CHAPTER - 1
INTRODUCTION

1.1 Introduction:

The decade of 1970s brought in a turning point in the realm of international economics and finance. The Bretton Woods System broke down and flexible exchange rate system replaced the fixed exchange rate system in 1970s. Determination of exchange rates became the centre-price of deliberations in international economics while the management of balance of payments became almost a non-entity. Consequently, attention of economists was diverted from the Balance of Payments problems to issues relating to exchange rate dynamics. Variability of major world currencies in early seventies drew the attention of economists and they proceeded to provide theoretical explanations for such empirical phenomena. Consequently, over the last three decades a large number of theories on exchange rate grew up. On the other hand, the issues of dynamic adjustment of balance of payments were relegated to the background.

The important theories of exchange rate, developed during the last three decades which excited the imaginations of economists include *Purchasing Power Parity Theory, Portfolio Balance Model, Asset Market Model, Covered and Uncovered Interest Parity Theories, Currency Substitution Theory and Monetary Approaches to Exchange Rate (MAER) Theory.*

The most exciting feature of this period is the growth of renewed interest of economists in the '*Purchasing Power Parity Doctrine*'. As a matter of fact, '*Purchasing Power Parity*' is almost an invariable ingredient of the macroeconomic models of exchange rate whether by itself or in combination with other equilibrium conditions. Thus the '*Purchasing Power Parity Theory*' has emerged as an influential theory of the determination of the exchange rate since 1970s.

The *'Purchasing Power Parity Theory'* is theoretically attractive no doubt. But the empirical support for PPP is mixed. Some authors find in favour of PPP, while others do not. Yet the research on PPP is extensive. That so much research has been reported on this subject indicates, in past, a reluctance to reject PPP, at least in the long-run. The present study is an attempt in this direction with an objective of examining how far the Rupee/Nepalese rupee exchange rates conformed to the *'Purchasing Power Parity Doctrine'* over the period 1976:1-2006:1.

1.2 Purchasing Power Parity: Meaning, Importance in International Trade

1.2.1 Purchasing Power Parity: Meaning

Purchasing Power Parity states that prices of the same good in different countries with their own currencies should be the same when the domestic price of the good is converted to a common currency. Thus *PPP theory* establishes the *'Law of One Price'*(LOOP) across trading nations.

1.2.2 Absolute PPP: Single Good Case

If there was just one internationally traded good with domestic and foreign prices, p_{1t} and p^*_{1t} respectively, then the *PPP exchange rate* (e_t) is

$$e_t = \frac{p_{1t}}{p^*_{1t}} \tag{1.1}$$

This is the Absolute Version of PPP (APPP).

1.2.3 Absolute PPP: Multiple Good Case

When there are multiple goods, PPP states that the nominal exchange rate at time t, E_t, should be equal to the ratio of domestic price level (index) P_t to the foreign price level (index) P^*_t such that

$$e_t = A\frac{P_t}{P^*_t} \tag{1.2}$$

with A = 1,

$$e_t = \frac{P_t}{P^*_t}$$

and this is also known as the *Absolute Version of PPP (APPP).*

1.2.4 Relative Purchasing Power Parity(RPPP):-

If $A \neq 1$, then this is the Relative Version of PPP (RPPP). Even if $A \neq 1$, RPPP indicates that the elasticity of nominal exchange rate with respect to relative price is unity. In such case, 1% change in the ratio of price indices in the home and overseas countries will lead to 1% change in the nominal exchange rate.

Now let $A \neq 1$, Then from equation (1.2) we get

$$\log E_t = \log A + \log p_t - \log p^*_t$$

Differentiating with respect to t,

$$\frac{1}{E_t}\frac{dE_t}{dt} = \frac{1}{p_t}\frac{dp_t}{dt} - \frac{1}{p^*_t}\frac{dp^*_t}{dt}$$

$$\text{or } \dot{E}_t = \dot{\pi}_t - \dot{\pi}^*_t \tag{1.3}$$

$$\text{or } \dot{\pi}_t = \dot{E}_t + \dot{\pi}^*_t \tag{1.4}$$

where $\dot{\pi}_t$ and π^*_t are the inflation rates at domestic and foreign countries respectively.

