EXPLORING THE LINK BETWEEN EXCHANGE MARKET PRESSURE AND MONETARY POLICY IN ETHIOPIA[1]

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Abstract

Entrusted with the responsibilities of maintaining exchange rate stability, the central bank Ethiopia, namely, the National Bank of Ethiopia (NBE) has paid more attention to the maintenance of exchange rate stability in the formulation and implementation of monetary policy during the past years. These considerations often prompted the NBE to intervene in the foreign exchange market so as to influence exchange rate developments.

A recent study that estimated an index of the Exchange Market Pressure(EMP) for Ethiopia over the period November, 2001 to December, 2005, on the other hand, reveals that in majority of the cases (in 42 months out of 49 months considered) the Ethiopian foreign exchange market was characterized by depreciation pressures (Abebe, 2006). According to a monetary model of exchange market pressure, an increase in domestic credit (expansionary monetary policy) will increase the EMP by decreasing foreign reserves, or by causing a depreciation of the exchange rate, or some combination of the two (Kim, 1985).

The objective of this study is, therefore, to examine empirically the existence of such link between EMP and monetary policy in Ethiopia using the Girton-Roper monetary model of exchange market pressure and VAR technique. The result of the single equation model reveals that measure of the stance of monetary policy, i.e domestic credit growth, has a significant and positive impact on EMP. The VAR test provides further evidence supporting the claim that domestic credit has a positive impact on exchange market pressure. The estimated impulse response function (IRF) as well indicates a positive response of EMP due to a shock in domestic credit, implying that an expansionary monetary policy increases EMP in line with the traditional theory.

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1. Introduction

The level and movements in the exchange rate have been a matter of policy concern for central banks of most countries, including that of Ethiopia, as erratic changes in the exchange rate not only undermine the goal of price stability but also reduce real output, trade, capital flows and investment (IMF, 1984). These considerations often prompt central banks to intervene in the foreign exchange market so as to influence exchange rate developments.

In a free floating exchange rate regime, the total pressure in the foreign exchange market is reflected in observed changes in exchange rate. At the other extreme, in a fixed exchange rate regime, foreign exchange market conditions are completely captured by changes in reserves. But, in mixed exchange rate regimes such as in a managed floating, a part of the pressure is absorbed by a change in exchange rate and a part by changes in reserves. Under such circumstances, neither the reserve changes nor the exchange rate movements capture the extent or nature of the exchange market disequilibrium. This calls for the precise measurement of pressures in the foreign exchange market. The pressure in the foreign exchange market is measured by an exchange market pressure (EMP). It is simply the sum of the percentage changes of international reserves and nominal exchange rate depreciation.

As the exchange rate regime of Ethiopia is characterized as managed floating (the simultaneous adjustment of both exchange rates and reserves), EMP is the appropriate concept for analysis. A recent study that estimated an index of the EMP for Ethiopia over the period November, 2001 to December, 2005 reveals that in majority of the cases (in 42 months out of 49 months considered) the Ethiopian foreign exchange market was characterized by depreciation pressures (Abebe, 2006). A critical issue under such circumstances is the identification of the sources of exchange market pressure in Ethiopia.

A simple monetary model of exchange market pressure states that for a given rate of growth of world prices, real income and the money multiplier, an increase in domestic credit (expansionary monetary policy) will result in an equi-proportionate loss in foreign reserves, or an equi-proportionate depreciation of the exchange rate, or some combination of the two (Kim, 1985). Another study also indicated that a pressure in the foreign exchange market pressure can be contained by tight monetary policy, via controlling domestic credit (Kamaly and Erbil, 2000, Tanner, 2001).

To the best of my knowledge, however, there has been no study conducted so far investigating the impact of monetary policy on EMP in Ethiopia. Previous studies mainly investigated the relationship between exchange rate and monetary policy or the relationship between reserves and monetary policy alone, instead of the relationship between exchange market pressure and monetary policy.

