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The Editorial Board, *Economic Review: Occasional Paper* (ISSN 1608-6627), has the pleasure of releasing this 22nd issue of the Review on the occasion of the 55th Anniversary of the Nepal Rastra Bank (NRB). This issue incorporates analytical articles from the staff of the NRB on contemporary issues of the economy.

Though the articles are reviewed by the Editorial Board, the Board does not guarantee the accuracy of the data and analytical results along with their implications. Moreover, the views and interpretations included in the articles are those of the authors and do not necessarily reflect and represent the views and policies of the NRB. The Editorial Board would also like to thank Mr. Prakash Rai, Assistant Director and Mr. Sanu Bhai Maharjan, Supervisor (Computer), Research Department both in the Publication Section for their valuable assistance in the publication of this issue.

The Editorial Board invites applications of quantitative, econometric, and analytical tools and techniques as developed by the authors of the articles to draw on conclusions and suggestions to be most useful to the readers. Those interested in contributing analytical articles to the *Economic Review* on pertinent subject of the economy such as money, banking and finance, trade and balance of payments, government finance, broad-based and sustained economic growth, socio-economic development, etc. are requested to submit the articles for consideration in the forthcoming issues.

Any comments, queries, suggestions, and correspondence should be directed to the Editorial Board.

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Interest Rate Pass-Through in Nepal

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

Nephil Matangi Maskay, Ph.D.^{*}, Rajendra Pandit^{**}

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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Remarks: The views expressed are personal and do not represent the official stance of the Nepal Rastra Bank or that of the SEACEN Centre.

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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.¹ In this regard, it is difficult to

¹ For a nice textbook discussion see Kaufman (1992).

examine interest rate policy in Nepal without understanding the level of financial development (FD).

- **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.² 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 1959³; ii) Rastriya Banijya Bank (RBB) 1966⁴; and iii) Agriculture Development Bank in 1968⁵; 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

² 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.

³ 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

⁴ 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

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

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 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

Source: NRB, CBS, GON and authors' calculation.

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 1989/1990⁶ Q1 and ends in 2008/2009 Q4 – a total of 80 data points. Four interest time

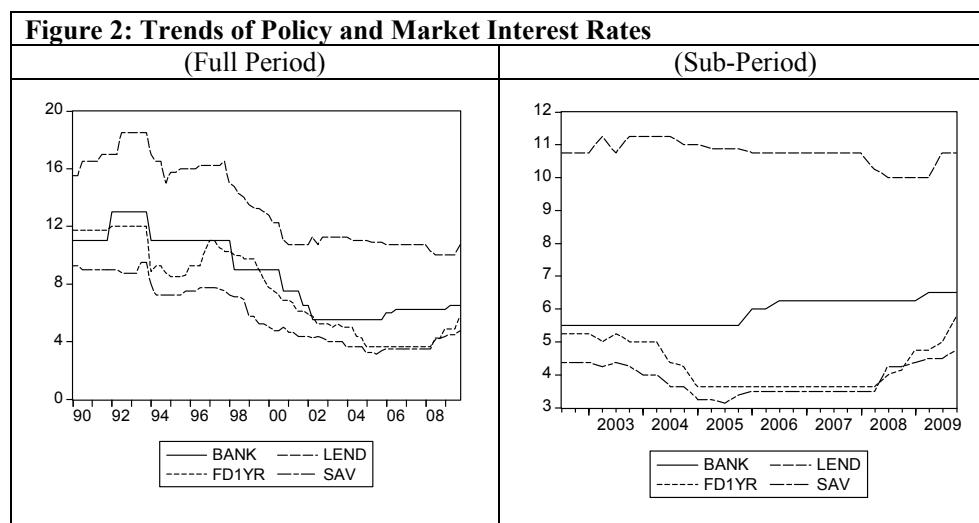
⁶ Each year represents a fiscal year used by the Government of Nepal; the FY is denoted as 1989/1990 but for short simply as 1990. The Nepalese fiscal year ends on July 15, so FY 1990:4 which is May 15 to July 15, 2009.

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. 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:

Table 3: Statistics of Policy and Market Interest Rates									
	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	

Source: Quarterly Economic Bulletin, various issues, NRB.



Source: Nepal Rastra Bank

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!⁷ 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, α is a mark up, and β reflects the demand elasticity of market rates with respect to policy rates. With perfect competition in the loan market an elasticity of β 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 β 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.,

⁷ 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.

when capital markets are underdeveloped, or because of the structure of the market for bank loans (De Bondt, 2002 as cited in Tieman, 2004).⁸ Relationship (1) is a standard representation used by many authors to examine the relationship between the market and policy rates.⁹

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:

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

⁸ 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.

⁹ 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.

Here, Δ is the difference operator, and the equation states that the first difference of market interest rates, Δi_t^m , depends on its own one-period lag, Δi_{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, γ_1 . In such an ECM, the coefficient γ_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, Δ is the difference operator, and the equation states that the first difference of market interest rates, Δi_t^m , depends on contemporaneous Δi_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, γ_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, σ^2). The term $\gamma_i u_{i,t-1}$ captures the adjustment towards equilibrium and a significant negative γ_i is consistent with the series being cointegrated. The error correction parameter γ_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. It 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 γ_3 (γ_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 Tieman (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 FD1YR 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 FD1YR 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.

MKT RATE	MKT RATE = c(1) + c(2) * BANK								
	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!¹⁰ 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.

¹⁰ This comparison has to be taken in perspective as Tieman (2004) looks at monthly data while the study looks at quarterly data.

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.

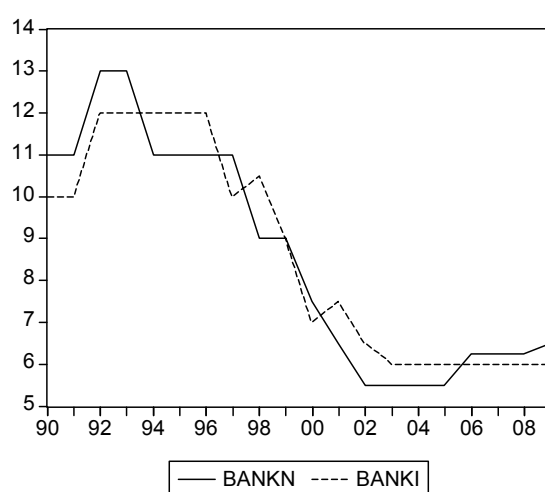
On one hand, the results of the full sample are consistent with expectations – in general the empirical results suggest that there is a long-term relationship between the policy and market rates with there being an elastic demand of the market rates for the policy rates. However, there is absence of, 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.¹¹ Thus, the existing policy rate is not so effective for affecting market interest rates and is thus is 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

Figure 3: Trend of Nepal and Indian Policy Rates



Source: Nepal Rastra Bank and Reserve Bank of India

¹¹ OMO is conducted on volume basis not in interest rate basis.

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!¹² 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 sources¹³ 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 linkage (e.g. the policy interest rate)¹⁴. 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

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

¹³ 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.

¹⁴ 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.

country. Additionally, the utilization of the bank rate is quite low, this would mean that the bank rate has become less effective.¹⁵

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.

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).

¹⁵ 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.

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: Data Series on Interest Rates

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

Source: Nepal Rastra Bank.

Enhancing FDI Flows to Nepal during the Period of Post-conflict Transition and Global Recession

Bhubanesh Pant, Ph.D.*

FDI is much sought after in conflict-stricken countries such as Nepal as it can play a crucial role in the development process. However, the process of attracting and promoting FDI is complex, in particular as most developing countries, including Nepal, are competing for similar types of FDI. Although a number of efforts have been made in the past to boost FDI flows to the country, they have not had any striking impact. The country has not been able to draw on the potential technological and other contributions that FDI can make to the process of development. This underlines the need for effective policy interventions with a view to maximizing the benefits of FDI for Nepal's development in an open environment. Nepal also needs policy framework to enhance national and regional infrastructure, in areas such as transport, energy and communications services, and to generate domestic employment and skills transfer. The main policy conclusion that can be drawn from this paper is that the economic benefits of FDI are real, but they do not accrue automatically. To reap the maximum benefits, a healthy enabling environment for business is paramount, which encourages domestic as well as foreign investment, provides incentives for innovation and improvements of skills and contributes to a competitive investment climate.

I. BACKGROUND

Foreign direct investment (FDI) in developing countries has a long history. It has fluctuated over time, as investors have responded to changes in the environment for investment, including government policies toward FDI and the broader economic policy framework. Hence, trends in FDI have reflected changes in policy stances by developing countries, from import substitution in the 1950s and 1960s through natural resource-led development in the 1970s, structural adjustment and transition to market economies in the 1980s, and an increased role for the private sector in the 1990s.

Sudden and sharp capital inflow reversals have been a salient feature of recent emerging market crises. Among the different types of capital flows, short-term bank flows and portfolio flows, especially, have been most volatile. Longer-term capital flows such as FDI, on the other hand, have generally been more stable. Thus, FDI is viewed as a “desirable” form of capital inflow compared with other more volatile flows. Again, beyond providing additional financial resources (when not financed locally), FDI can facilitate the transfer of intangible assets such as technology, skills, and management know-how, thus helping to directly raise productivity and growth; in addition, FDI could

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assist in securing foreign market access. In short, FDI seems to offer a bundle of “good” characteristics ranging from a high degree of stability, financial resource augmentation, positive productivity effects and, perhaps, access to foreign markets.

Analogous to other economic activities, FDI has been going through dramatic changes since the end of 2008. The atypical magnitude of the ongoing economic and financial crisis—the worst in the last 60 years—provokes major apprehensions about the propensity and capability of multinational corporations (MNCs) to continue investing and expanding abroad. Faltering profits, reduced access to financial resources, declining market opportunities, coupled with the risk of a possible worsening of the current global economic downturn are some of the factors responsible for a fall in FDI flows.

The current global crisis has largely affected FDI flows, after their steady upward trend between 2003 and 2007, with FDI inflows touching a historic figure of \$1.9 trillion in 2007. Because of the financial crisis, global FDI inflows are estimated to go down from \$1.7 trillion in 2008 to below \$1.2 trillion in 2009, with a slow recovery in 2010 (to a level up to \$1.4 trillion) and gaining momentum in 2011 (approaching \$1.8 trillion). The crisis has altered the FDI landscape: investments to developing and transition economies soared, increasing their share in global FDI flows to 43 percent in 2008. This was partly attributed to a concurrent large decline in FDI flows to developed countries (29 percent) (UNCTAD, 2009). However, in 2009 FDI flows to all regions will experience a setback.

The decrease in FDI flows, together with a surge in corporate restructurings and divestments, emanates from two main factors. One, the capability of firms to invest has been reduced by a reduction in access to financial resources, both internally—owing to a decline in corporate profits—and externally—owing to lower availability and higher costs of finance. Two, the propensity to invest has been diminished by negative economic prospects, especially in developed countries that have been the worst affected (UNCTAD, 2009a).

With respect to Nepal, so far the country does not seem have witnessed an adverse impact in terms of FDI inflows due to the global recession. Nepal’s foreign investment rules and regulations are based on the *Foreign Investment and Technology Transfer Act 1992*, which was amended in 1996 in line with open and liberal economic policies. One of the major policies of the Three-Year Interim Plan (2007/8-2009/10) is the promotion of domestic and foreign investment for the development of the economic sector of the country. Again, in the case of Nepal, as a conflict-stricken economy, FDI is more sought since it has an even more instrumental role in buttressing the building-up process. Though many attempts were made in the past to boost FDI flows to the country, they did not have any noteworthy impact.

On the basis of the above background, this paper is organized as follows. Section II examines the determining factors and benefits of attracting more FDI. The following section reviews some theories of FDI while Section IV assesses the problems encountered by post-conflict economies in promoting FDI. Nepal’s experiences in attracting FDI are highlighted in Section V. Some policy measures are also suggested. The last section provides the concluding observations.

II. DEFINITION, DETERMINANTS AND BENEFITS

Definition

FDI occurs when an investor based in one country (the home country) acquires an asset in another country (the host country) with the intent to manage that asset. The management dimension is what distinguishes FDI from portfolio investment in foreign stocks, bonds and other financial instruments. In most instances, both the investor and the asset it manages abroad are business firms. In such cases, the investor is typically referred to as the “parent firm” and the asset as the “affiliate” or “subsidiary”.

There are three main categories of FDI:

- Equity capital is the value of the multinational corporation's (MNC) investment in shares of an enterprise in a foreign country. An equity capital stake of 10 percent or more of the ordinary shares or voting power in an incorporated enterprise, or its equivalent in an unincorporated enterprise, is normally considered as a threshold for the control of assets. This category includes both mergers and acquisitions and “greenfield” investments (the creation of new facilities).
- Reinvested earnings are the MNC's share of affiliate earnings not distributed as dividends or remitted to the MNC. Such retained profits by affiliates are assumed to be reinvested in the affiliate.
- Other capital refers to short or long-term borrowing and lending of funds between the MNC and the affiliate.

These three main categories of FDI described above are those used in balance-of-payments (BoP) statistics.

The available statistics on FDI, which are far from ideal, come mainly from three sources. First, there are statistics from the records of ministries and agencies that administer the country's laws and regulations on FDI. The request for a license or the fulfillment of notification requirements allows these agencies to record data on FDI flows. Typically, re-invested earnings, intra-company loans, and liquidations of investment are not recorded, and not all notified investments are fully realized in the period covered by notification. Second, there are the FDI data taken from government and other surveys, which evaluate financial and operating data of companies. While these data provide information on sales (domestic and foreign), earnings, employment and the share of value added of foreign affiliates in domestic output, they often are not comparable across countries because of differences in definitions and coverage. Third, there are the data taken from national BOP, for which internationally agreed guidelines exist in the fifth edition of the IMF's *Balance of Payments Manual* (IMF, 1993).

Determinants

How FDI impacts growth and development depends, to a large degree, on the type and volume of FDI. Hence, it is crucial to understand what attracts FDI, how this has changed over time, and what these changes in determinants and types of FDI mean for differential growth prospects.

The major determinants of inward FDI can be divided into many categories, and link to a) general policy factors (e.g. political stability, privatization); b) specific FDI policies (incentives, performance requirements, investment promotion), c) macro economic factors (human resources, infrastructure, market size and growth); and d) firm specific factors (technology).¹

General Policy Factors

Theory indicates that long-term investment benefits from stability as it lowers the risks for the long-term investor. This has been supported by investor surveys and evidences. Politically unstable countries appear to attract relatively small amounts of FDI.²

Countries that provide a welcoming ‘investment climate’ attract more investment. A welcoming investment climate is governed by many factors determining investment. Stricter regulation of business entry is associated with higher corruption and thus weaker governance, deterring investment. Even though countries have begun to understand what a welcoming investment climate involves, with some reductions in red tape, there is still a wide variation in administrative and regulatory practices.

