2001/2002 to the final quarter of 2008/2009, suggests that there is insignificant elasticity coefficient between the policy rate and two of the above-mentioned market rates. Paradoxically, while the elasticity coefficient between the policy rate and lending rate is found to be significant, it is negative! Overall, the situation indicates that at present, the bank rate in Nepal is ineffective in influencing the market rates and suggests that there are other factors at play. The empirical results thus suggests that the interest rate channel of the transmission mechanism of monetary policy is presently by and large useless in Nepal – it rather reinforces the present focus on monetary targeting which is a “superior” policy variable than the interest rate (Khatiwada, 2005).

The above observations in line with the current state of FD suggest that the policy interest rate is presently not effective in affecting the market interest rates, especially in the sub-period. In this regard, some recommendations which fall out of this examination are:

- *Develop an effective indicator of monetary stance:* This indicator should be linked with the SLF rate and coordinated with the other instruments in the Bank's arsenal, such as CRR and OMOs, in the short term. This indicator should be taken in accordance with the ex ante monetary policy stance. This should also be modified with growing FD.
- *Conduct monetary policy with greater awareness of policy rates in India:* The geographical relationship between both countries sharing an open and porous border suggests that the NRB is needed to be more attentive to implement monetary policy in Nepal, since funds can move more quickly across borders. Thus, the formulation process of monetary policy in Nepal should take into account the impacts of Indian policies in order to ensure effective conduct of the policy and thereby achieving economic objectives.
- *Guide Financial Development Appropriately:* To accomplish the sustainable development of the financial system a roadmap such as a Financial Sector Master Plan (FSMP) needs to be formulated, as suggested in NRB Strategic Action Plan (NRB, 2006) and in Maskay and Subedi (2009).

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### Appendix 1: Date Series on Interest Rates

Year	BANK	FD1YR	LEND	SAV	Year	BANK	FD1YR	LEND	SAV
1990Q1	11.00	11.75	15.50	9.25	2002Q3	5.50	5.25	10.75	4.38
1990Q2	11.00	11.75	15.50	9.25	2002Q4	5.50	5.25	10.75	4.38
1990Q3	11.00	11.75	16.50	9.00	2003Q1	5.50	5.25	10.75	4.38
1990Q4	11.00	11.75	16.50	9.00	2003Q2	5.50	5.00	11.25	4.25
1991Q1	11.00	11.75	16.50	9.00	2003Q3	5.50	5.25	10.75	4.38
1991Q2	11.00	11.75	16.50	9.00	2003Q4	5.50	5.00	11.25	4.25
1991Q3	11.00	11.75	17.00	9.00	2004Q1	5.50	5.00	11.25	4.00
1991Q4	11.00	11.75	17.00	9.00	2004Q2	5.50	5.00	11.25	4.00
1992Q1	13.00	12.00	17.00	9.00	2004Q3	5.50	4.38	11.25	3.63
1992Q2	13.00	12.00	17.00	9.00	2004Q4	5.50	4.25	11.00	3.63
1992Q3	13.00	12.00	18.50	8.75	2005Q1	5.50	3.63	11.00	3.25
1992Q4	13.00	12.00	18.50	8.75	2005Q2	5.50	3.63	10.88	3.25
1993Q1	13.00	12.00	18.50	8.75	2005Q3	5.50	3.63	10.88	3.13
1993Q2	13.00	12.00	18.50	8.75	2005Q4	5.50	3.63	10.88	3.38
1993Q3	13.00	12.00	18.50	9.50	2006Q1	6.00	3.63	10.75	3.50
1993Q4	13.00	12.00	18.50	9.50	2006Q2	6.00	3.63	10.75	3.50
1994Q1	11.00	8.88	17.00	8.00	2006Q3	6.25	3.63	10.75	3.50
1994Q2	11.00	9.25	16.50	7.25	2006Q4	6.25	3.63	10.75	3.50
1994Q3	11.00	9.25	16.50	7.25	2007Q1	6.25	3.63	10.75	3.50
1994Q4	11.00	8.75	15.00	7.25	2007Q2	6.25	3.63	10.75	3.50
1995Q1	11.00	8.50	15.75	7.25	2007Q3	6.25	3.63	10.75	3.50
1995Q2	11.00	8.50	15.75	7.25	2007Q4	6.25	3.63	10.75	3.50
1995Q3	11.00	8.50	16.00	7.25	2008Q1	6.25	3.63	10.75	3.50
1995Q4	11.00	8.63	16.00	7.50	2008Q2	6.25	3.63	10.25	3.50
1996Q1	11.00	9.25	16.00	7.50	2008Q3	6.25	4.00	10.00	4.25
1996Q2	11.00	9.25	16.00	7.50	2008Q4	6.25	4.13	10.00	4.25
1996Q3	11.00	9.25	16.25	7.75	2009Q1	6.25	4.75	10.00	4.38
1996Q4	11.00	10.25	16.25	7.75	2009Q2	6.50	4.75	10.00	4.50
1997Q1	11.00	11.00	16.25	7.75	2009Q3	6.50	5.00	10.75	4.50
1997Q2	11.00	11.00	16.25	7.75	2009Q4	6.50	5.75	10.75	4.75
1997Q3	11.00	10.50	16.50	7.63					
1997Q4	11.00	10.25	16.50	7.50					
1998Q1	11.00	10.25	16.50	7.38					
1998Q2	9.00	10.00	15.75	7.38					
1998Q3	9.00	10.00	15.75	7.38					
1998Q4	9.00	9.75	15.25	7.50					
1999Q1	9.00	9.75	15.00	7.25					
1999Q2	9.00	9.75	14.75	7.13					
1999Q3	9.00	9.00	14.25	7.13					
1999Q4	9.00	8.38	14.00	6.88					
2000Q1	9.00	7.75	13.50	5.75					
2000Q2	9.00	7.50	13.25	5.75					
2000Q3	9.00	7.25	13.25	5.25					
2000Q4	7.50	6.88	13.00	5.25					
2001Q1	7.50	6.88	12.75	5.00					
2001Q2	7.50	6.63	12.25	4.75					
2001Q3	7.50	6.13	12.25	4.75					
2001Q4	6.50	6.13	11.00	5.00					
2002Q1	6.50	5.88	10.75	4.63					
2002Q2	5.50	5.75	10.75	4.63					

Source: Nepal Rastra Bank