Equation (1.4) states that the home country's inflation rate ($\dot{\pi}_t$) will be equal to the sum of the inflation rate π^*_t and the rate of currency depreciation. Again equation (1.3) states that rate of domestic currency depreciation equals the rate by which domestic inflation rate exceeds that in the foreign country.

Thus the Relative PPP Hypothesis basically states that *one country's inflation rate can only be higher (lower) than another's to the extent that its exchange rate depreciate (appreciates).*

It may be noted that APPP holds when A = 1. In such case also equation (1.3) and (1.4) hold. In that case

$$\log E_t = \log A + \log p_t - \log p^*_t$$

$$or \log E_t = \log p_t - \log p^*_t \quad [\text{ since } \log 1 = 0\ ] \tag{1.5}$$

Differencing with respect to t, we have

$$\frac{1}{E_t}\frac{dE_t}{dt} = \frac{1}{p_t}\frac{dp_t}{dt} - \frac{1}{p^*_t}\frac{dp^*_t}{dt}$$

$$\text{or } \dot{E}_t = \dot{\pi}_t - \dot{\pi}_t \tag{1.6}$$

Thus whether A = 1 or $A \neq 1$, RPPP Doctrine is always valid. This accounts for the widespread use of RPPP in economic literature.

1.2.5 Real Exchange Rate:

Real exchange rate (RE_t) is such that

$$RE_t = E_t . \frac{P^*_t}{P_t} \tag{1.7}$$

It is the ratio of the foreign price level, converted to domestic currency units, to the domestic price level.

If $RE_t > 1$, the domestic currency is *undervalued.*

If $RE_t < 1$, the domestic currency is *overvalued.*

If $RE_t = 1$, domestic currency is *just valued* and APPP holds.

However, in RPPP case the real exchange rate is constant and any changes in domestic and foreign price level must be matched by an exactly compensating movement in the nominal exchange rate.

Given equation (1.7) we have

$$\log RE_t = \log E_t + \log p^*_t - \log p_t \tag{1.8}$$

Differentiating with respect to t, we get

$$\frac{1}{RE_t}\frac{dRE_t}{dt} = \frac{1}{E_t}\frac{dE_t}{dt} + \frac{1}{p^*_t}\frac{d\,p^*_t}{dt} - \frac{1}{p_t}\frac{dp_t}{dt}$$

$$= \dot{E}_t + \dot{\pi}^*_t - \dot{\pi}_t$$

$$= \dot{E}_t - (\dot{\pi}_t - \dot{\pi}^*_t)$$

$$= \dot{E}_t - \dot{E}_t \quad [\text{ from equations (1.3) and (1.4) }]$$

$$= 0 \tag{1.9}$$

Thus real exchange rate is always constant whether APPP holds or not. In case of APPP, $RE_t = 1$ and in case of RPPP, RE_t is a constant (A) where $A \neq 1$.

1.2.6 Importance of PPP in Economic Theory

Purchasing Power Parity has become an attractive theory of exchange rate on the ground that it has a substantial commonsense appeal. It compares the common currency price of identical goods produced in different countries. In case of difference between such prices, arbitrage would occur leading to the removal of the difference in the common currency price by adjustment in nominal exchange rate so that real exchange rate remains unchanged.

As a matter of fact, a key reason behind the popularity of the PPP as the theory of exchange rate is the possibility of 'arbitrage' in commodities. According to PPP, if an imported commodity, identical to any product produced domestically, can be bought at a price, when converted is cheaper than the domestically produced commodity, then it is possible to make profit by trading in that good. If trading continues, then increased demand would raise the price of the imported goods. Finally, arbitrage will establish the *'Law of One Price' (LOOP).*

1.2.7 Importance of PPP in the Expansion of International Trade:

If APPP or RPPP holds, then real exchange rate will remain constant. Consequently, the change in real exchange rate will be zero. This indicates, if exchange rate once ensures long-run equilibrium for the trading nations, then the real exchange rate will remain constant and '*neutral*'. Consequently, exchange rate movements over time, under PPP, would ensure that terms of trade would not favour any trading partner against another. Thus exchange rates, under PPP, never hinders the growth of trade among participating trading partner nations. PPP, therefore, promotes trade and opens up scope for expansion of trade among trading partners.