FDI Policies

Renewed confidence in the advantages of FDI has led many countries that were restricting FDI in the 1960s, 1970s and 1980s to be more open towards FDI in the 1990s and beyond (Lall, 2000).

Much of the FDI potential in developing countries was not acknowledged a few decades ago as many countries had stringent restrictions on foreign ownership, and many of what are now regarded as conducive factors (for instance, a competitive environment and good quality local capabilities) were not in order. This is slowly changing. Almost all countries are now actively and aggressively welcoming FDI.

Investment liberalization has coincided with an increased focus on FDI protection and promotion. Countries now actively try to attract FDI and have set up FDI promotion agencies. Tools included for FDI promotion comprise incentives, export processing zones and science parks, among others.

Macro-economic Factors

General and specific FDI policies have become less restrictive to inward FDI. With fewer policy barriers, other factors have become more crucial as determinants. Among these are basic economic pull factors like good quality and appropriate human resources and infrastructure on the supply side, and market size and market potential on the demand side. Macro-economic policies that shape the underlying fundamentals of cost-competitiveness have become more crucial over time in attracting FDI. Lall (2000a)

¹ For instance, ICT developments have had a significant impact on the way companies structure their international activities. Most importantly, it has facilitated a more specialized production attracted to those locations that can offer the most competitive environment for any given activity. Details are given in Velde (2006).

² The major exception to this rule are countries rich in natural resources which have managed to attract huge amount of FDI despite often unstable environment.

argues that FDI location decisions will, to a large extent, depend on economic factors and not on temporary policy interventions.

Firm Specific Factors

Since the 1950s, researchers have attempted to understand the evolution of FDI through micro-economic factors. International business studies have had a long tradition studying MNCs and use an eclectic paradigm for FDI, the Ownership-Location-Internalization (OLI) framework (Dunning, 1993).³ Economists such as Caves (1974) and Dunning have emphasized that MNCs need to possess some firm-specific asset that differentiates them from domestic firm to compensate for the extra costs in terms of local knowledge that a foreign firm must incur to operate in foreign markets. The firm-specific asset is called an ownership (O) advantage. As the firm-specific asset is often related to access to some superior technology or to specific knowledge of production processes, foreign affiliates require the right skill-mix to use the specific technology and to undertake a complex production process in usually large-sized plants. MNCs should also have an internalization (I) advantage to internalize business contacts, and not to outsource. Finally, the reason why a multinational invests in one country but not in another depends on the country's locational advantage (L).

It is suggested by Markusen (1995) that technology or the firm-specific asset (ownership advantage) is the primary reason for FDI. The claim that technology rather than different factor endowments and prices underpin FDI can also explain why trade and FDI can be complements rather than substitutes.

Benefits

In general, FDI inflows can contribute to the growth and development of the economy in host countries by generating employment and expanding the supply of goods. FDI associated with MNCs can create spillover effects, providing new skills, technologies, and marketing networks for local producers. Foreign firms also can provide training for workers—not only in manufacturing processes but also in management. Such training can make local workers more productive, particularly when technology transfer is involved, and increase their wages (ADB, 2004).

FDI can help earn foreign currencies for host countries by increasing the manufacture of goods and services that are exported. The earning of foreign currencies is critical for developing countries to generate a current account surplus to finance the import of necessary inputs, among other things. If a current account surplus is not available to finance imports, the country's capital account must be relied upon, which can lead to debt accumulation. FDI focused on export-oriented industries can positively affect the volume of trade in the host country, and stimulate economic growth. In addition, the global marketing network of MNCs that invest in export-oriented industries can be used to market products of local affiliates and other worthy local firms in the host country.⁴

³ This is further discussed in Section III.

⁴ In India, for instance, FDI from the US has been observed to positively and significantly affect the export intensities of domestic firms operating in the nontraditional export market. See Banga (2003) for further elaboration.

If the domestic market of a prospective host country is expected to be large in the future, especially in countries with large populations, MNCs may use FDI to establish large domestic production bases in those markets. Purchasing power and consumption can expand quickly in developing economies with rapidly expanding economies. Countries with large populations can thus provide rich business opportunities for MNCs for the production of goods for domestic markets at local production bases. Such production can replace imports and reduce the burden of foreign borrowing. This type of FDI can also expand consumer welfare in the host country if local consumers are provided a wider range of products of better quality at lower prices.

Technology transfer and knowledge spillovers often can be expected from FDI inflows. Spillovers are indirect effects of FDI, and can be defined as circumstances where FDI improves the technology or productivity of domestic firms. Spillover effects can have both vertical and horizontal impacts on host economies. Vertical spillovers refer to inter-industry impacts.⁵ Horizontal spillovers occur when FDI promotes intra-industry competition in local markets through imitation effects and positive effects on human capital, industrial relations, market competition, and technology transfer. Vertical and horizontal effects can help local firms raise productivity as a result of improvements in human capital and industrial management skills, competition and efficiency, production processes, technological capabilities, and research and development (R&D). Through these linkages, FDI can help diversify local industries and thus diminish the economic vulnerability of host economies to external shocks that result from a narrowly based industrial structure.

FDI can play an important role in the overall development process, and in meeting the MDGs (Addison and Mavrotas, 2004). First, FDI is a source of capital accumulation, both physical capital and human capital. Provided that the FDI projects are well-designed, their rate of return will raise economic growth, thereby adding to the growth of employment, an indirect effect which is additional to the jobs created by FDI projects themselves. Second, FDI can generate much-needed revenues for governments to spend on MDG-focused infrastructure and services. These revenue effects are both direct (through corporate taxes paid by the enterprises themselves as well as revenue from FDI in the natural resource sectors) and indirect (when FDI raises economic growth and therefore the economy's total tax base).

To sum up this section, FDI's development benefits are potentially strong, but whether this potential is realized or not largely depends on the host country having a clear vision of how FDI fits into its overall development strategy. Thus, FDI can be used to diversify the economy thereby reducing over-dependence on a few commodity-based sectors, for example by creating new manufacturing and service-sectors, particularly in exports and in services which use the new information and communication technologies (ICTs).

⁵ For example, when foreign manufacturing firms tap local suppliers for procurement of inputs, the demand for local inputs expands production possibilities in the host country through backward linkages.

III. THEORIES

Market Imperfections

One of the earliest attempts to introduce market imperfections in the theory of FDI was made by Hymer (1976). He argued that the investing firm must have some advantages specific to its ownership which are sufficient to outweigh the disadvantages they faced in competing with indigenous firms in the host country. These exclusive advantages imply the existence of some kind of market failure. This is because in a perfectly competitive world, all firms are competing equally and have no advantage over others. FDI cannot take place in such a world.

However, as other writers (Hood and Trijuens, 1993; Dunning, 1988, 1993) have pointed out, the existence of ownership advantages does not necessitate production abroad, for the foreign firm can exploit its advantage through licensing or through producing at home and exporting. To explain the choice of FDI over producing at home and exporting, it is necessary to take into account local-specific factors such as trade barriers and market characteristics.

Internalization Theory

Internalization theory also focuses on market imperfections. But these imperfections are in the markets for intermediate inputs and technology. Intermediate inputs in this context are not just semi-processed materials but more often are types of knowledge incorporated in patents and human capital, among others (Hood and Young, 1984). Imperfections in markets for intermediate inputs create difficulties and uncertainty for the firm to fully exploit its advantages. A profit-maximizing firm faced with such imperfections will try to overcome these in the external market by internalizing them in their operation, either through backward or forward integration.

There are a number of such imperfections that are considered important in stimulating internalization. An example is government intervention in the form of tariff, taxation, and exchange rate policies that create difficulties in the firm's sourcing activities and in exploiting location-specific advantages. All these factors stimulate firms to internalize.

Product Cycle Hypothesis

The above explanations of FDI have been based upon static advantages, either specific to firms or specific to a location. However, the relative importance of these advantages will change over time as the product develops through its life cycle. As a consequence the firm's choice between export, FDI and licensing might also change. Vernon (1966) developed the product cycle model to deal with such dynamic aspects of FDI activities. Initially, Vernon attempted to explain US investment in Europe during the post-war period by answering two questions. The first concerns why innovations occur in developed countries and the second concerns why they are transferred abroad. Vernon tried to answer these questions by relating the product life cycle, which is divided into three stages progressing from the 'new' to the 'mature' and ultimately the 'standardized'

product, to the location decisions made by firms and the choice between exports and overseas production.⁶

Although the product cycle hypothesis has several weaknesses and might be an oversimplification of reality, it has provided an explanation of why innovations occur mostly in developed countries, while at the same time it explains both trade and investment flows.

Eclectic Paradigm

According to Dunning (1979), the product cycle hypothesis is only a partial explanation. He developed an eclectic approach to the problem. The principal hypothesis of this eclectic theory is that a firm will engage in FDI if the following three conditions are met:

1. It possesses ownership advantages over firms of other nationalities in serving particular markets. These advantages are specific to the firm.
2. Given (1) is satisfied, it must be more beneficial to the firm to exploit the advantages itself rather than to sell or lease or license them to foreign firms, that is to internalize its advantages through an extension of its activities rather than externalizing them.
3. Given (1) and (2) are satisfied, it must be profitable for the firm to combine these advantages with some factors in the foreign country.

The key point of the eclectic theory is that any one of these advantages may be necessary but not sufficient to give rise to FDI. It is necessary to consider all three conditions together. Dunning (1993) concludes that all forms of FDI can be explained by the above three conditions.

Investment Development Path Theory

The Investment Development Path (IDP) theory was introduced by Dunning (1981) as an extension of Eclectic Paradigm, to explain the net outward investment position of countries in relation to their development stages. The Eclectic Paradigm suggests that the direct investment stock of countries is determined by three factors: ownership, location and internalization (OLI) advantages. According to the IDP theory, the country passes through five main development stages determined by the changes in the OLI parameters

⁶ In the first stage, market conditions in developed countries, particularly in the US, facilitate the innovation of new products. The second stage is when the product is maturing, and potential competitors appear. Some degree of standardization has been introduced in the design and production process. Faced with the resultant competition, producers are more concerned with the cost of production. In the final stage of this model, namely the standardized product, developing countries are at a comparative advantage as a production location. At this stage, market knowledge and information are less important; therefore, the priority is for the least-cost location. The net result is that the production facility or assembly is moved to developing countries to take advantage of low labor costs.

of domestic firms of the country (Dunning and Narula 1996).⁷ These changes affect the international investment position of the country with respect to its development.

Recent Empirical Studies

According to Blomström & Kokko (2003) and Borenzstein, De Gregorio & Lee (1998), the contributions of FDI to the development of a country are widely recognized as filling the gap between desired investment and domestically mobilized saving, increasing tax revenues, and improving management and technology, as well as labor skills in host countries. These could help the country to fight its way out of poverty.

Empirical studies suggest that FDI provides a source of capital and complements domestic private investment. Some studies (Blomström & Kokko, 2003, and Chen & Démurger, 2002) conclude that FDI contributes to total factor productivity and income growth in host economies, over and above what domestic investment would trigger. These studies find, further, that policies that promote indigenous technological capability, such as education, technical training, and R & D, increase the aggregate rate of technology transfer from FDI and that export promoting trade regimes are also important prerequisites for positive FDI impact. For instance, the study by Borenzstein, De Gregorio, and Lee (1998) using data on FDI received by developing countries tested the effect of FDI on economic growth in a cross-country regression framework. They found some indications that FDI has a positive effect on economic growth, but this impact was dependent on the human capital stock in the host economy.

However, there is growing empirical evidence suggesting that the impact of FDI on economic growth is not automatic. Borenzstein, De Gregorio, and Lee (1998) show that for FDI to contribute to economic growth, the host country must have achieved a minimum threshold level of development in education, technology, infrastructure, financial markets, and health. Thus, FDI contributes to economic growth only when the host country has reached a developmental level capable of absorbing the advanced technology that it brings.

Excessive FDI may not be beneficial. Through ownership and control of domestic companies, foreign firms know more about the host country's productivity, and they could overinvest, at the expense of domestic producers. Possibility exists that the most solid firms will be financed through FDI, leaving domestic investors stuck with low-productivity firms. Such "adverse selection" is not the best economic outcome.⁸

⁷ In the first stage of IDP, outward FDI of the country is at a negligible level or zero because of insufficient ownership advantages of domestic firms. In the second stage of IDP, outward direct investments remain still at a negligible level but inward FDI begins to rise as the location advantages of the country improves, particularly with the help of government policies. Eventually, the rate of outward FDI begins to increase in the third stage of IDP. In the fourth stage, outward FDI of the country becomes equal to or greater than its inward FDI. Finally, the net outward investment level of a country fluctuates at the zero level in the fifth stage of IDP while the growth rate of both inward and outward FDI continues to rise.

⁸ The impact of too much FDI is discussed in Kumar (2007).

IV. FDI IN POST-CONFLICT ECONOMIES

Post conflict transition countries cannot be considered as normal economies. The majority of them are burdened by substantial market failures, relative small market size, severe economic constraints and weak institutions necessary for a well functioning economy. Many of them fall into the category of countries described as least developed; some of them are landlocked, such as Nepal. These countries are also afflicted by a number of risks and capacity deficits including political instability and security problems. Physical infrastructure is often destroyed or unavailable, including electricity, water, transport and access to land. Corruption is often rife, while transparency and the rule of law are very weak. These economies are also normally deprived of skilled labor as they struggle to cope with the effects of brain drain and capital flight.

In the process of post-conflict recovery, reconstruction and development of physical and institutional infrastructure are the prime goals. The two major avenues of such development are foreign aid and FDI. Development aid alone cannot transform devastated economies into vibrant, self-sufficient systems—FDI can bring added advantages, and can eventually even abolish the need for foreign aid (Turner *et. al*, 2008). FDI generates employment opportunities, which are crucial in the attainment of long-term economic stability. It provides capital to raise the productive capacity of the host economy, access to international markets, helping countries to shift from aid-dependent to investment-driven post-conflict reconstruction. The presence of foreign investment can also provide a type of 'peace dividend', instilling the people with a stronger sense of hope and providing incentives to consolidate peace.