The objective of this study is, therefore, to examine empirically the impact of monetary policy on exchange market pressure (EMP) in Ethiopia. More specifically, this study examine whether expansionary monetary policy contributed to EMP or not. The study also tests empirically how the monetary authority absorbs the pressures in the foreign exchange market. The hypothesis of the study is that domestic credit growth would have a positive and significant effect on EMP. In this study, EMP is measured as the sum of the percentage change of international reserves scaled by the monetary base and the percentage change of nominal exchange rate depreciation. Domestic credit, the domestic component of monetary base, which is considered the variable directly controlled by policy makers, is used as measure of monetary policy.

The remainder of this paper is organized as follows. The next chapter provides a brief overview of the conduct of exchange and monetary policy in Ethiopia. Chapter 3 briefly describes a theoretical model of EMP and reviews an empirical work on exchange market pressure and monetary policy focusing in particular on the Griton-Roper's model of exchange market pressure. Chapter 4 specifies an empirical EMP model for Ethiopia and presents main results. Chapter 5 presents conclusions and policy implications.

2. An overview of the conduct of exchange and monetary policy in Ethiopia

As the central bank of the country, the National Bank of Ethiopia (NBE) is obviously entrusted with the responsibility of maintaining the stability of the exchange rate of the Birr, the country's legal tender currency against other currencies.

Accordingly, during 1970s and 1980s, when the Ethiopian Birr was pegged to the US dollar at a fixed rate, the NBE used to maintain exchange rate stability of the Birr by making available foreign currency to the market at the fixed rate.

Following the introduction of the auction system on May 1, 1993 and the subsequent replacement of the auction system by the daily inter-bank foreign exchange market in October, 2001, demand and supply factors were given more latitude in the determination of the exchange rate. As a result, the NBE acts as a buffer between forces of demand and supply through intervention. Indeed, the NBE has attempted to stabilize the exchange rate through official interventions mainly by varying the amount of foreign exchange it supplied to the market. In effect, pressures in the foreign exchange market are reflected by changes in both exchange rate and reserve holdings of the NBE.

The objectives of monetary policy in Ethiopia are, among others, maintenance of price and exchange rate stability and ensuring the safety and soundness of the financial system, within the broader macroeconomic policy of attaining high level of economic growth. The responsibility of formulation and implementation of Monetary Policy in Ethiopia is vested in the National Bank of Ethiopia (NBE).

A monetary control mechanism in Ethiopia mainly resembles the financial programming approach applied by IMF. This involves establishing a ceiling for the growth rate of money supply on the basis of projected growth rate of GDP and targeted inflation, establishing a floor for international reserves and ceilings for net domestic assets of the National Bank of Ethiopia and net domestic government financing.

With regard to instruments of monetary policy, prior to the commencement of economic reform program in 1992, the National Bank of Ethiopia uses direct monetary policy instruments. The direct control mechanisms include aggregate and individual bank credit ceilings, direct controls on interest rates, including preferential rates for socialized sectors.

Since 1992, the NBE starts to shift its policy orientation towards use of indirect monetary policy instruments. The NBE started to rationalize the structure and interest rates in October 1992, by eliminating discriminatory deposit and lending interest rates. By January 1, 1998, the NBE has totally liberalized the lending interest rates while continued to determine the minimum deposit rate.

In short, the National Bank of Ethiopia controls the supply of and demand for money largely by using the mix of both direct and indirect monetary policy instruments. These include setting a floor rate for saving and time deposits, reserve requirements and open market operations mainly sale of Treasury-bills.

3. Literature review

3.1 The relationship between exchange rate and monetary policy

An exchange rate policy implies a systematic effort on the part of the monetary authorities to influence the level or rate of change of the exchange rate. A variety of policy instruments are potentially available to influence the exchange rate, including foreign exchange market intervention, domestic monetary policy, various forms of controls on international trade and capital flows, and official announcements of future policies (Glick and Hutchison, 1989).