1.3 Importance of PPP in Trade Among South Asian Countries:

South Asian Countries have been stressing upon, since 1980s, developing stronger economic and culture relations among themselves. The establishment of SAARC in 1987 was the concrete outcome of such effort. With the passage of time, the members of the SAARC put importance on extension of bilateral and multilateral trade relations among themselves. Consequently, trade practices were liberalized, and trade restrictions in many cases have been removed. Reciprocal lifting of tariffs followed in and trade relations were extended as well as strengthened.

India, as a founder leader of the SAARC, further floated the 'Look East' doctrine in order to usher in growing trade relations with South East Asian Countries also. SAFTA is becoming a reality which opened up a scope for expansion of trade among South and South-East Asian Countries.

India, as a leader of the SAARC and a big partner of trade, could expect flourishing trade relations with other South –Asian Countries provided the terms of trade were 'neutral'. If not, then the argument of 'dominant bias' as propounded in '*Prebisch-Singer Hypothesis*' might crop up. This would be detrimental for the expansion of Indian trade relation with other South-Asian Countries.

This indicates that for the expansion of trade, *neutral 'terms of trade'* in exchange is urgently required and PPP can assure such '*neutrality*' in terms of trade. Consequently,

even in case of expansion of trade among South Asian Countries, quoted exchange rates among currencies concerned are required to conform to the PPP doctrine.

1.4 Importance of PPP in Indo-Nepalese Trade:

Nepal is a land-locked country and a close neighbour of India. Nepal also happens to be one of the closest political allies for India. Trade relation between India and Nepal had existed more than five hundred years before the Christian era began. By the first half of seventh century when the *Lichhavis* were ruling India, Nepal emerged as a country of transit trade between India and Tibet. During the British Period and even to-day the borders between these two countries are open. Nepal depends on India for most of its importables and India is the country of transit trade between Nepal and her other trade partners.

Given these historical, economic and political relations between India and Nepal, it becomes pertinent to see if expansion of Indo-Nepalese trade in desired proportions would be supported by the '*terms of trade*' arising out of the exchange rates quoted between Rupee and Nepalese Rupee.

In 1990-91 the age-old Indo-Nepalese trade-relation, however, suffered a jolt when Nepal insisted on a bulk diversion of trade form India to China. Such a snag in Indo-Nepalese trade was considered unprecedented. This move of Nepal, with some political connotations, was accounted for by *unfavourable terms of trade* which Nepal experienced in her trade with India at this time.

This indicates that the expansion of Indian trade with other South-Asian Countries like Nepal may be possible and viable provided *terms of trade* remain '*neutral*' over time. Herein comes the role of PPP in the fixation of exchange rate of Indian currency (Rupee) vs Nepalese Currency (Nepalese Rupee). If such quoted exchange rates conform to PPP, terms of trade will be *neutral* contributing to unhindered expansion of Indo-Nepalese trade. Therefore, it becomes pertinent for us to examine the system of exchange rate determination in both the countries in the post Bretton Woods System period.

1.5 Exchange Rate Management in India Since 1971

The *Bretton Woods System* broke down in 1971. This paved the way for the worldwide replacement of *fixed exchange rate system* with *flexible exchange rate system.* In December, 1971 Indian Rupee was linked to Pound-Starling. Under *Smithsonian Agreement* of 1971 value of Starling was fixed in terms of US dollar and, therefore, the value of rupee was stable against dollar. However, in September, 1975 the Reserve Bank of India gave up policy of '*Single Currency Peg'* and, instead, value of rupee was pegged to a '*Basket of Currencies.*

The '*Pegged Exchange Rate System'* was given up in 1991 when India moved towards the adoption of the *Market Determined Exchange Rate System. Liberalized Exchange Rate Management System* (LERMS) initially replaced the *Pegged Exchange Rate System* in 1992. Under *LERMS* initially a *Dual Exchange Rate System* was followed.