Attracting a form of FDI that is beneficial to post-conflict countries depends upon prioritizing quality of investment, rather than focusing solely on the size of investment flows. FDI can only be justified if it is high value and makes a genuine contribution to the host economy, with respect to employment generation and spillover of knowledge or technology. Any investment regime must acknowledge that foreign investment is part of economic development within a reconstruction and peace-building process, and not an end in itself.

Hence, in order for FDI to transform post conflict transition countries, some positive and proactive steps need to be initiated to ensure that FDI fits into some domestic investment demand systems, such that FDI creates the necessary spill-over effects and internal linkages with the local economy.

With regard to the impact of internal conflict in FDI in conflict-ridden countries, limited literature exists in both theoretical and research form. Vadlamannati (2007) showed how internal state conflict affected FDI inflows in Sri Lanka from 1980 to 2006.⁹ The claims

⁹ The methodology included generating econometric models based on linear approach which takes into account both FDI presence and actual FDI inflows into the country to estimate the impact of civil war. Also examined are the role of internal conflict and economic performance on volatility in FDI inflows and intensity of volatility in FDI inflows. Vadlamannati's paper brought into play these empirical models using conflict variables and other key macroeconomic variables, which would allow obtaining some general characterization of the effects of internal state conflict on FDI inflows in Sri Lanka.

rought forward by Vadlamannati's study are that foreign investor, while choosing an investment destination keenly observe whether the investment destination is war free or not and do not take into account the issues like number of terror events. However, once the investment is made in the country, foreign investors are likely to react to the extremities of the civil war in the form of the number of terror events. Besides, this study also shows that ongoing civil war in the country coupled with poor economic performance in the past are the prime reasons for volatility in FDI inflows.

Overall, experiences demonstrate clearly that investors will often invest in locations with suboptimal investment climates, as long as there is a clear business case and as long as they believe that the location satisfies certain minimum business environment standards. They often also invest when things are moving in the right path and the government is committed to reform. Hence, once reform is perceived to be underway, it would become more feasible to consider promoting selectively for investment in key sectors. In this perspective, experiences from a number of post-conflict countries show that investment promotion agencies (IPAs) have a number of responsibilities to fulfill in building credibility (Box 1).

Box 1: Experience from Post-Conflict Countries

Experiences in post-conflict countries such as the Balkans, Sub-Saharan Africa and Indonesia (Aceh) suggest that investment promotion agencies (IPAs) face three key challenges in building credibility:

- Building the country's image as a stable and peaceful place for investors to locate their businesses;
- Building the country's "promotional product", in other words the IPA needs to build effective "arguments" to sell the country as location for investment. These include being able to point to a good investment environment, strong business-related infrastructure, labor skills, power and water supply, among others; and
- Building a targeted marketing strategy and creating a network of business contacts that will get the country back on to investors' "radar screens"; in other words, IPAs face a real challenge in letting potential investors know that the country is open and ready to do business with them.

Source: IFC (2007).

V. NEPAL'S EXPERIENCES

Background

Development priorities of Nepal include achieving sustained economic and human development to reduce poverty by strengthening technological capacities and skills, improving access to world markets, and creating more and better employment opportunities. To pursue these strategies, the country needs significantly increased flow of investment capital, especially FDI. However, globalization has led to an increase in competition for FDI among developing countries thereby making it even more difficult for Nepal to attract new investment flows. Hence, one of the development challenges facing Nepal is how to attract and retain FDI on a sustainable basis. It is true that in the present context of global economic recession, it could be difficult for Nepal to attract FDI

inflows as most developing countries are competing for similar types of FDI. Still, FDI is highly preferred in this post-conflict economy as it can play a key role in facilitating the building-up process.

A direct investment enterprise is defined as "an incorporated or unincorporated enterprise in which a direct investor, who is resident in another economy, owns 10 percent or more of the ordinary shares or voting power (for an incorporated enterprise) or the equivalent (for an unincorporated enterprise)" (IMF, 1993, p. 86). However, Nepal does not apply the current 10 percent rule. According to the *Foreign Investment and Technology Transfer Act 1992*, foreign investment means the following investment made by a foreign investor in any industry: a) investment in share (equity); b) reinvestment of the earnings derived from the investment in share (equity); and c) investment made in the form of loan or loan facilities. The minimum investment needs to be equivalent to US\$ 20,000.

FDI in Policy-making

For the first time, the Sixth Plan (1980/81-1984/85) incorporated a policy for utilizing foreign capital and technology as a useful supplement. The Plan mentioned that foreign investment and technology was primarily required in large-scale industries and mineral industries. As an upshot, the *Foreign Investment and Technology Transfer Act 1982* was introduced. Presently, however, Nepal's foreign investment rules and regulations have been formulated on the basis of the *Foreign Investment and Technology Transfer Act 1992* that was amended in 1996 in line with open and liberal economic policies.

According to *Foreign Investment and Technology Transfer Act, 1992*, foreign investors are equally treated as local investors and the same act prevails regarding incentives and facilities to foreign investors. Incentives and facilities are designed to make investment viable and products competitive. Some of them include the following: a) foreign investors are allowed to hold 100 percent ownership in industries, except the cottage scale enterprises and a few restricted activities such as security related ones; b) technology transfer is allowed in all types of industries even in the areas where foreign investment is not allowed; c) full repatriation of the amount received from the sale of equity, profits, or dividends and interest on foreign loan and the repatriation of the amount received under an agreement for the transfer of technology is permitted; d) foreign investors will be granted a business visa until their investment is retained; e) the resident visa will be provided to foreign investors, who at a time, makes an investment in excess of US \$ 100,000 or equivalent; and f) only nominal import duty is levied on raw materials. Despite the implementation of most of the policy measures of the *Foreign Investment and Technology Transfer Act, 1992*, the country has not been able to attract FDI for its development benefits.

One of the major policies of the Three-Year Interim Plan (2007/8-2009/10) is the promotion of domestic and foreign investment for the country's economic development (NPC, 2008). The main objectives of foreign investment include raising of the foreign investment level by broadening the industrial base, seeking foreign aid to supplement resources needed for a sustainable high economic growth and employment generation, and augmenting technology and management skill transfer.

Some policies pertaining to FDI in the Three-Year Interim Plan include the following:

- Foreign investment in the form of joint ventures would be encouraged in hydropower production; components of tourism development such as airport construction and its management; airlines, star hotels and recreational facilities construction; agriculture and non-timber based high value products; development of education and health related facilities. Financial services, information technology, and biotechnology related industries, would also be incorporated in the field of such investments.
- With respect to the medium and large-scale production industries, 100 per cent share-based investment would be permitted. Similarly, that list would also comprise export-oriented industries, natural resources excavation, construction of toll roads and construction of goods management terminal.
- Individuals wishing to invest in the development of the basis for the dissemination of employment technology making compatible with the existing economic structure would be encouraged. Investors that seek to invest in joint venture with the Nepalese, with management skills and technology transfer package, would also be welcomed.
- Suitable policy would be formulated to attract capital, skills, efficiency and technology of the non-resident Nepalese.
- Nepalese diplomatic missions abroad would be mobilized for the promotion of foreign investment.
- A high-level investment promotion board would be set up to facilitate foreign investment. This board would operate as a "one window" shop for satisfying the requirement of project approval, licensing, tax facilities and infrastructure management as necessary, for the large-scale investors.

Whether the objectives of FDI as delineated in the Three Year Interim Plan will be realized or not is yet to be seen.

One of the objectives of the *Budget Speech for 2008/09* is investment promotion (MOF, 2008). A policy has been initiated to guarantee industrial and investment security, reform in legal and organization structure for creation of investment climate, procedural simplification, additional provision for sick industry rehabilitation and opportunities for foreign, non-resident Nepalis and private sector investment. A law related to Special Economic Zone is to be enacted for development and management of industrial estates, export processing zones and special commercial areas. A Garment Processing Centre is to be set up in Simara. An Investment Board with full authority would be established for industrial investment promotion.

Institutional Arrangements

As per *the Industrial Enterprises Act, 1992*, there existed a provision to establish the One Window Service (OWS) whose aim was to provide all services required by foreign investors under one roof. Specifically, the policy listed two types of services to be provided by the OWS: a) permission, facilities, and other administrative services under

the *Foreign and Technology Transfer Act, 1992* and b) other infrastructural facilities (such as registration, land, electricity, telecommunication, water) and other services as required by the investors. However, the One Window Committee set up to provide infrastructure facilities under the one-window system for industries to be established with foreign investment was not successful in addressing the true needs of the investors.

An Industrial Promotion Board was formed under the chairmanship of the Minister of Industries on the basis of the *Industrial Enterprises Act, 1992*. The principal objectives of the Board were a) providing necessary co-operation in developing and implementing policies, laws and regulations pertaining to industrial development of the country; b) developing guidelines in meeting the aims of liberal, open and competitive economic policies undertaken by the country in order to make the industrial sector competitive; c) coordinating between the policy level and the implementation level of the industrial policy; and d) suggesting to the Government for including any other industry in the classification of industries. An evaluation of the functions, duties and powers of the Industrial Promotion Board depicts that they are confined to a large extent to policy-related matters.

Nepal formed a Board of Investment (BOI) under the chairmanship of the Prime Minister in December 2001. The BOI was established for promoting investment and making it more transparent and reliable. The other objectives of the Board were, among others, a) formulating new policies by reviewing the existing investment policy, b) maintaining coordination between various government and non-government organizations for the promotion of investment, c) pinpointing the areas of priority sector for investment promotion, d) monitoring the activities associated with investment promotion and e) providing directives to the concerned department to boost up investment. However, it is disappointing to note that the BOI has not been functioning smoothly as per its objectives. In this respect, as indicated earlier, the announcement of the formation of an Investment Board in *Budget Speech for 2008/09* with full authority for promoting industrial investment seems a positive step. However, just the formation of the BOI is not adequate. It needs to accord priority to implementation of a focused and targeted investment promotion and facilitation policy.

Experiences indicate that most successful investment regimes in a number of countries have been driven with a single-minded goal at the highest level of Government. A powerful institutional arrangement with all necessary powers will command respect and authority and enable the country to put foreign investment at the top of the development agenda. This type of arrangement is essential in promoting and attracting FDI and also in facilitating the post-approval process. In this respect, as the Board of Investment kind of institutional arrangement in Sri Lanka and Bangladesh have been found quite successful

in carrying out its functions, Nepal could draw many lessons from the experiences of these two countries (Pant and Sigdel, 2004).¹⁰

Data Limitations

In Nepal, the *Foreign Investment and Technology Transfer Act, 1992* empowers the Department of Industries (DOI) to administer, implement and evaluate all foreign investment projects. The compilation, maintenance and publishing of statistical data related to industrial sector of Nepal (including FDI) are generally made by the DOI. The DOI approves direct investment applications and the Foreign Exchange Management Department of the Nepal Rastra Bank (NRB) approves principal and interest repayments by these enterprises.

The FDI figures for Nepal are based on data provided by the DOI and are linked to the number of projects approved. There are often significant time lags between approval and actual investment; the actual investment may not take place at all. For instance, in 2008/09, the number of approved FDI projects was 230. The foreign investment tied with these projects amounted to Rs. 6.25 billion. However, it is believed that the actual disbursement of FDI in Nepal is much lower than the approvals.¹¹ Information on reinvested earnings and on withdrawals of investment (disinvestments) is generally not captured. Although the DOI requires all FDI-related enterprises to submit their financial statements every three months, this practice has not been followed.

In 2002 and 2003, a survey was undertaken by the NRB in an attempt to improve the recording of FDI data. Direct investment surveys forms were provided to 158 previously-identified direct investment enterprises. However, completed survey forms were received from just 78 enterprises. A number of problems were encountered: a) some enterprises had ceased operations and/or changed their locations with no known forwarding address; b) data reported by the enterprises did not relate to the requested period; and c) most of the responding enterprises reported net losses from operations in Nepal.

¹⁰ In the case of Sri Lanka, for instance, investor friendly policies, simplified systems and procedures and business-like attitudes adopted by the BOI over the last few years led to phenomenal growth of FDI inflows. The country has achieved the highest ever growth of FDI inflow in 2008, which reached US\$ 889 mil. This was achieved in a year when worldwide FDI inflows were down by 15 percent. Sri Lanka was able to attract such FDI inflows introducing innovative measures such as simplified application and approval procedures where the investment approval could be granted within a day. The investor was freed of the burden of filing and lodging a large number of documents. In addition there was a reduction of bureaucracy, of cumbersome practices, a reduction of waiting time, a simplification of the process of company formation and registration. The long-term effect was an improvement of the doing business index of Sri Lanka. The setting up of the Cabinet Sub-Committee on Investment Facilitation (CSIF) headed by the President to resolve the major policy issues faced by the investors is further proof of importance Sri Lankan authorities accord to and of their commitment to the promotion and facilitation and retention of FDI (*The Colombo Times*, May 11, 2009). These measures are worth emulating by Nepal in pursuit of attracting FDI under severe competitive conditions.

¹¹ According to the balance of payments (BoP) data, however, FDI amounting to only Rs. 1.83 billion flowed into the country in 2008/09. It should be noted that this figure is an underestimation since not all the FDI

To resolve the problem pertaining to the compilation and monitoring of FDI data, the formation of a Foreign Direct Investment Supervision Committee is being initiated comprising members from the Department of Industries, the Federation of the Nepalese Chamber of Commerce and Industry, and the Foreign Exchange Management Department and Research Department of the NRB. The proposed Committee would regulate the data reporting by direct investment enterprises and the systematic compilation of such data.

Again, for proper recording of FDI data, Nepal is participating in the Coordinated Direct Investment Survey (CDIS) that is being conducted by the IMF.¹² In a country where data on FDI has not been properly recorded, participation in this Survey would greatly facilitate in the improvement of the country's recording system.

Other Impediments

Nepal faces multiple challenges such as inadequate development of macroeconomic environment, unsatisfactory physical and economic infrastructure development, level of technology development, disadvantaged geographical situation and lack of entrepreneurship and managerial capacity in its efforts for attracting FDI. Administrative instability, lack of consistent planning, insufficient institutional capacity, reliance on unsolicited proposals and a lack of government support arrangements are other obstacles.

The absence of supporting infrastructure such as telecommunication, transport, power and water supply and skilled labor discourage foreign investors since it increases transaction costs. Investment comes along with the need to communicate with clients at ease, operate efficiently under reliable utilities. Such factors include proper infrastructure and utilities that would make investing in Nepal a pleasure with no hassles. The constant cuts in power and water supply make it hard for international businesses to manufacture and produce efficiently. Moreover, the cost of transport is very high in the country.

Political instability denotes that Nepal presents mainstream foreign investors with an unacceptably high level of political risk. Significant prospective investors will delay the identification and implementation of projects until the risk profile becomes acceptable.