Most attention has focused on either foreign exchange market intervention or domestic monetary policy as the primary instruments available to the central bank in its pursuit of systematic exchange rate policy. In many respects, it is possible to accomplish the same objectives with either domestic monetary policy or foreign exchange intervention policy (Glick and Hutchison, 1989). Domestic monetary policy typically involves a change in domestic monetary base (that is, reserves held by the banking sector plus currency held by the public) brought about by the central bank through the open market purchase or sale of domestic government securities. Un-sterilized foreign exchange market intervention - purchase or sale of foreign currency in the foreign exchange market have also a direct effect on the domestic monetary base. In case of un-sterilized intervention, the central bank changes its net foreign asset holdings through purchases and sales of foreign exchange and allows a corresponding change in its monetary liabilities, that is, the monetary base. Un-sterilized intervention, thus, amounts to using the foreign exchange market to conduct monetary policy in lieu of the domestic financial market.

The exchange rate is often a signal of the stance of monetary policy. For example, in the absence of any other changes in economic circumstances, a weakening of the exchange rate (or upward pressure) may suggest that monetary policy is too loose, relative to policy in the country of the reference foreign currency. On the other hand, a strengthening of the exchange rate, or downward pressure, may suggest that monetary policy is tight.

3.2 Monetary model of EMP

The exchange market pressure model draws on the combination of the monetary approach to the balance of payments and the monetary approach to the exchange rate determination (Younus, 2005).

Following the work of Girton-Roper (1977), different authors (for instance, Kim (1985), Thornton (1995), and Younus (2005)) have developed a simple monetary model of exchange market pressure as follows:-

$$M^d = kPY \quad (1)$$

$$M^s = A(R+D) \quad (2)$$

$$P = EP^* \quad (3)$$

$$M^d = M^s \quad (4)$$

Equation (1) represents the demand for money where P stands for the domestic price level and Y is real income, k is a fraction of nominal income that people want to hold as cash. Equation (2) is a nominal money supply equation. The money supply is the sum of the net foreign assets (R), the foreign component of the monetary base and the domestic assets (D), the domestic component of the monetary base multiplied by the money multiplier, A, where as A=M2/Monetary Base. Equation (3) represents a purchasing power parity condition where E is the nominal exchange rate, which is defined as the domestic currency per unit of foreign currency and P^* is the foreign price level. Equation (4) represents a money market equilibrium identity where money demand equals money supply.

Substituting (1) and (2) into (4) we get

$$kPY = A(R+D) \quad (5)$$

Replacing P by EP^*, we get

$$k(EP^*)Y = A(R+D) \quad (6)$$

In terms of percentage change and rearranging terms, equation (6) can be rewritten as:

$$r - e = -d + p^* + y - a \quad (7)$$

Where, r = the percentage change in international reserves;
e = the percentage change in the nominal exchange rate depreciation;
d = the percentage change in domestic credit;
p*= the percentage change in the foreign price level;
y = the percentage change in domestic real income; and
a = the percentage change in the money multiplier; money multiplier is calculated as the ratio of broad money to the monetary base

Kim (1985) and Thornton (1995) citing the works of Connolly and Silveira (1979), and Shiva and Bahmani-Oskooee (1998) included a variable Q= (e-1/r-1) on the right hand side of the equation to see whether the monetary authority respond to absorb exchange market pressure either by the exchange rate depreciation or reserve depletion. The variable Q is a measure of the way a central bank absorbs exchange market pressure. A significant and positive coefficient of Q implies that the monetary authority absorb more pressure by the exchange rate depreciation, while a significant and negative Q implies that more pressure is absorbed by reserve losses (Younus, 2005). An insignificant coefficient implies that the monetary authority is not sensitive to components of EMP.

3.3 Review of empirical literature

Empirical studies on the interrelations between exchange market pressure and monetary policy can be broadly divided into two categories: single-equation econometric methods and vector autoregressive (VAR) models. Earlier studies mostly used single-equation econometric methods, while a number of recent studies have applied VAR models.

Most of the empirical studies that applied Girton-Roper model of exchange market pressure (Kim 1985, Hallwood and Marsh, 2003, Thornton, 1995) found that there is a strong evidence of a negative relationship between the rate of domestic credit creation and the rates of changes in the exchange market pressure.