Under *Dual Exchange Rate System* all foreign exchange receipts of current accounts transaction were required to be surrendered to the authorized dealers for conversion into domestic currency. 60% of the receipts were converted at the market rate while the rest 40% of the receipts were converted at the RBI quoted official rate. The dealers had to surrender the 40% of their purchase of the foreign currencies to the Reserve Bank of India and they retained the rest 60% of the foreign exchange for selling in the free market. The *Dual Exchange Rate System* was replaced by the '*Unified Exchange Rate System'* in 1993. India finally established the era of *flexible exchange rate system.* Rupee became fully convertible on all current accounts transactions in 1994 and with this *fully flexible exchange rate regime* came into force in Indian economy.

1.6 Evolution of Exchange Rate System In Nepal – A Brief History

Nepal was divided into various states until 1769 and these states had their own metallic currencies. Gold and silver coins were used as means of exchange. Nepal was unified into a state in 1769 and since then Nepal did have a single currency. Evolution of Nepal's exchange rate policy began only after the unification of Nepal in 1769. Over a period of 240 years, Nepal moved from having '*no defined exchange rate'* policy to the *market*

determined system. Over this period Nepalese exchange rate system passed through eight different phases as stated below.

i. Phase 1(1769-1834): Floating Exchange Rate System

Prior to the establishment of Nepal Rastra Bank, many foreign currencies along with the Nepalese currency were in circulation in Nepal. The exchange rate between Nepalese currency and any other currency in circulation was determined by market forces. Fluctuations in demand and supply of currencies were reflected in the floating rates. However, these currencies were metallic and their values were based on metallic content. It continued until 1834.

ii. Phase II (1835-1956): Dual Currency System

Nepal experienced dual currency system since 1835 to 1956 when both Nepalese currency and Indian currency were in circulation in Nepal. Indian paper currency was acceptable for heavy transactions. Nepalese currency dominated in Kathmandu while Indian currency was heavily circulated in Terai region close to the Indo-Nepal boarder. However, in hilly regions barter system still prevailed.

iii. Phase III (1957-1959): Pegged Exchange Rate System

Nepalese currency-Indian currency exchange rates experienced extreme volatility between 1951 and 1956. Such volatility had adverse effects on the confidence of Nepalese currency and, thereby, on Nepalese economy. Consequently, the dual system was abolished in 1957 under **Nepal Currency Circulation and Expansion Act.** Since then the Nepalese currency has been in circulation as a *'Single Currency'*. Nepalese currency was then pegged to Indian currency at the fixed rate of 160 NC to 100 IC. This rate was revised several times thereafter.

iv. Phase IV (1960-1973): Dual Exchange Rate Phase

In accordance with the *Bretton Woods System*, Nepal Rastra Bank pegged 1 USD to 7.60 Nepalese currency in 1960. Thus Nepal adopted a **'Dual Pegged System'** when Nepalese

currency was pegged to US dollar (7.60NC= 1USD) and again Nepalese currency was pegged to Indian currency. This period extended from 1960 to 1973.

v. Phase V (1973-1975): Discrete Pegging Phase

After the collapse of Bretton Woods System in 1971, Nepal revised the pegging rates occasionally over the period 1973- 76, between Nepalese currency and US dollar. At the same time exchange rates between Nepalese currency and Indian currency were revised.

vi. Phase VI (1976-1982): Regular Crawling Peg Phase

Between 1976 and 1982 Nepal practiced *Crawling Peg System* with regular revision of *peg rates* of Nepalese currency vis-à-vis US dollar and Indian currency (Rupee).