Plausible Measures

The current global environment is characterized by an intense “global race” for foreign investment. No doubt, FDI is drawn to different countries for different reasons. Nonetheless, at a general level, in order for a country to be more attractive to investors, there is a need to put in place measures to ensure the existence of an enabling environment, i.e., one that is conducive to doing business. In this respect, the following measures could facilitate in the promotion of FDI in Nepal in this post-conflict era:

- Regional integration could be used as strategy to overcome the limitations of market size of Nepal. Furthermore, since all countries in the South Asian region are trying to

¹² The major objectives of the CDIS include: a) collecting comprehensive and harmonized information, with geographic detail, on the stock of inward FDI as at end 2009; b) for the major investing countries, also gathering comprehensive and harmonized information, with geographic detail, on the stock of outward FDI; and c) exchanging bilateral data among the participating countries.

attract FDI, a great deal of competitive overbidding and unnecessary loss of resources could be avoided through some harmonization of FDI policies among different governments.

- Policies and strategies for the promotion and attraction of FDI should clearly delineate areas in which FDI is desired; FDI should not be attracted indiscriminately but should be geared to the country's needs and requirements while taking investor concerns into full account.¹³ At the same time, countries and regions from which foreign companies are to be attracted, as well as the foreign companies themselves, need to be carefully screened on their suitability and targeted on the basis of solid research and superior marketing techniques. In this context, particular attention could be paid to attracting investment from nationals living abroad as experience shows that in many countries the diaspora has been the pioneer of foreign investment.
- Nepal should strive to improve, in particular: (a) a well-disciplined, relatively cheap, but reasonably well-educated labor force; (b) access to adequate infrastructural and institutional facilities, including information and communications technology (ICT) facilities; (c) a stable legal and financial framework and environment; and (d) a stable political environment with a government committed to economic development and reform and absence of excessive red tape and corruption in the FDI approval and implementation process.
- The country needs to accord priority to improving the rule of law, including transparency in the formulation of the laws and regulations, consistency among them, and due implementation, enforcement as well as proper dissemination and communication of laws and regulations and any changes therein and consistent interpretation by all concerned official entities. Laws and regulations should not change too often while incentives for investors need to be carefully evaluated on their net benefits. All in all, there is a need of a substantial revision of the Foreign Investment and Technology Transfer Act of 1992 in the context of Nepal's entry into the WTO, SAFTA and BIMSTEC.
- Without accurate and reliable FDI data, policy makers in Nepal face difficulties in the formulation of appropriate investment policies. In this context, the formation of a Foreign Direct Investment Supervision Committee that is being initiated for regulating the FDI data reporting by direct investment enterprises and the country's participation in the CDIS are steps in the right direction.

¹³ In this context, an example from India seems worth-mentioning. India's FDI inflows have reached US\$ 42 billion in 2008-09, an 11 percent jump from the previous year. It is being seen among the top five investors' destinations during the next two years, according to UNCTAD's *World Investment Prospects Survey 2009-2011*. The Government has turned pro-active and is instituting measures to attract inflows. Ministries are coordinating with investor countries and enterprises to present investment opportunities across sectors. The Government, for the first time, has established a non-profit company, Invest India, in collaboration with industry body FICCI and state governments for attracting foreign investment focusing on small and medium companies. Invest India is all set to bridge the information gap for small and medium foreign investors via its website with comprehensive knowledge about the policy framework that they seek. For details, see Mukherjee (2009)

- The issue of peace and stability must be addressed with increased urgency. The extra costs of security for firms that wish to invest in Nepal and those who are already present are high. The extra cost from the view of many prospective investors makes such investment efforts not worth it. Hence they stay away. Conflict prevention, peace and stability in Nepal would help create a favorable economic environment, which would allow the implementation of sound investment friendly policies to attract FDI.
- Effective FDI promotion involves image building, investment generation and investor servicing to influence investment decisions.
 - Image-building activities comprise effective communication about the location and include producing and distributing fact sheets, videos, brochures and newsletters, holding briefings and engaging in media relations, public relations and advertising. Image-building techniques must be accompanied by removing administrative obstacles and managerial impediments, investment-generation and investor-servicing activities.
 - Investment-generating activities are necessary where the flow of new investments falls short of national objectives and where the country wants to expand into new areas of investment for reasons of resource availability, comparative advantage or long-term development. To attract new investment, Nepal should engage in in-bound and out-bound overseas missions and seminars, communications (advertising, mail and telephone), campaigns and direct contact with individual investors.
 - Servicing investors usually entails a range of pre-approval, approval and post-approval activities. These entail providing information on doing business, granting approvals and clearances quickly and efficiently, assisting in the implementation of projects, helping with access to essential infrastructure, and supporting and monitoring investor performance.
- The close partnership between the private and public sector is essential to build confidence. In this respect, it is recommended that a forum be established where the private and public sectors could sit together to discuss business promotion-related issues. The forum needs to be composed of the prime minister, all the presidents of the national chambers, top businessmen/industrialists, top bankers, as well as heads of overseas chambers of commerce and relevant ministries' secretaries and ministers. The forum may meet regularly to review the economic situation of the country. The problem faced by the business community can be discussed and decisions could be taken immediately. This kind of partnership between the government and private sector will help restore market confidence.

VI. CONCLUSIONS

Economic development is essential for every country but it is especially crucial for post-conflict transition countries such as Nepal, requiring peace-building, recovery and reconstruction. Development aid *per se* cannot transform a post-conflict economy, and it

is here that FDI can be an effective technique for revitalizing industries and rebuilding infrastructure.

The country needs to remain attractive for FDI in the current context of global recession, especially for such investment that serves its long-term development goals and enhances competitiveness (for instance, investment in areas such as infrastructure and hydropower). Retaining existing investment is equally important, particularly in the present deteriorating security conditions where MNCs may consider closing foreign affiliates or transferring them to other safe locations. Moreover, as the recent political trends are very disturbing, the country must make every possible effort to ensure that the trend of FDI inflows is not jeopardized by such negative images.

Finally, though some measures have been spelled out in this paper for boosting FDI flows into Nepal, there are certain issues pertaining to FDI that demand further research. In the first place, should Nepal try to influence the mix of FDI by pursuing to draw in only export-oriented FDI and smaller firms and exclude multinationals in order to limit the risks of monopoly? Secondly, how can the country be successful in directing FDI into specific locations or socially preferred sectors? Thirdly, how can Nepal satisfy the particular challenges posed by its small domestic market size, by the shortage of skilled labor and by the weakness of physical infrastructure? And, lastly, how can the country move ahead with the appropriate sequencing in tackling the different policy requirements?

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Potential Output and Output Gap in Nepal

Pitambar Bhandari*

Abstract

The potential output and output gap are key variables in identifying the scope for sustainable non-inflationary growth and assessment of the stance of macroeconomic policies. This paper estimates potential output and the output gap in Nepal by different methodologies. The different methodologies produce similar results followed by analysis and observations. The results show that the output gaps were within relatively narrower band since 1990s. The results also reveal some sign of overheating in recent years. The results from production function approach indicate that total factor productivity is declining continuously in the last decade limiting the scope for demand management policies to attain high and sustainable economic growth.

I. INTRODUCTION

Nation's potential output is the level of output which could be attained by the full employment of available resources. It, therefore, reflects the productive capacity of the economy. Supply side factors- capital stock, labour force and technology determine the level of potential output of an economy. Transitory movements in output caused by policy shocks do not count for potential output. 'It represents the steady-state level of output associated with the long-run aggregate supply curve-the level to which gross domestic product (GDP) reverts as the transitory effects of macroeconomic disturbances dissipate' (Kuttner, 1994). Since, real gross domestic product (GDP) is generally used as a conventional measure of a nation's output, potential real GDP stands as a natural candidate for measuring potential output. The deviation of the actual output from potential output is the output gap. Output gap are generally measured as the deviation of actual output from potential output relative to potential output.

Since potential output represents the maximum production without inflationary pressure, it is a natural target for macroeconomic policy. The level of actual output relative to the potential output determines whether economic policy should be directed toward raising aggregate demand or whether structural issues should be given more prominence (Cerra and Saxena, 2000). Potential output and output gap provide a framework for assessing the policy stance. If the economy is operating below the potential level there could be the scope for monetary policy to stimulate non-inflationary economic growth. If the economy is operating above the potential level there could be demand-pull inflationary pressure. In

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countries where inflation targeting framework is used, the output gap is the most important determinant of how loose or tight the monetary policy should be in order for the inflation target to be obtained at maximum growth. Though an inflation-targeting framework is not used in Nepal, price stability is one of the main responsibilities of the Nepal Rastra Bank (NRB) as per the NRB Act 2002¹. Therefore, identification of output gap is believed to be helpful to discharge central bank's responsibilities. Similarly, output gap estimates also provide a framework for assessing the fiscal stance. An expansionary fiscal policy is desirable when output is below its potential level while contractionary fiscal policy is desirable when the economy is operating above its potential level. Therefore, reasonably accurate potential output and output gap estimates are necessary to conduct prudent monetary and fiscal policies. On the contrary, if an economy's growth performance is slow but is operating quite closer to its theoretical potential, issues of structural reform assume central importance.

Nepalese economy witnessed moderate growth performance during the last three decades. The emphasis on state's role and inward looking strategies, which were the core of the development strategies before mid-1980s, shifted towards a more liberal and outward oriented strategies from mid-1980s. The process got momentum after the political regime shift to multiparty democracy in early 1990s (Khatiwada and Sharma, 2002). These reform and liberalization measures boosted industrial activities, trade, domestic as well as foreign investment and helped to manage the then macroeconomic instability and push the economy from slow growth path of 1970s to a moderate growth path. The improvement in the growth performance, however, could not contribute much towards the reduction in state's mass poverty and narrow down the gap between haves and have not (Khatiwada and Sharma, 2002). The nation encountered a long internal conflict and the use of the nation's scarce resources diverted towards security arrangements and public expenditure on development activities plunged sharply². On the other hand, domestic private investment as well as foreign direct investment also affected, in the absence of conducive investment climate. These developments believed to have serious implications for the growth performance and potential output of the economy in the later years.

Reliable estimate of potential output and output gap are crucial to identify productive capacity of the economy and thereby help economic policy formulation. However, potential output is an unobserved variable. Because of this very nature, economists apply different methods to estimate potential output and come up with different estimates of output gap. This paper attempts to estimate potential output and output gap for Nepal applying two conventional approaches: Hodrick-Prescott (HP) filter and production function approach. The remainder of this paper is organized as follows. Section 2 presents an overview economic growth and income structure of Nepal. Section 3 presents conceptual discussion of potential output and output gap. Section 4 discusses the estimation methodology and data used in this paper. Section 5 presents estimates of potential output and output gap, and discusses the results. It also presents alternative

¹ Nepal has been following fixed exchange rate regime that is considered to be incompatible with inflation targeting framework.

² The ratio of public sector gross fixed capital formation to GDP was 7.4 percent in the 1990s which declined to 3.3 percent in the period of 2001-2009 on the average.

medium term scenarios of growth of potential output. Section 6 concludes with discussions on the policy implications of the output gap estimates.

II. AN OVERVIEW OF NEPAL'S ECONOMIC GROWTH AND INCOME STRUCTURE

Nepal is traditionally considered an agricultural economy in terms of its significant contribution to income and employment. Though the contribution of this sector is gradually declining over the years, it still accounts for about one third of total GDP. Likewise, it offers employment to 73 percent of the total economically active population of Nepal (CBS, 2008).

Dominated by agriculture sector, the growth performance of the economy was quite slow in 1970s. In the first half of the 1970s, the annual average growth rate remained at 1.8 percent as the international oil shock dampened economic activities and fuelled inflation. In the second half of the 1970s, the annual GDP growth rate remained at 2.4 per cent on average (Khatiwada and Sharma, 2002). This means that the economy had grown at an average annual rate of about 2 percent in the 1970s. The 1980s witnessed an improvement in economic growth. The real GDP grew at an average annual rate of 5.25 percent during this decade due to impressive performance of the agricultural sector.

Fig. 1

Annual Average Growth of Real GDP

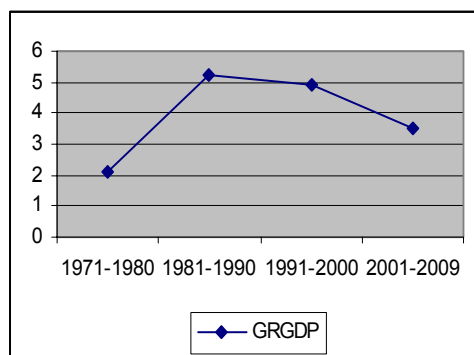
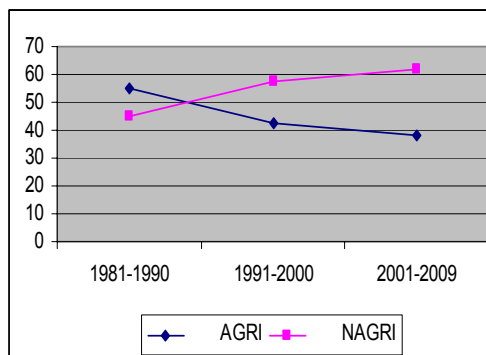


Fig. 2

Relative Share in GDP



Nepal further accelerated economic liberalization and reform processes in the first half of 1990s. They include deregulation of trade, industry, finance and foreign exchange regime; streamlining of administrated price and subsidies; privatization of public enterprises, and rationalization of tax and tariff structure. These liberalization and reform measures helped to promote private sector investment. Consequently, impressive growth in non-agriculture sector helped to maintain overall economic growth to about 5 percent in the face of sluggish performance of agriculture sector. Policy shift from import substitution to outward looking strategy and other liberalization measures led to surge in external trade. The trade (merchandise plus service)/GDP ratio, which was about 34 percent in 1980s, surged to about 57 percent in 1990s.

Social conflicts, political instability emerged in mid-1990s and accelerated in later years, however, distorted investment climate by the beginning of the 21st century. In addition, the increased imbalance between power (electricity) supply and demand in the recent

years not only added additional complication to the industrial and business activities but also badly hurt daily household activities. As a consequence, gross fixed capital formation shrank to about 20 percent of GDP in the last nine years on average from 22 percent of the previous decade. Export/GDP ratio contracted by about 8 percentage point to 15.6 percent from 23.5 percent in the previous decade. Slowdown in the industrial sector pushed the economic growth down to 3.5 percent in the period of 2001-2009. On the contrary, trade gap intensified and crossed 15 percent of GDP on account of weak export and high import to meet the increased consumption backed by escalated inflows of workers' remittances. The substantial inflows of remittances during the last decade not only supported external sector stability by financing widening trade gap but also helped to pull out many families from the state of absolute poverty.