Kim (1985) applied a Girton-Roper model of exchange market pressure to the Korean data from March 1980 to July 1983. The regression analysis using the OLS estimation technique shows that there is a strong evidence of a negative relation ship between the rate of domestic credit creation and the rates of changes in the exchange market pressure. The coefficient of domestic credit was -0.699 indicating the fact that as the domestic credit increases by 10 percent, foreign reserve decreases by 6.7 percent or exchange rate depreciates by the same amount. The result also shows that coefficients of foreign prices and domestic real income are positive (0.952 and 0.057 respectively) implying that an increase in foreign prices or real income increases the foreign reserves or appreciates the domestic currency. On the other hand, an increase in money multiplier is found to reduce reserves or depreciate the domestic currency in line with theoretical expectations. The study also indicated that the measure of exchange market pressure does not depend on its composition between foreign exchange and foreign reserves as the variable Q is statistically insignificant. Moreover, the Korean experience indicates that most exchange market pressure is absorbed by adjustments in foreign reserves (as use of r as the sole dependent variable results in overall good fit while use of e alone as the dependent variable results in exceedingly poor fit), reflecting the government's wariness of inflation and of the debt burden effects of exchange rate devaluation.

Thornton (1995) applied the Girton-Roper monetary model of exchange market pressure to the experience of Costa Rica in the period 1986-92. The OLS estimation of the exchange market pressure provide a strong evidence of a negative relationship between domestic credit creation and exchange market pressure (measuring EMP as the sum of r and e, where e is the percentage appreciation (if positive) of the exchange rate). The coefficient for domestic credit, d, is close to its hypothesized value of minus one. The study also indicated that over the sample period, the Central Bank of Costa Rica absorbed most of the exchange market pressure by adjustments in foreign reserves.

Many current works prefer to apply a VAR technique in order to account for the many possible interactions between the variables in monetary models. Tanner (2001) uses a VAR technique to unravel the interrelations between EMP and monetary policy (observable in changes in domestic credit and the interest rate differential) for the cases of Brazil, Chile, Mexico, Indonesia, Korea, and Thailand in 1990-98. He found that monetary policy affects EMP as generally expected: contractionary monetary policy helps to reduce EMP.

Kamaly and Erbil (2000) applied a VAR technique to Turkey, Egypt and Tunisia. There results are somewhat more mixed. They found a strong link between domestic credit and EMP for Turkey. Egypt and Tunisia have used domestic credit and interest rate changes, respectively, as a policy tool in response to EMP shock, but the direction of the response is not clear from the results.

Younus (2005) examined empirically the impact of monetary policy on exchange market pressure (EMP) in Bangladesh using quarterly data from 1976:2 to 2003:1. He applied Engle and Granger's (1987) two-step single-equation error correction model (ECM) and Impulse response functions (IRFs) and variance decompositions (VDCs) derived from a vector error correction model (VECM), to examine the Girton and

Roper's (1977) monetary model of the EMP. The estimated coefficient of domestic credit derived from the ECM shows that domestic credit has a significant and negative impact on EMP. The IRFs and VDCs derived from the VECM also indicate that monetary policy, measured by domestic credit, has a significant and negative impact on EMP. Younus (2005) found insignificant coefficient of Qi , indicating the fact that the monetary authority in Bangladesh responds to EMP by depreciating currency and losing international reserves.

Empirical literatures on Ethiopia mainly focused on the determinants of the real exchange rate (Andualem, 1996, Teferi, 2005, Melesse, 2001). The real exchange rate is hypothesized to be determined by terms of trade, fiscal and monetary policy variables and trade variables. The rate of growth of domestic credit less the lagged rate of growth of real GDP, a proxy for excess supply of credits, was among the monetary variables frequently used in empirical analysis.

An excess supply of credits is found to have a depreciating impact on the real exchange rate (Andualem, 1996, Teferi, 2005) contrary to the expectations of appreciating the real exchange rate. On the contrary, Melesse (2001) found that high level of excess credit would result in the appreciation of the real exchange rate.