vii. Phase VII (1983-1992): Basket of Currency Pegging System

Nepal adopted the ***Basket of Currency System*** from 1983. Since June 1, 1983, Nepalese currency was linked with 'Basket of Currencies' which included number currencies with *'trade weights'*. However, the exact composition of basket of currencies had not ever been divulged by Nepal Rastra Bank. Indian currency was also included in the basket of currency. Consequently, Rupee/Nepalese rupee rates also changed on daily basis during this period. This practice continued until 1992.

viii. Phase VIII (1993): Market Determination Phase

Basket of Currency System was discarded in 1992 and Nepalese currency was floated according to the demand for and supply of relevant currencies in the market since 1993. However, the system was '*Managed Float System*' by nature.

1.7 Objective of the Study

The objective of the present study is to investigate into the nature of Rupee/Nepalese Rupee exchange rate variations over the period 1976:1-2006:1 and to examine if these exchange rates were in conformity with the *'Purchasing Power Parity Doctrine'* at all. More specifically, the objective of the study is to examine.

i. the '*stationarity*' and *integrability*' of Rupee/Nepalese Rupee exchange rate and relative price level time series over the period of study.
ii. if any long-run relationship between these variables did exist.
iii. if the long-run relations, in the event of its existence, were 'stable'.
iv. the nature of the causal relationship between the variable concerned.
v. the responses of these variables to different types of endogenous shocks.
vi. how far the causal relationships, if any, remained invariant under the '*frequency domain*' study.

1.8 Chapter Specification

The study consists of the following Chapters.

Chapter 2 presents the survey of relevant literature and provides the theoretical as well as empirical findings on the relationship between exchange rate and relative price level.

Chapter 3 deals with the nature, source of datasets, period of the study and methodological issues.

Chapter 4 is devoted to the study of '*stationarity*' and '*integrability*' of the relevant time series.

Chapter 5 enquires into the *'cointegration'* between Rupee/Nepalese Rupee exchange rates and relative price levels over the period of study. The study on '*Cointegration*' provides a scope for examining if *Purchasing Power Parity Doctrine* were operative during the period of study.

This chapter also presents the identification of two sub-periods in the historical dataset on the basis of structural shift in the relation between exchange rates and relative price level. Consequently, the study of '*stationarity*' and *'integrability'* on the time series concerned for two different sub-periods would be taken up.

Chapter 6 is devoted to examine the existence of long-run relationship between exchange rate and relative price level in two different sub-periods. This involves the study of '*cointegration*' for the confirmation of RPPP in any of the sub-period identified.

The existence of long-run relationship between exchange rate and relative price level in the sub-period 1993:2- 2006:1 will be confirmed.

Chapter 7 presents the study on the *dynamics of short-run shocks* and the *stability* of the long-run relationship between the variables in the sub-period 1993:2-2006:1.

Chapter 8 is devoted to the examination of the long-run relationship between Rupee/Nepalese Rupee exchange rate and relative price level in the sub-period 1993:2-2006:1 through the study of an *Unrestricted Structural VAR Model.* This allows us to examine the nature and direction of *Granger Causality* between the variables concerned over the period 1993:2-2006:1.

Chapter 9 presents the '*Intervention Analysis'* through the study of the *Impulse Response Functions* of the endogenous variables in the *Unrestricted Structural VAR Model.*

Chapter 10 presents the *Intervention Analysis* through the study of the '*Variance Decomposition'* of *Forecast Errors* of the endogenous variables concerned.

Chapter 11 is devoted to the study of the nature and direction of *Granger Causality* between exchange rate and relative price level over the period 1993:2-2006:1 through the study of an appropriate *Restricted VAR Model.*

Chapter 12 presents the *Spectral Analysis* for the confirmation of '*Granger Causality*' between the variables concerned over the period 1993:2-2006:1. Thus the '*Time Domain Analysis'* is being supplemented with the '*Frequency Domain'* study.

Chapter 13 presents the *Summary, Conclusions* and *Policy Implications* of the study.