Fig. 3

Trend in Capital Formation (% of GDP)

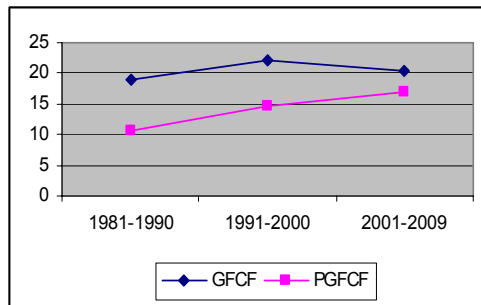
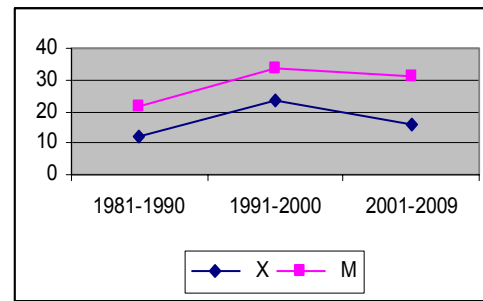


Fig. 4

Trend in Exports and Imports (% of GDP)



Such a transfer income, however, can not support the economic stability for a long time in the absence of sustainable economic growth. To ensure that Nepal maintains a high and sustainable growth path and sets the foundation for achieving double digit growth, it is essential that monetary and fiscal policy be given accurate information regarding the state of the economy in relation to its theoretical potential. The next section discusses potential output and output gap.

III. CONCEPTUAL DISCUSSION ON POTENTIAL OUTPUT AND OUTPUT GAP

Potential output is the level of output which can be produced with the full employment of economy's available resources³. This means that, it is the level of output consistent with the productive capacity of the economy. Productive capacity of an economy depends on the capital accumulation, human resource and level of technology. If an economy's investment exceeds the amount of depreciation, it adds to the productive capacity of the economy leading to expansion in potential output. Likewise, an increase in the quality and quantity of workforce (human resource) widens the productive capacity. Advancement in technology and good governance and other multifold factors help to improve total factor productivity leading to increase in potential output.

³ Full employment does not necessarily mean no unemployment. Economists prefer to define a certain rate of unemployment as natural rate of unemployment to be consistent with full employment.

The output gap is defined as deviations of actual output from potential output⁴. A negative output gap indicates that the economy is operating below its potential level. It indicates the scope for demand management policies to improve economic growth without inflationary pressure. On the contrary, the positive output gap put limitation for demand management policy to increase growth without inflationary pressure. This signifies the importance of measurement of potential output and output gap.

Measurement of potential output is a difficult task because it is an unobserved variable and no one knows the exact level of potential output at least in real time. The very nature of the potential output offers a wide space to the economists for vigorous but never ending exercise to come up with best methodology and estimate of output gap. The exercise has enriched literature on potential output and output gap. Accordingly, there are several ways of estimating the output gap. They can be classified into two broad methods: statistical detrending method and estimation of structural relationships. The statistical detrending methods, such as linear trend method, HP filter and unobserved component methods, attempt to separate a time series into permanent and cyclical components. They provide a straightforward measure of potential output. The methods that estimate structural relationships, such as production function approach and structural VAR use economic theory to isolate the effects of structural and cyclical influences on output while estimating output gap (Cerra and Saxena, 2000).

Linear Trend Method

The linear trend method is the simplest method to estimate potential output and output gap. It assumes that observed output may be decomposed into a cyclical component and linear function of time. The later component is the so called potential output which can be estimated by using following linear equation:

$$Y_t^* = \alpha + \beta\tau \quad (1)$$

where Y^* is potential output, α is the intercept, β is the coefficient for the trend of potential output and τ is a time trend.

Linear trend method is a simple statistical procedure and does not rely on economic theory. The main assumption of this method that potential output grows at a constant rate is not practical in real life. The estimates of the output gap subject to end sample bias, which undermines the credibility of the estimates obtained from this method (Gounder and Morling, 2000).

Hodrick-Prescott (HP) Filter Approach

The Hodrick-Prescott (HP) filter is a simple smoothing procedure that has become increasingly popular because of its flexibility in tracking the characteristics of the fluctuations in trend output. For example, smaller value of the restriction parameter (λ), which captures the importance of cyclical shocks to output relative to trend output

⁴ The output gap is defined as actual output minus potential output relative to potential output, $(y-y^*)/y^*$, in percent.

shocks, indicates a lower importance of cyclical shocks and yields more volatile series of potential output and thereby output gap (Cerra and Saxena 2000).

The HP filter estimates potential output by minimizing a combination of the gap between actual output an trend output and the rate of change in trend output for the whole sample of observations;

$$\text{Min} \sum_{t=0}^T (Y_t - Y_t^*)^2 + \lambda \sum_{t=2}^{T-1} [(Y_{t+1}^* - Y_t^*) - (Y_t^* - Y_{t-1}^*)]^2 \quad (2)$$

where Y^* is potential output, Y is actual output and λ is the restriction parameter that determines the degree of smoothness of the trend (Cerra and Saxena 2000). Typically the value of λ is set at 1600 for quarterly data and 100 for annual data. This choice comes from the business cycle work of Burns and Mitchell (1944), who found that the length of business cycles in the United States varied between two and eight years (Gounder and Morling, 2000).

The advantage of the HP filter is that it renders the output gap over a wide range of smoothing values and it allows the trend to change over time. The HP filter has several shortcomings, including the arbitrary choices of the business cycle frequency and the smoothing parameter λ , the neglect of structural breaks and regime shifts and the inadequate treatment of nonstationary dynamics (Scacciavillani and Swagel, 1999).

Unobserved Components Approaches

The unobserved components approach estimates unobserved variables such as potential output using information from observed variables. This approach has the advantage of specifying explicit relationships between output, unemployment and inflation. The relationships are first written in state space form such that the observed variables are specified as a function of the unobserved state variables in the measurement equation and a separate transition equation specifies the autoregressive process for the state variables. Then the unobserved state vector can be estimated using the Kalman filter. It uses guesses for the unobserved variables to create predictions for the observed variables and then updates the guesses based on the prediction errors. The approach has the disadvantage of requiring considerable programming. In addition, the results are often sensitive to the initial guesses for the parameters (Cerra and Saxena 2000).

Production Function Approach

Another conventional method used to estimate potential output and output gap is the production function approach. Production function approach models potential output as a function of potential labor and capital inputs, as well as of potential total factor productivity (TFP). Cobb-Douglas production function characterized by constant returns is widely used to represent the technology.

$$Y_t^* = A_t^* L_t^{*\alpha} K_t^{*(1-\alpha)} \quad (3)$$

Where, Y^* is potential output, L^* and K^* refer to potential (or full-employment) labor and capital inputs respectively, A^* is potential TFP, and α is the elasticity of output with respect to labour or share of labour in output.

The production function approach of estimating output gap has certain advantages over other approaches. First, it relates inputs to outputs, a quite intuitive and accepted fact by economists. If investment increases, the economy's productive capacity will also increase. The same thing happens if there is an increase in the amount of labour. Second, TFP estimates are obtained during the estimation of potential output which is important indicator of aggregate economic efficiency and one of the central determinants of economic growth. Third, the production function method is quite flexible, because it can deal with different assumption about technology and can incorporate some advances of the new growth theory, such as changes in the quality of inputs, such as human capital (Filho, 2000). Additionally, the production function method allows enough flexibility so that policymakers can exercise their judgment about how the key variables will evolve and, therefore, affect growth. However, the estimation of potential output involves a lot of uncertainty in this approach as well.

Structural VAR Approach

This method stems from the traditional Keynesian and neoclassical synthesis, which identifies potential output with the aggregate supply capacity of the economy and cyclical fluctuation with changes in aggregate demand. Based on the vector autoregression (VAR) for output and unemployment, structural supply and demand disturbances are identified by assuming that the former have a permanent impact on output while the later can have only temporary effects (Cerra and Saxena, 2000).

Compared with other multivariate detrending techniques, this method relies on clear theoretical foundations and does not impose undue restrictions on the short-run dynamics of the permanent component of output. In addition, the output gap estimates are not subject to any end-sample biases. One obvious drawback of this approach lies in the identification of shocks because a supply shock may increase demand and a demand shock may produce long run supply side effects (Cerra and Saxena, 2000).

Comparative Review of Approaches

Measurement of potential output is a difficult task because it is an unobserved variable. Economists have continued vigorous but never ending exercise to estimate accurate output gap. Accordingly, there are several ways of estimating the output gap. However, yet no one probably knows which estimate is the correct one, especially in real time. Hence, different technique or model that comes with a different output gap profile should be regarded as one estimate.

The linear trend method is simplest to calculate but it is quite simple statistical detrending without any theoretical foundation. It assumes that potential output grows at constant rate which is not realistic. It also suffers from high end-sample bias. Unobserved components approach requires considerable programming and the results are often sensitive to the initial guesses for the parameters (Cerra and Saxena, 2000). Compared with other multivariate detrending techniques, the structural VAR method relies on clear theoretical

foundations and does not impose undue restrictions on the short-run dynamics of the permanent component of output. In addition, the output gap estimates are not subject to any end-sample biases. However, the main problem with this method is the identification of shocks and the failure to do so may produce misleading results (Cerra and Saxena, 2000).

The HP filter is the most commonly used statistical method because of its simplicity in estimation and the flexibility in tracking the fluctuations of trend output (Cerra and Saxena, 2000). Another conventional approach, the production function approach, has clear advantages over other approaches. It relates inputs to outputs on pure theoretical ground; provides with the estimates of TFP: indicator of aggregate economic efficiency and a central determinants of economic growth; and allows for dealing with different assumption about technology. Moreover, it allows enough flexibility so that policymakers can exercise their judgment about how the key variables will evolve and, therefore, affect growth.

IV. ESTIMATION METHODOLOGY AND DATA

This paper uses these two widely used methods: statistical detrending method represented by Hodrick-Prescott filter and production function approach to estimate potential output and output gap in Nepal. The HP filter estimates potential output by minimizing the sum, over the sample period, of squared distances between actual and potential output at each point in time, subject to a restriction on the variation of potential output. Potential output and the output gaps are estimated by applying the HP filter represented by equation (2) to the annual real GDP series for 1975/76–2008/09⁵. The restriction parameter λ is set at 100, as suggested in the literature for annual time series.

Another conventional method used to estimate potential output and output gap in this paper is the production function approach. This approach provides estimates based on theoretical foundation and information crucial for policy purposes such as TFP, labour share and potential level of factor inputs. Following Konuki (2008), the input-output relationship represented by Cobb-Douglas production function specified in equation (3) of the preceding section is used to estimate potential output and output gaps. Estimating potential output from this method requires identifying full-employment capital and labor input levels, potential TFP, and the labor share.

The data set used for the estimation of potential output are taken from various issues of Economic Survey, Ministry of Finance, Government of Nepal (GON), Population Census, Central Bureau of Statistics (CBS), GON, and Nepal Labour Force Survey, CBS, GON. Consistent data on real GDP are available on annual basis only after 1975/76. Therefore, the data span of the study covers a period of 34 years from Fiscal Year 1975/76 to 2008/09. The time series data on capital stock that are required for applying the production function approach are not readily available. This is the case of most of the developing countries. Following, the empirical literature, a perpetual inventory method was applied to derive required data on capital stock by using data on gross fixed capital formation. Likewise, time series data on labour force employment are also not available.

⁵ Nepali fiscal year begins from 16th July and ends 15th July of the following year.

The Population census conducted every ten year provide data on economically active population only on the ten years interval. Such data available on interval basis were interpolated to come up with annual series. It is also supplemented by data on recent Nepal Labour Force Survey by CBS.

V. ESTIMATION RESULTS AND DISCUSSIONS

Potential Output and Output Gap from H-P Filter

Output gaps using potential output estimated by the HP filter indicate that the Nepalese economy was operating above its potential level reflecting positive output gap before 1979. The positive output gap gradually narrow down in the subsequent years and turned negative by 1979. The negative output gap substantially crosses the one standard deviation band in 1980 as reflected in the large downward swing. Though, the output gap narrowed sharply in the following two years, the negative gap expanded remarkably in 1983 again crossing the one standard deviation band. The negative output gap again crossed the one standard deviation band in 1987. The results indicate that in the decade of 1980s (1981-1990), the actual output fell below the potential level by more than one percentage point in 1983 and 1987. However, the actual output exceeded one percent of potential only in 1985. The output gaps were within the one standard deviation band in the 1990s (1991-2000). However, output gap crossed one percent in 1993, 1994 and 2000. The former year had negative output gap while the later two years characterized by positive output gap. In the period of 2001-2009, there were only four years with less than one percent deviation in actual output from the potential output. However, the gap crossed one stand deviation band only in 2001 in this period.

Fig. 5

Potential Output from HP Filter

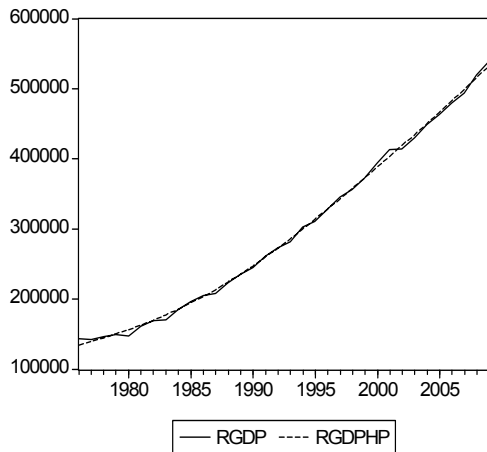
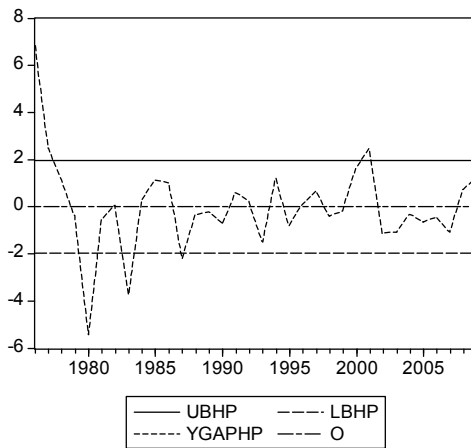


Fig. 6

Output Gap from HP Filter



The observation of actual and potential output in recent years reveals that the output gap were negative during 2002-2007. It reflects that the economy was operating below its

potential in those years. However, some sign of overheating can be observed in 2008 and 2009 as reflected in the positive output gap of around one percent.