4. An application of the EMP model to Ethiopia

4.1 Sources and description of the data

The main sources of the data for this study are NBE's Quarterly Bulletin (various issues) and International Financial Statistics (IFS) data base. The data used in empirical analysis are monthly data spanning from August 1993/94 to December 2005/06.

4.2 Econometric methodology

In order to gauge the impact of monetary policy on the exchange rate, this study estimates two sets of econometric models-single equation regressions and Vector auto regressions (VARs)

4.2.1 Single equation model.

Following the works of Kim (1985), Thornton (1995), and Younus (2005), the empirical formulation of the model is given by the following form:-

$$\ln EMP_t = \beta 0 + \beta 1 \ln DC_t + \beta 2 \ln FP_t + \beta 3 \ln mm_t + \beta 4 \ln SP_t + \beta 5 \ln Q_t$$

Where EMP is exchange market pressure, DC is the percentage change in domestic credit, FP is US inflation (a proxy for foreign inflation), mm is the change in money multiplier, SP is the spread and Q is Q= (e-1/r-1). The variable Q is added to the model to see whether the monetary authority in Ethiopia, namely, NBE respond to absorb exchange market pressure either by the exchange rate depreciation or reserve draw down or both. In other words, it shows the sensitivity of the NBE to the components of the EMP. A significant and positive coefficient of Q implies that the NBE absorbs more pressure by the exchange rate depreciation, while a significant and negative Q implies that more pressure is absorbed by reserves losses. An insignificant coefficient implies that the monetary authority is not sensitive to components of EMP.

The expected sign of β1 is positive as an increase in domestic credit creation is assumed to increase the exchange market pressure through depreciating the domestic currency or reserve losses. For similar reason, the expected signs of β3 and β4 are also positive. On the other hand, the expected sign of β2 is negative, implying that an increase in foreign prices increases the foreign reserves or appreciates the domestic currency, thereby reducing EMP.

4.2.2 Vector Auto Regression (VAR)

Despite its simple appearance, single equation estimation embodies a number of interdependent relations between variables. For instance, when faced with a surge in EMP, the authority may choose to fend such pressures by reducing domestic credit. According to this policy option, the line of causality runs from EMP to domestic credit. Similarly, in case of a bulge in capital flows monetary authority may decide to sterilize these flows by lessening the amount of domestic credit. Here, a fall in EMP following the accumulation of international reserves induces a reduction in domestic credit. Single estimation equation, on the other hand, depicts the opposite direction of causality from domestic credit to EMP. This relation simply states that a lax monetary policy would likely result in a loss in reserves or a depreciation in domestic currency or both spurring a rise in EMP. The interdependence between the variables renders the process of empirically delineating the factors affecting EMP a bit challenging. In order to sift out the reactions of the monetary authority to a rise in EMP, we need to portend the response of domestic credit to a shock in EMP. This, however, can not be accomplished under OLS framework (Kamaly and Erbil, 2000). There are mainly two reasons that justify the use of VAR. First, VAR would enable a researcher to circumvent the endogeinty problems that exist in a single equation. Second, VAR is a very effective tool in portending how this system reacts to a shock in one of its components through impulse response functions (Tanner, 2001).

Following Tanner (2001), this study uses a VAR methodology and focuses on EMP. A key feature of this framework is how monetary policy is modeled. In most recent research works, a monetary aggregate and the interest differential are considered as the policy variable. However, in this study, the domestic credit is considered as the stance of monetary policy.

The VAR system applied in this study takes the following form:-

$$Xt = a0 + a1Xt\text{-}1 + a2Xt\text{-}2 + ... + vt \qquad (1)$$

where X = (δ , EMP,) is a matrix of variables, ai is a vector of coefficients, and vt = (vδ , vE,) is a vector of error terms. A system like (1) permits testing for effects of past values of X on current values. Assumptions regarding the exogeneity of certain variables (like a policy variable) are easily incorporated into a system like (1). To do so, first assume that each element of the error vector vt is, in turn, composed of "own" error terms wt = (wδ , wE,) and contemporaneous correlations with "other" errors. That is:

$$vt = Bwt \qquad (2)$$

where B is a 2 x 2 matrix whose diagonal elements (own correlations) equal one and whose nonzero off-diagonal elements reflect contemporaneous correlations among the error terms.

