Chapter 7

Summary, Limitations and Scope for Further Research

7.1 Summary

The primary aim of the thesis was to find a suitable measure of the exchange market pressure under the managed float system of exchange rates in India. In order to do so, the methodology suggested by Weymark (1995, 1998) was used.

The idea behind the measure is that the excess demand for domestic currency (which is the exchange market pressure) is removed by changes in the exchange rate and the money supply. The latter depends upon the monetary policy followed for internal as well as external stabilisation. The exchange market pressure can in principle be measured quantitatively by a statistic formed by combining observed changes in exchange rate and changes in money supply that are explicitly aimed at intervening in the foreign exchange market, including both direct and indirect intervention. In order to arrive at such a measure, changes in money supply have to be converted into equivalent changes in exchange rate. This conversion factor naturally depends upon the structure of the economy, since the effects of the changes in money supply are felt on the exchange rate after they have worked through the other markets in the economy.

With this purpose, a suitable short-run macroeconomic model of the Indian economy was formulated, following a preliminary look at the behaviour of some of the fundamental macroeconomic variables and their inter-relationships. The model has explicitly taken into consideration, both the product and asset markets. It is assumed that output price is determined in the product market, giving up the assumption of purchasing power parity. A Lucas supply function for output was specified. A standard small open economy demand for output function was taken, with real exchange rate and real interest rate as its arguments. The assets considered were money, domestic and foreign bonds. Since capital is only imperfectly mobile across the Indian border, domestic and foreign bonds are not perfect substitutes, because of differing risk characteristics. So the interest parity condition was taken in
an inexact form and only up to a risk premium. The money supply was assumed to
be under the control of the Reserve Bank of India, with a constant money multiplier.
The monetary policy rule of the RBI was set up under the assumption that the
foreign exchange policy takes the form of direct intervention only, and that it is
sterilised. Domestic credit changes, other than those meant to sterilise foreign
exchange reserve inflow, were assumed to be aimed at price and output stabilisation.
The model also assumed that expectations are rationally formed.

An expression for the conversion factor was worked out from the model. This expression depends upon the parameters of the model. So the model was
estimated. The estimate of our monetary policy reaction function shows that price
stability has been a major concern of the policy authority. We also find that sterilization takes place, since the sterilization coefficient has a high value.

The value of the conversion factor was calculated from the estimated
parameters. On the basis of observed changes in exchange rate and official reserves,
this was used to calculate the monthly exchange market pressure and a related index
of intervention activity of the RBI between March 1993 and March 2002. These
figures were then used to analyse the RBI's intervention policies over this period.

The results indicate that the conversion factor has a low value, viz. -0.2583. This suggests that direct intervention in the foreign exchange market can only be of
limited effectiveness to manage exchange rates. Analysis of the actual situation and
RBI's interventions suggests that over this period RBI did manage the exchange rate
volatility, while allowing it to broadly follow the market. RBI seemed to have a
preference for keeping the rupee mildly depreciating, while aggressively controlling
appreciation. However, in crisis periods, it intervened strongly to protect the rupee.
But it relied on both indirect and direct intervention at such times, with direct
intervention being mainly used to relieve the residual pressure after indirect
intervention. It also emerged that building up reserves appeared to be an important
objective of the RBI, especially in the later years. The overall objective of RBI in
the foreign exchange market has been to ensure confidence in the market, and keep
it "orderly" and "calibrated", is reflected from our results.
7.2 Limitations of the Study

The EMP and IIA measures we have derived are specific to the structural model used. As such the measures are only as credible as the underlying model. The model we used is a fairly standard open economy model, commonly used in the literature. However the model has certain limitations in the Indian context.

The first concerns the specification of the product market. Given the structural milieu of the Indian economy and its rigidities, it is difficult to defend the Lucas supply curve and the market clearing assumption. An alternative may be to use a Keynesian specification or a Mundell-Fleming type of model, where output is demand determined, and which allows for unemployment.

When we deal with money market equilibrium, it is assumed that money multiplier is constant. This is done to simplify the estimation process, particularly of the reaction function of monetary policy. However, during the sample period 1993 to 2002 there has been steady reduction in CRR and market oriented financial sector reforms have contributed to financial innovation, bringing changes in the proximate determinants (currency to deposit ratio, and reserve to deposit ratio) of money multiplier. The changes in money multiplier could strengthen or dampen the effect of money market and foreign exchange intervention on money market liquidity or the exchange rate and thereby on the measure of EMP. In the extreme case, it could even change the sign of the EMP measure. For example, even if the RBI was selling reserves to alleviate the downward pressure on the rupee, if the money multiplier were to increase sufficiently, money market liquidity might increase and exert further downward pressure. In addition, the growing fiscal deficit in India has contributed to the endogeneity of money supply process. Hence, it may be untenable to assume that money supply is a policy determined variable.

We have also specified a monetary policy reaction function that incorporates only price and output stability. In other words, we have assumed that monetary policy to attain exchange rate stability consists only of direct intervention in the foreign exchange market. If indirect intervention also takes place, it should be incorporated into the policy reaction function. Ignoring it would result in biased
estimates of parameters of policy reaction function, which would in turn result in erroneous measure of exchange market pressure. In this context, the role of sterilisation and indirect intervention needs to be closely examined.

The monetary policy reaction function has been defined to show that policy reacts to deviation of actual output from its potential level. Estimation of potential level of output for a developing country like India is misleading, because the method involved in deriving the potential output takes into account the information available in the actual output, which is always far below the natural rate. Therefore, output stabilisation policy might be the right one at the trough of the cycle, but it will be the wrong policy at the peak of the cycle.

Further limitations come from the data. In the estimation process, we have used index of industrial production as a proxy for income due to non-availability of monthly time series on income. As the industrial output constitutes only around 25 per cent of our GDP, using this as a scale variable in the demand for money function tends to underestimate the income elasticity or overestimate the interest elasticity of demand for function. For instance, in the present study, the income elasticity turns out to be 0.08 in the demand for M3 money stock, whereas empirical studies using GDP as scale variable reports elasticity around 1.5 for M3 money demand. This will inflate the errors in the measure of the EMP. The results from the supply and demand for output will suffer for the same reasons.

Finally it should be mentioned that the model itself is valid for a stable economy, where there are no shocks in the financial market. So the conversion factor, and hence the EMP measures obtained may not capture the pressure in the exchange market when the economy is subject to shocks like a speculative attack or any other financial crisis.

7.3 Scope for Further Research
Since the EMP and IIA measures are model dependent, it would be interesting to see how sensitive they are to changes in the underlying model. This could be done by deriving and calculating EMP and IIA for different model specifications and carrying out a sensitivity analysis. Further, if the potential use of these measures in
applications is identified, then the relative performance of the alternative measures may be evaluated.

Within the present model itself, a forecasting exercise can be carried out. This will provide potential information to the policy makers in advance.

The structural model framed in this study assumes parameter constancy hence, constant conversion factor. One can reformulate the model where parameters are time varying. The econometric methods such as time varying parameter estimation or Kalman Filter estimation can be used to derive the time varying conversion factor which would capture the dynamic changes in the financial markets.