Potential Output and Output Gap from Production Function Approach

Since production function approach models potential output as a function of potential labor and capital inputs, as well as of potential total factor productivity (TFP), the estimation of these apparatus is the precondition for estimation of potential output and output gap.

Labour and Capital Inputs

As in the case of many developing countries, all the time series data required for the above specification are not readily available for Nepal. Due to the unavailability of data on actual employment, the data on economically active population is used as a proxy for labour force. The data on economically active population from census and labour force survey, which are available only on interval basis, were interpolated to derive annual time series. The trend underlying the series of economically active population derived by applying HP filter is used as the proxy for potential labor input.

Actual total capital stock, following the literature, is assumed to be equal full-employment capital stock. As in the case of data on employment, the data on actual capital stock are also not readily available. Total capital stock is estimated by applying perpetual inventory method. First, to estimate the initial level of the real capital stock at end-1975, the real gross fixed capital formation in 1975 was divided by the average growth rate of real gross fixed capital formation during 1976–2009⁶. The ratio of real capital stock to real GDP in 1975 calculated in this way is 2.7, which is similar to the ratio estimated in other empirical literature. Second, to get the real value of capital stock after 1976, the following standard formula was applied:

$$K_{t+1} = K_t + I_{t+1} \quad (4)$$

where K is the real value of total capital stock and I is real gross fixed capital formation⁷.

⁶ Reliable estimate of rate of depreciation are not available for which the author is unable to clean series allowing for depreciation while deriving data on capital stock.

⁷ The incremental capital output ratio (ICOR) was found to be 5:1 for the period of 1977-2009 on an average.

Fig. 7

Labour Input

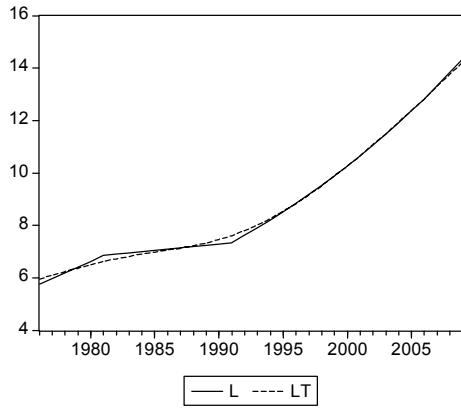
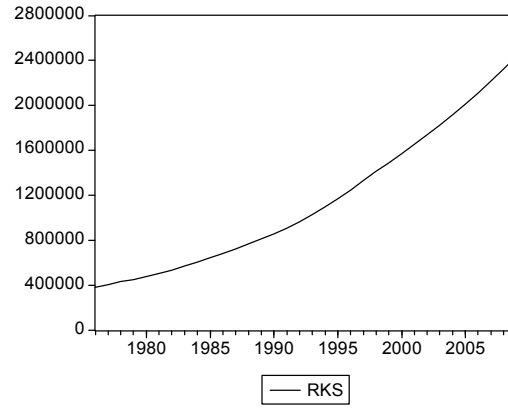


Fig. 8

Real Capital Stock



Total Factor Productivity and Labour Share

The estimation of TFP requires the determination of labour share and share of capital in output. To estimate the labour share, the following form of Cobb-Douglas production function derived from equation (3) is used.

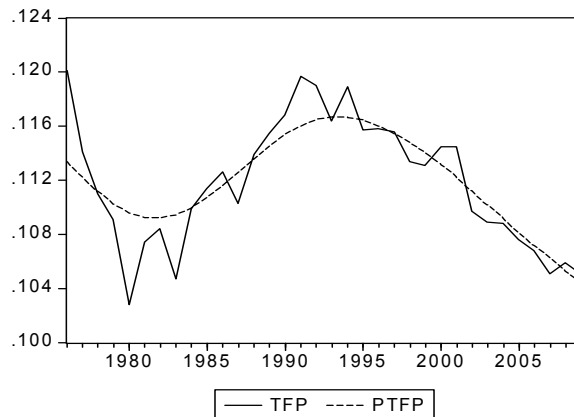
$$y_t = a + (1 - \alpha)k_t \tag{5}$$

where, small case letters y is output per worker and k is capital per worker both in natural logarithms.

The estimation of equation (5) using time series data on actual output per worker and actual capital stock per worker for the period 1975/76-2008/09 yields the estimate of labour share to be 0.42. Then, the actual TFP (A) was calculated by plugging in actual employment, real capital stock, real GDP, and the labor share (α) in equation (4).

Fig. 9

Total Factor Productivity



The trend underlying the actual TFP is assumed to be potential TFP which is estimated by applying the HP filter. The estimated TFP indicates that the TFP is surprisingly low ranging between 0.12 and 0.10. Another interesting outcome is that the TFP is declining continuously in the last decade. TFP reached highest ever of 0.12 in 1991. The estimate also reveals that the TFP was relatively higher in the 1990s as compared to the decade of 1980s and the period of 2001-09.

Potential Output and Output Gap

Potential output was then derived by plugging in the full-employment labor (L^*) and capital (K^*) inputs and potential TFP (A^*) estimated above in equation (3). The plot of the actual output (RGDP) and potential output (PRGDP) derived by using production function approach are presented in the following figure.

Fig. 10

Potential Output from PFA

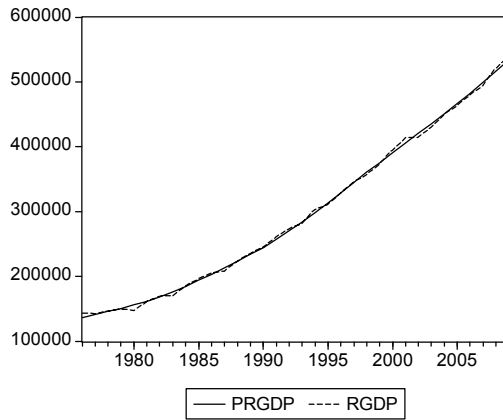
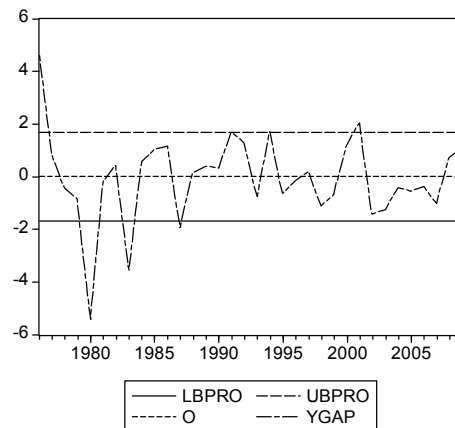


Fig. 11

Output Gap from PFA



The level of potential output derived from production function approach highly correlates with that from previous one⁸. As in the case of HP filter, the output gaps estimate derived from production function approach imply that the Nepalese economy was operating close to potential output with smaller fluctuations in output gap in 1990s and in the period of 2001-2009 relative to 1990s and the period of 1976-1980. The role of agriculture, whose performance depends largely on monsoon condition, was relatively dominant in GDP before 1990s. This is believed to be one of the important factors for such a high fluctuations in output gap before 1990s. The economic liberalization that got momentum in the early years of 1990s helped to weaken the role of agriculture as the share of industry and service sector in GDP increased substantially.

As in the case of HP filter, the results from the production function approach also show large downward swing in output gap in 1980, 1983 and 1987. The negative output gap exceeded the one-standard deviation lower bound with output gap of respectively 5.4 percent, 3.6 percent and 1.9 percent in those years. Similarly, the output gaps in 1976,

⁸ Correlation coefficient was found to be 0.99 for the two series of potential output.

1991, 1994 and 2001 crossed the upper one-standard deviation band. The output gap estimates for the respective years are 4.6 percent, 1.7 percent, 1.7 percent and 2 percent. The observation of the output gaps in the recent years shows that the economy is operating below its potential during 2002-2007 reflected in negative output gap. However, the gaps turn positive in 2008 and 2009. The observation of the results indicates that the economy went through the process of overheating in the last two years; 2008 and 2009 after six consecutive years of demand deficiency. Though the high inflation in the last two years believed to be driven mainly by supply side factors, the results support the argument that the roll of excess liquidity can not be completely ruled out as the monetary expansion was far beyond the target in those years.

A very high degree of correlation (0.93) is observed between output gap estimates from the two approaches. The production function approach was also constrained by statistical detrending to come up with the potential level of inputs and TFP while estimating potential output. Therefore, this outcome is neither just a coincidence nor a surprising event, rather an expected outcome. However, relatively high deviation in output gap from HP filter towards the end samples indicates one of its weaknesses that this method suffers from end sample bias to some extent. The standard deviation of output gaps from HP filter is relatively higher compared to that of output gap from production function approach.

Fig. 12

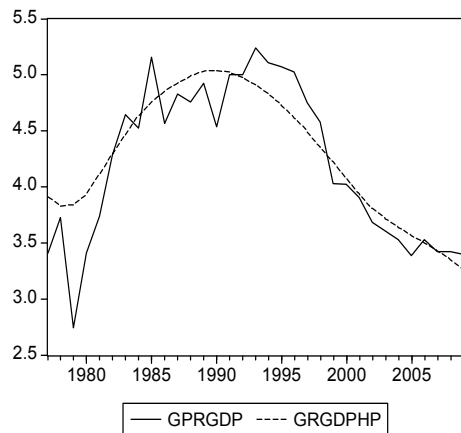
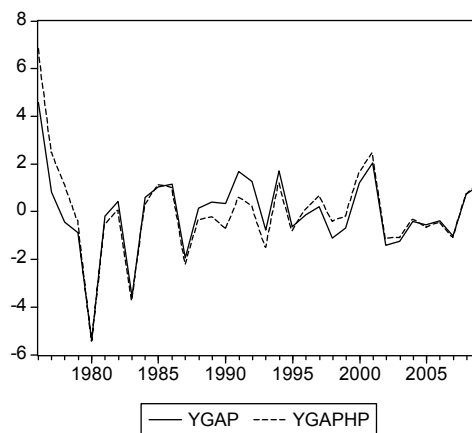
Output Gaps from HP and PFA

Fig. 13

Potential Output Growth from HP and PFA

The potential output estimated by HP filter and production function approach both indicate that the potential output growth is falling continuously especially after mid-1990s. The fall in the growth of potential output is fairly explained by the movement in TFP which also slowed down during this period.

Alternative Medium-term Scenarios of Potential Output Growth

Three different scenarios are assumed regarding growth of TFP and growth of real gross fixed capital formation for the next three years: a) TFP declines as the same 2007-2009 average rate-1.0%; and real GFCF increases by 5.0%, b) TFP growth increases to 1.0%

and real GFCF increases by 10.0%, and c) TFP growth increases to 1.5 and the real GFCF increases by 15.0%. Regarding labour input, it is assumed that the labour force will grow at the same average rate of 2001-2009, 3.8%. Table 1 shows the results for potential output growth rates during the 2010-2012 period, according to each scenario considered.

Table 1: Projected Alternative Medium-term Scenarios

No. of Scenarios	TFP Growth (%)	RGFCF Growth (%)	Growth Rate of Potential Output (%)		
			2010	2011	2012
1	-1.0	5.0	3.5	3.5	3.5
		10.0	3.6	3.7	3.9
		15.0	3.7	4.0	4.3
2	1.0	5.0	5.5	5.5	5.5
		10.0	5.7	5.8	6.0
		15.0	5.8	6.1	6.4
3	1.5	5.0	6.1	6.1	6.1
		10.0	6.2	6.3	6.5
		15.0	6.3	6.6	6.9

Depending upon pair of TFP and RGFCF growth, potential output will grow between 3.5% and 6.9% in the period of 2010-12 period. In the most optimistic scenario, in which investment and TFP are assumed grow by 15 percent and 1.5 percent respectively, potential output growth is likely to grow by 6.3 percent in 2010, 6.6 percent in 2011 and 6.9 percent in 2012 without overheating. However, if TFP and investment growth can't improve from the last three years average, potential output growth will be limited to only 3.5 percent in each next three years.

VI. CONCLUSIONS AND POLICY IMPLICATIONS

Potential output and output gap measurements are an integral part of economic policy formulation. Monetary and fiscal policies both should take into account the development in output gap to attain reasonable economic growth without unwanted inflationary pressure.

The estimated output gaps in this study indicate that the actual output of the economy was below its potential during 2002-2007. This suggests that there was some scope to ease monetary and fiscal policy to stimulate economic growth without the fear of inflationary pressure. However, the situation was contrary in 2008 and further aggravated in 2009 as the economy exhibits sign of overheating reflected in the positive output gap of around one percent. It indicates that monetary policy relaxation is likely to produce inflationary pressure rather than adjustment in national output. This development calls for tighter stance of monetary policy to control inflation.

An important finding of the study is that the potential output growth is falling over the last decade. It indicates the limited scope for GON to run a budget deficit without the fear of inflation. Hence, fiscal policy must also bear in mind the declining potential output growth that the economy has been experiencing.

Since the results indicate limited scope for the use of expansionary fiscal and monetary policies, the focus should be directed at structural issues that would reverse the declining

growth of productivity. The medium term scenarios projected under different assumptions also indicates that high economic growth is not attainable without enhancing TFP. Though the determinants of the TFP and its growth are beyond the scope of this study, some cases can be made from general observation. The capital expenditure of the GON has contracted sharply in the last decade which could have implication for TFP growth because it also influences the productivity of private investment. Therefore, one of such areas could be the reform in the fiscal structure of the government expenditures with a bias towards higher spending in productive investments. It helps to weaken the supply side constraints. Labour market, governance, trade promotion and technology could be the other potential areas for reform. A detail study on determinants of TFP could only precisely point out the necessary reform to revert the slowdown in TFP.

Finally, since uncertainties are inevitable in the estimation of output gap, other additional information especially the developments in field should also be considered while taking policy decisions.

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Appendix 1: Data Set used in estimation of Potential Output and Output Gap

Year	RGDP (Rs. in Million)	RKS (Rs. in Million)	EAP (in Million)	RGDPHP (Rs. in Million)	TFP	PRGDP (Rs. in Million)	YGAP (in %)	YGAPHP (%)
1976	143101	380602	5.77	133923	0.120	136818	4.59	6.85
1977	142628	403240	5.97	139157	0.114	141483	0.81	2.49
1978	146115	429368	6.18	144483	0.111	146755	-0.44	1.13
1979	149453	449118	6.39	150027	0.109	150776	-0.88	-0.38
1980	147473	473921	6.62	155932	0.103	155914	-5.41	-5.42
1981	161439	501174	6.85	162335	0.107	161742	-0.19	-0.55
1982	169385	533054	6.90	169289	0.108	168674	0.42	0.06
1983	170244	568433	6.95	176837	0.105	176505	-3.55	-3.73
1984	185594	603075	6.99	185024	0.110	184496	0.60	0.31
1985	196020	644874	7.04	193828	0.111	194014	1.03	1.13
1986	205239	681584	7.09	203234	0.113	202873	1.17	0.99
1987	208566	722435	7.14	213247	0.110	212667	-1.93	-2.20
1988	223115	763880	7.19	223895	0.114	222780	0.15	-0.35
1989	234681	809399	7.24	235156	0.116	233749	0.40	-0.20
1990	245169	852118	7.29	247002	0.117	244357	0.33	-0.74
1991	260925	904331	7.34	259400	0.120	256584	1.69	0.59
1992	272847	960584	7.62	272299	0.119	269426	1.27	0.20
1993	281394	1025427	7.91	285662	0.116	283548	-0.76	-1.49
1994	303113	1093513	8.20	299458	0.119	298032	1.70	1.22
1995	311147	1166960	8.51	313615	0.116	313148	-0.64	-0.79
1996	328456	1245862	8.84	328095	0.116	328878	-0.13	0.11
1997	345193	1325788	9.17	342838	0.116	344509	0.20	0.69
1998	356275	1408411	9.52	357784	0.113	360286	-1.11	-0.42
1999	372237	1484197	9.88	372899	0.113	374802	-0.68	-0.18
2000	394586	1565573	10.25	388135	0.115	389876	1.21	1.66
2001	413429	1650324	10.64	403434	0.115	405109	2.05	2.48
2002	414091	1735187	11.04	418807	0.110	420026	-1.41	-1.13
2003	429699	1823256	11.46	434360	0.109	435161	-1.26	-1.07
2004	448654	1914205	11.90	450155	0.109	450515	-0.41	-0.33
2005	463165	2005632	12.35	466207	0.108	465768	-0.56	-0.65
2006	480435	2107202	12.82	482515	0.107	482206	-0.37	-0.43
2007	493604	2210714	13.30	499049	0.105	498698	-1.02	-1.09
2008	519574	2320472	13.81	515756	0.106	515754	0.74	0.74
2009	539319	2436703	14.34	532532	0.105	533281	1.13	1.27

RGDP: Real GDP, RKS: Real Capital Stock, EAP: Economically Active Population, RGDPHP: Potential GDP estimate from HP filter, TFP: Total Factor Productivity, PRGDP: Potential GDP estimate from production function approach, YGAP: output gap estimate from production function approach, YGAPHP: Output gap estimate from HP Filter.

Welfare Costs of Inflation in Nepal: An Empirical Analysis

T.P. Koirala, Ph.D.*

This paper empirically examines the welfare losses arising from the currently rising inflation rate of Nepal using the method introduced into the literature by Bailey (1956) and the demand for real balance function put forward by Deaver (1970). Utilizing annual time series ranging from 1973 to 2009, the result obtained here supports the theoretical underpinning that the rise in inflation is leading to decrease in real balance and hence increase in welfare loss. It is also found that the rate of increases in welfare cost as a result of significant rises in inflation is sluggish. Further, the finding also leads one to conclude that the significant fraction of real income as welfare cost in the year 2010 corresponds to other factors affecting real balance rather than anticipated inflation. However, the evidence is consistent with the view that such cost may change under the relaxation of restrictions imposed corresponding to government's motivation in raising inflation tax revenue (seigniorage), investment decisions of the economic agents, inflation uncertainty affecting the behavior of money holders and optimal rate of inflation specified.

I. INTRODUCTION

A central question concerning public policy towards inflation is whether or not the costs of reducing inflation exceed the benefits of the consequent lower rate of inflation. The costs in eliminating inflation are the retardation of economic efficiencies and hence decline in output and employment (Tobin, 1972). The argument is that a small amount of inflation provides a necessary mechanism for lowering real wages without cutting nominal wages (Akerlof, Dickens, and Perry 1996, and Tobin, 1972). Nominal pay cuts are relatively rare (Card and Hyslop, 1996). The cost of reduced output and employment would more than offset the benefits from maintaining price stability (Lucas 1989, 1990, Fortin 1990, Peters 1990, and Scarth 1990). Therefore, the consensus exists among the economists that inflation is costly and bad so that macroeconomic policies should be geared toward its outright control without disrupting economic efficiency (Gavin and Stockman 1988, Gavin 1990, Howitt 1990, Selody 1990a, 1990b, and Hoskins 1990, 1992).

The measurement of the cost of inflation is one debated issue among the economists and the policy makers. The formers base their analysis by examining surplus of real money holders whereas the latters consider the rate of sacrifice of output as a result of stabilizing inflation into desired level (Dowd, 1994). In light of these differentiated approaches, one widely examined cost of inflation is the welfare loss arising from a rise in inflation which leads economic agents to reduce their real money balances. Inflation is said to create welfare loss to the economic agents when they devote more time and energy (increase in

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work and decrease in leisure) to purchase goods and services for any given level of spending so that there is a decrease in utility (Cooley, and Hansen, 1991). Such a cost is known by examining the reduction of real income corresponding to a fall in real balance as a result of inflation.

The argument is that, the level of real money balances depends negatively on the prevailing inflation rate, as the rate of interest must rise *pari passu* with the rate of inflation, which thereby depresses the real demand for money balances (Tower, 1971). A relatively low level of real money balances implies a reduction in the transaction-facilitating services provided by money which hence increases time and energy that must be devoted to purchasing goods and services for a given level of spending. Since this must be at the expense of leisure which is desired by individuals, it follows that higher inflation leads to lower utility level for the individuals and hence yielding higher welfare cost. Therefore, rise in inflation reduces the volume of monetary services and consequently decrease in the welfare of money-holders.

If we think of the benefits that real balances provide as given by the area under the demand curve for money-holders, the loss from inflation can be represented by the reduction in the area under the curve resulting from an inflation-induced fall in real balance holdings (Driffil, Mizon and Ulph, 1990). In the light of the foregoing argument, it is of considerable interest to develop a technique for measuring the magnitude of the welfare cost of inflation. Section II attempts a review of literature on welfare cost of inflation while Section III presents objective and approach of the study. Methodology section is given in Section IV followed by estimation and results of the analysis in Section V. Conclusions of the paper are given in Section VI.

II. REVIEW OF LITERATURE

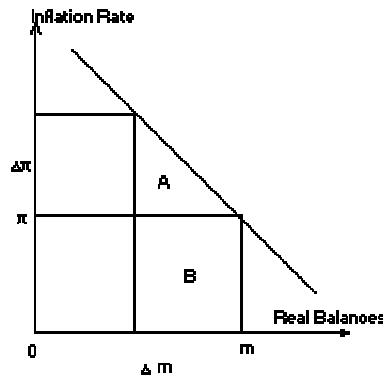
One widely examined cost of inflation is the welfare loss arisen when the anticipated inflation leads economic agents to reduce their real money balances (Dowd, 1994) In examining the cost of inflation, a distinction between anticipated and unanticipated inflation is important (Foster, 1972). Anticipated inflation has no real costs except two qualifications: one is rise in costs of holding currency arising from the inconvenience in making more trips to banks to cash smaller checks than they did before as a result of rise in inflation, popularly known as shoe-leather cost of inflation; and another is rise in cost of holding currency due to menu cost of inflation, that is, additional cost incurred as a result of substitution of old menu printing by new ones due to changes in price quotation (Dornbusch, Fischer and Startz, 2000).

The welfare cost of inflation in the economic system is transmitted via interest rate. The cost to the individual of holding currency is the interest foregone by not holding an interest-bearing asset (McNabb and McKenna, 1990). When the inflation rate rises, the nominal interest rate rises, the interest lost by holding currency increases, and the cost of holding currency therefore increases. The demand for currency accordingly falls that qualifies minimization of utility in holding real balances. Therefore, such a fall in demand for currency holding is associated with rise in inflation and consequent increase in nominal interest rate in the system.

The cost of fully anticipated inflation seems to be small which does not disrupt the functioning of payments system for the economy provided that the rate of inflation is low as well as moderate (Fischer, 1993, Chari, Jones and Manuelli, 1996, Burno and Easterly, 1996, and Barro, 1996). However, the cost of unanticipated inflation is arisen as a result of asymmetry of information, money illusion, long memory of economic agents, lack of rational expectation, etc. that fall on the parties to transactions in credit or resource market, fixed income recipients and taxpayers in general (McCulloch, 1975).

So far as the technique of measuring welfare loss is concern, a popular method is to describe the magnitude of welfare triangle. The welfare loss from inflation can be represented by the reduction in that area resulting from an inflation-induced reduction in real balance holdings, given the benefits that real balances provide represented by the area under the real balance curve.

Figure 1: Inflation and the Demand for Real Balances



As depicted in Figure 1, if inflation rises from π to $\Delta\pi$ it results to a decrease in real balance from m by an amount Δm and hence creating welfare loss represented by the area A+B. Therefore, current-period loss of an increase in inflation is noting that this loss is equal to the inflation-induced fall in the area under the demand curve for real balances. The magnitude of welfare loss is determined by the elasticity of real demand function. If the real balance function is more inelastic, then the welfare loss happens to be small because a significant increase in inflation is associated with relatively small decrease in real balance and hence possesses small welfare loss.

A number of empirical investigations relating to the cost of perfectly anticipated inflation to the holders of real money balances are found in the literature of welfare cost of inflation. The seminal article on the welfare cost of inflation by Bailey (1956) is “The Welfare Cost of Inflationary Finance”. He examined the cost of perfectly anticipated inflation to holders of real money balances in a stationary economy. Bailey also identified the revenue from inflationary money creation which accrues to the government that produces fiat money. This revenue is a transfer from money owners to all households through the government. Therefore, he argued that the social cost or excess burden of an inflation tax is the total cost to money owners less the transfer to government. His analysis is identical to the analysis of the welfare cost of an excise tax.

Using the traditional Bailey approach, Dowd (1994) empirically examined the welfare cost of inflation by means of a semi log model of a demand for real money balance for U.S. economy. The estimated cost of inflation at a rate of zero percent, zero to 5 percent, zero to 10 percent and zero to 20 percent are found to be 0.0043, 0.021, 0.026 and 0.029 percent of GDP respectively. Similarly, for zero to 10 percent inflation rate the estimated welfare loss for the United States are 0.28 percent of GDP according to McCallum (1989), 0.3 percent of GDP according to Fisher (1981), 0.12 percent of GDP according to Lucas (1981), 0.39 percent of GDP according to Cooley and Hansen (1989) and 0.034 percent of GDP computed by Garfinkel (1989). Foster (1972) found such cost as 0.034 percent of GDP at the inflation rate between zero to 10 percent.

However, Feldstein (1979) and Tatom (1976) extended the traditional approach of loss calculation model popularly known as consumption-smoothing model by incorporating the impact of the expected future growth in real balances under liquidity constraints. The results obtained by them showed further increase in the magnitude of welfare loss than those found in earlier studies. If Dowd's (1994) calculation is reexamined by incorporating latter approach, a present-value inflation cost ratio increased to be 0.42 percent of GNP (or \$27.3 billion). He also found that inflation uncertainty (as proxied by the conditional variance of inflation) had no significant impact on output growth.

Instead of Cagan-style semi-log specification of demand for money function, Eckstein and Leiderman (1992) used Sidrauski's (1967) monetary model in estimating welfare loss applying Israeli data. The simulation of the welfare loss function for an inflation rate of 10 percent yielded a current-period welfare loss of about 1 percent of national income. Further, Cooley and Hansen (1989, 1991) Benabou (1991) and Howitt (1990) instigated a distinct quantitative technique to measure cost of inflation arising from reduction of investment with regard to inflation. The effect of capital stock on welfare loss was found to be increased by a factor of 10, which is much more important than the money-holding losses emphasized by traditional studies. Lopez (2000) computed welfare cost of inflation rate of Colombia using Sidrauski (1967) type model and found that welfare loss of inflation equivalent to 2.3 percent of GDP for an increase in the inflation from 5% to 20% and 1.2% of GDP for the inflation ranging from 10% to 20%. He also found welfare loss of around 1.3 percent of GDP when inflation increases from zero to 10 percent in Colombia and Israel.

The assumptions regarding the way that money can enter into the economy will have differential magnitude of welfare cost of inflation. The first assumption is that newly created money is turned over by the monetary authority to the government, which then distributes it to households as transfer payments paid in a lump-sum fashion (McCallum, 1989). In such a situation behavior of households has no influence on the amount they receive and inflation cost is measured with respect to inflation reducing the volume of monetary services and decreasing the welfare of money holders. The second assumption is that the government uses money creation as a source of revenue popularly known as inflation tax revenue. Differential sizes of the welfare cost of inflation are obtained in terms of the interaction of money with fiscal policy.

In light of the foregoing assumptions, Rao (1991) examined two aspects of welfare costs of inflation in India in line with the assumptions described above. Firstly, he examined

the magnitude of welfare loss under the steady inflation reducing the volume of monetary services and decreasing the welfare of money-holders and found just three-tenths of projected National Domestic Product (NDP) as welfare cost of inflation in India. If the government is motivated in inflation tax revenue under the assumption that the government uses newly printed money to finance part of its purchases of goods and services, social cost works out to be approximately 72 paise per rupee earned from inflation tax revenue.

In summing up, the literature examined so far emphasizes two particular welfare costs of inflation: the costs of reduced holdings of real balances, and the cost of inflation-induced reductions in investment. The most conservative estimates suggested cost ratios ranging from 0.026 to 0.39 percent of national income for the inflation rate ranging zero percent to 10 percent. The cost of inflation arising from reduction of investment found to be increased by a factor of 10. Using a Sidrauski (1967) monetary simulations model, current-period welfare loss rose to 1 percent of national income. Lopez (2000) found that welfare loss of inflation equivalent to 1.3 percent of GDP for an increase in the inflation from zero to 10 percent for Colombia. Rao (1991) found just three-tenths of the projected National Domestic Product (NDP) of India as welfare cost of inflation in terms of money holdings and social cost equivalent to two-third of inflation tax revenue. In the light of the foregoing reviews of literature, this paper has set following objective to measure the welfare cost of inflation in Nepal.

III. OBJECTIVE AND APPROACH OF THE STUDY

The objective of this paper is to estimate the magnitude of welfare cost of inflation in Nepal on different rate of inflation corresponding to the reduction of volume of monetary services and hence decrease in the welfare of money holders. Estimation is undergone with the assumption that the newly created money is distributed to households as transfer payments paid in a lump-sum way (McCallum, 1989) as against the interaction of money with fiscal policy shocks of the government and investment decisions of the economic agents affecting the behavior of money holders. Estimation under such topic in the context of developing country like Nepal is a first attempt and lacks sufficient literature. This study has been undertaken under the assumption that there is prompt adjustment of expected and contemporaneous rate of inflation (Koirala, 2008). In the light of said assumption, the welfare cost of inflation calculated in this paper is based on the view that inflation expectation is anticipated.

IV. METHODOLOGY

The methodology of estimation that is adopted in this paper is in line with the technique introduced into the literature by Bailey (1956). An examination of welfare costs of inflation is conducted utilizing the demand for real money balance function estimated, where the latter function is estimated by employing Deaver's (1970) model that it assumes that the demand for real balances $(MD/P)_t$ depends upon the actual rate of inflation (π_t) and real income (Y_t) . The cost of inflation is assumed to be the fall in real income corresponding to the decrease in the area of real balance due to an increase in

inflation. Since this analysis assumes money market equilibrium, demand for money is deemed equal to supply of money.

Secondary data are used in the analysis. Annual time series ranging from 1973 to 2009 consisting of 36 observations are taken for the analysis. The main sources of data for the present study are Quarterly Economic Bulletin of the Nepal Rastra Bank (the central bank of Nepal), Various Economic Survey of the Government of Nepal (GON), Ministry of Finance, International Financial Statistics, etc. The coefficients of regression equation of the model are estimated by using Ordinary Least Square (OLS) method. If required, variables are transformed to logarithm before running regression to eliminate variability of the variables so as to interpret estimated coefficients as elasticity coefficients. ARIMA (p,d,q) terms as well as dummy variables are introduced in the demand for real money balance equation to make resultant systematic residuals white noise so that the coefficients are made unbiased and consistent.

V. ESTIMATION AND RESULTS OF THE ANALYSIS

An analysis of the phases and amplitudes of inflation business cycles is an important issue for the formulation of macroeconomic policies in general and monetary policy in particular. Economic fluctuations turn into a severe problem in the absence of stabilization policies. The inflation business cycle of Nepal as shown in Figure 1 has completed one cycle followed by an inflationary phase at present. However, inflation behaves downward trending over the long run with least square growth rate of 8.5 percent per annum as depicted in Figure 2.

Figure 1: Business Cycle of Inflation
(1973-2009)

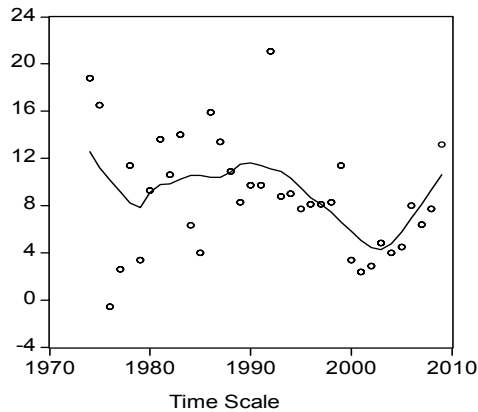
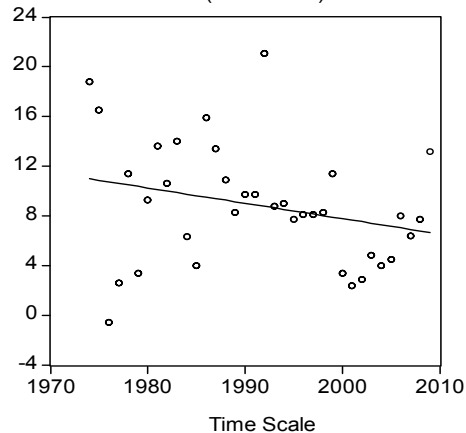
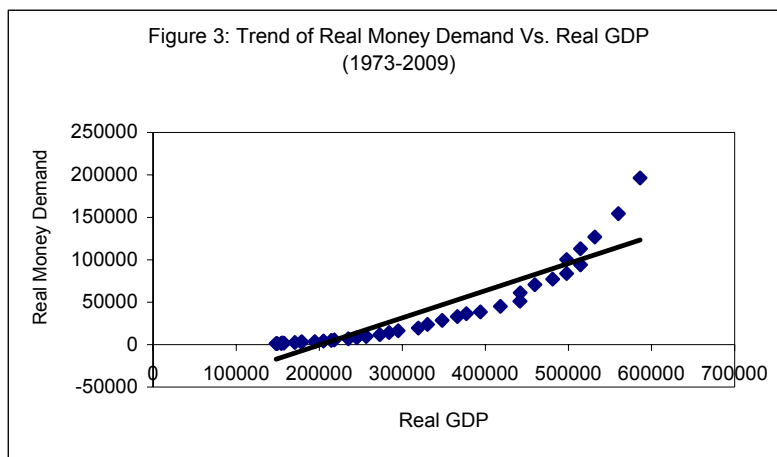


Figure 2: Linear Trend of Inflation
(1973-2009)





Sources: Nepal Rastra Bank

The fluctuation of inflation cycle leads to the determination of the shape of other macroeconomic variables such as real demand for money, real income, etc. and hence motivates policy-makers to choose appropriate counter-cyclical policy measures. In light of these discussions, there is need to examine costs of inflation for academic and policy interest.

The degree of welfare cost of inflation in a macroeconomic perspective is obtained by deducting the loss of real income incurred as a result of rise in inflation from total real income of an economy. However, this loss is proportional to the decrease in holding of real balances due to a specified increase in inflation. The first part of the analysis is to estimate the demand for money function. The latter function is subsequently applied to obtain real balance as a result of rise in inflation from zero and the rate projected for the year 2010. Lastly, welfare loss is worked out utilizing method of definite integrals between the limits of real balances as specified by different rates of inflation.

An econometric exercise is carried out to derive magnitude of welfare loss arising from the currently rising inflation rate in Nepal. For this purpose, use is made up Deaver's (1970) model that assumes that the demand for real balances (M^d/P) depends upon the actual rate of inflation (π) and real income (Y). It is given by:

$$(M^d/P) = AY^\alpha e^{\beta\pi} \quad (1)$$

where, α is the income elasticity of demand for real balances and $-\beta$ is the elasticity of demand for real balances with regard to inflation. Here e represents the base of all natural logarithms. A slight simplification of the money demand function presented in equation (1) represents the quantity of real balances demanded as a function of the rate of inflation, for a given level of real income as follows:

$$\ln(M^d/P)_t = \delta + \alpha \ln(y)_t - \beta\pi_t + \varepsilon_t \quad (2)$$

Where, α and β are coefficients of real income and price elasticities of demand for real money balance and δ is constant term. Using annual data over the 36 years from 1973 to 2009, I estimated following money demand function, whose theoretical form is suggested by equation (1), for the Nepalese economy:

$$\ln(M^d/P)_t = -12.6940 + 1.4543 \ln(y)_t - 0.0029 \pi_t + 0.5479 AR(1) + 0.5657 MA(1) \quad (3)$$

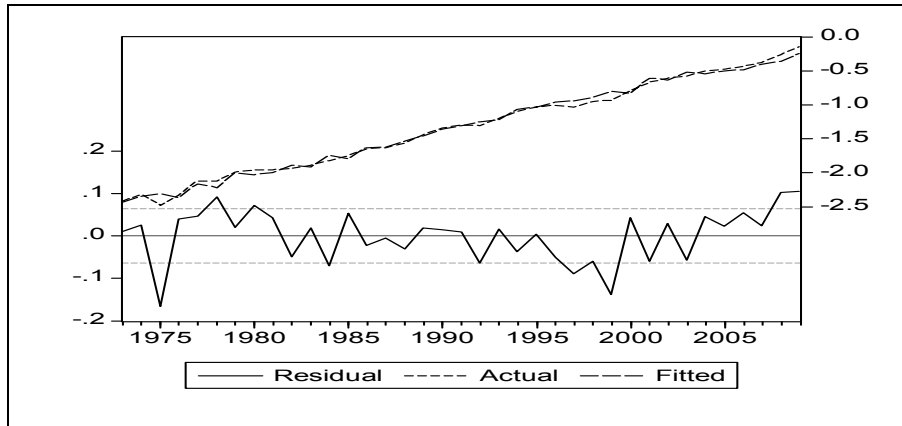
(-13.93) (20.23) (-1.50) (2.72) (2.17)

$$\bar{R}^2 = 0.9917, \quad DW = 1.967, \quad S.E.\ln(M^d/P)_{y,\pi,ARMA(1,1)} = 0.060, \quad S.E.\ln(M^d/P)_t = 0.66,$$

$$F = 1044.683$$

The estimated coefficients of demand for real money balance as presented in equation (3) are found to be statistically significant at 5 percent level except coefficient of inflation that is significant at 10 percent level. The signs of the coefficients are in line with theoretical plausibility, that is, demand for real money balance is positively related to real income and negatively to inflation rate. Very high \bar{R}^2 , acceptable level of DW statistics, $S.E.\ln(M^d/P)_{y,\pi,ARMA(1,1)} < S.E.\ln(M^d/P)_t$ with the incorporation of $ARIMA(1,0,1)$ are the valid statistical criteria for the robustness of the model. The residuals of the model behave almost white noise, as shown in Figure 4, employing predictive capacity of the model.

Figure 4: Actual, Fitted and Residual Graph of Real Money Demand Function
(Sample: 1973:2009)



Source: Derived from Equation No (3)

As explained at the beginning paragraph of this section, the next step of analysis is to calculate welfare cost of inflation utilizing estimated demand for real balance given in equation (3). Now assuming that real GDP (at 2000/01 price) grows at a 5 percent rate in

2010, the level of real income is projected at Rs.615.55 billion. Substituting $y = 615.55$ in equation (3) yields:

$$\ln(M^d/P)_t = 3.3538 - 0.0029\pi_t \quad (4)$$

It implies that the calculated welfare loss will be expressed as a fraction of this income level in 2010. Now the value of real money balances at a zero inflation rate $(M^d/P)^0$ is obtained by setting $\pi_t = 0$ in equation (4), this yields:

$$\ln(M^d/P)^0 = 3.3538 \text{ or } (M^d/P)^0 = 28.6113 \quad (5)$$

Let it be assumed that the inflation rate in 2010 would be 7.5 percent based on percentage change of the Urban Consumer Price Index of Nepal (Budget Speech of Fiscal Year 2009-2010). Thus, the level of real money balances $\ln(M^d/P)^1$ with a 7.5 percent inflation rate is obtained by setting $\pi_t = 7.5\%$ in equation (4). This yields:

$$\ln(M^d/P)^1 = 3.3035 \text{ or } (M^d/P)^1 = 27.2076 \quad (6)$$

In order to compute the welfare loss (L) resulting from this fall in real money balances because of inflation, let it be rewritten equation (4) in terms of the inflation rate, i.e.

$$\pi = 1156.4344 - 344.8275 \ln(M^d/P)_t \quad (7)$$

and then evaluate its definite integral between the limits defined in equation (5) and (6), i.e. $(M^d/P)^0 = 28.6112$ and $(M^d/P)^1 = 27.2076$:

$$L = \int_{27.2076}^{28.6112} [1156.4344 - 344.8275 \ln(M^d/P)] d(M^d/P) \quad (8)$$

The computation yields:

$$L = 1156.4344 \int_{27.2076}^{28.6112} d(M^d/P) - 344.8275 \int_{27.2076}^{28.6112} \ln(M^d/P) d(M^d/P) \quad (9)$$

$L = 1623.2869 - 1611.2825$, $L = 11.9457$ billion.

Thus the social cost at 7.5 rate of inflation and Rs. 615.55 billion real income projected for the Nepalese economy in 2010 is about Rs.12 billion.. The calculated cost yields to be 1.94 percent of real income, which accounts to be a significant fraction. The welfare losses corresponding to different ranges of inflation are presented in Table 1.

Table 1: Welfare Loss at Different Rates of Inflation
(1973-2009)

Inflation Rate	Antilog $(M^d/P)^0$	Antilog $(M^d/P)^1$	Welfare Loss (Rs in billion)	Projected real income for 2010	Percentage of loss to real income
0%-5.0%	28.6113	27.2131	11.8038	615.55	1.92
0%-7.5%	28.6113	27.2076	11.9457	615.55	1.94
0%-10%	28.6113	27.2023	12.0866	615.55	1.96
0%-13%	28.6113	27.1941	12.1826	615.55	1.98
0%-15%	28.6113	27.1887	12.3213	615.55	2.00

Source: Author's Calculation

Though an inverse relationship is found between inflation and real balance and positive relationship between inflation and welfare loss, the increases in welfare loss as a result of different ranges of inflation are less significant. As the result presented in Column 4 of Table 1, the welfare cost increased only from Rs.11.80 billion to Rs. 12.32 billion as a result of a significant rise in inflation from the range 0%-5% to 0%-15%. However, the extent of welfare cost of inflation as depicted in the analysis depends critically on the elasticity of real balance curve and use of newly created money by the government. The welfare cost of inflation is subject to change under the explicitly introduction of the government's fiscal policy shocks and investment decisions of the economic agents into the behavior of money holders.

VI. CONCLUSION

This paper carries out an econometric exercise to obtain welfare cost of inflation in the context of Nepalese economy utilizing annual time series data ranging from 1973 to 2009. Consumer surplus approach used here for the analysis supports the view that a rise in inflation leads to decrease in real balance and hence increase in welfare loss. A sluggish rate of increase in welfare cost as a result of a significant rise in inflation lead one to conclude that welfare loss is less responsive to anticipated inflation. A significant fraction of real income as welfare cost, as the cost accounts to be Rs. 11.95 billion out of projected real income of Rs. 615.55 billion (i.e., 1.95 percent of real income) in the year 2010, corresponds to other factors affecting real balance rather than anticipated inflation. In view of the calculated welfare cost of inflation utilizing relatively inelastic real balance curve as found in this paper, the aspire of mobilizing the amount of inflation tax revenue received by the government may not be a good policy options provided that such tax is determined by the product of inflation rate and real money base. However, the magnitude of welfare loss examined here depends critically on the degree of welfare loss owing to inflation-induced investment risk and motivation of the government to raise inflation tax revenue by printing new money independent of central bank's policy objectives, which are not dealt in this paper. Thus, the extent of welfare cost of inflation corresponding to an optimal rate of inflation has opened an avenue for the further research in this area.

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