The ordering of the variables imposes certain restrictions on the VAR model so that the domestic credit growth variable δ is assumed to be the exogenous policy variable. That is, in any period, innovations to δ (i.e., vδ)reflect only the tastes and preferences of the policymaker:

$$v\delta t = w\delta t \qquad (3)$$

Next, shocks to exchange market pressure (vE) contain two elements: the "own" shock (wE) plus one related to innovations in domestic credit:

$$vEt = wEt + b21w\delta t \qquad (4)$$

Thus, wE may be thought of as a shock to the demand for a country's currency, attributable perhaps to changes in investor confidence and sentiment. Thus, b21w$^{\delta}$t represents the portion of shocks to EMP that is contemporaneously correlated with domestic credit growth.

In addition to the contemporaneous relationships shown in equations (3) and (4), impulse response functions (IRFs) summarize the effect of past innovations (i.e., lagged elements of w) to current values of X. Thus, IRFs provide additional ways to evaluate the effect of monetary policy on EMP. IRFs show effects on EMP of both current and past innovations to domestic credit (w$^{\delta}$). The IRFs also provide a policy reaction function: they show effects on current δ of past (but not current) innovations to EMP (wE) .For example, when faced by positive innovations to EMP (for example, a decrease in investor confidence) policymakers may respond "prudently" with contractionary policy (reducing δ).

In brief, the IRFs show the dynamic response of each variable in the system to shocks from each variable in the system. Ordinarily we expect the response of the exchange market pressure to be significant and positive due to shocks to domestic credit. An IRF is significant if its t-statistic exceeds/2/

4.3 Unit root tests of the variables

As this study employs time series data, an analysis of the statistical properties of each variables are essential before proceeding to the estimation of the model. This procedure helps as to identify the problem of spurious regression. A series of Dickey-Fuller unit root tests are conducted to test for the presence of unit root using log level data.

The augmented Dickey-Fuller (ADF) unit root tests suggest that the logs of all the variables are stationary. Consequently, tests for co integration among the variables were not conducted.

4.4 Interpretation of results

4.4.1 Single equation results

The coefficients of the growth rate of the domestic credit and foreign prices appear to be statistically significant with the expected positive and negative signs, respectively. A significant and negative coefficient of foreign inflation implies that an increase in foreign prices decreases foreign exchange market pressure in Ethiopia, either through increase in reserves or appreciating the currency, or both.

The coefficient of money multiplier is with the expected positive sign but not statistically significant, presumably reflecting the offsetting impacts of increases in net foreign assets and domestic credit on exchange market pressure. In other words, increases in net foreign assets would decrease the pressure on EMP while an increase in domestic credit increases EMP. The coefficient of the spread between the parallel and official exchange rate is with a negative sign, contrary to the expectation and is also statistically insignificant. The negative coefficient may indicate the fact that unsatisfied demand in the official foreign exchange market will shift to the parallel market and cause the spread between the parallel and the official market to rise, while an increase in the spread will not immediately result in depreciation of the official exchange rate or in official reserve drawdown. The inclusion of an additional variable, Q, which captures the sensitivity of the NBE to exchange rate depreciation or reserve drawdown, improves the overall fits of the model. The coefficient of Q is negative and statistically significant implying that the NBE absorbs a lion's share of the exchange market pressure by drawdown of reserves rather than exchange rate depreciations.

Table 1: OLS Estimation Results:- Final Output

Independent Variables	Dependent Variables		Q	R^2	Ad.R^2	D-W
	LNDC	LNFP				
	0.93	-0.84		0.13	0.13	1.99
LNEMP	(5.83)	(-2.66)				
	2.564		-1.658	0.31	0.30	2.1
	(8.49)		(-6.81)			

Note: T-statistics in parentheses

4.4.2 VAR estimation results

Table 2 presents the summary results of the VAR test. The Table depicts that 24 percent of the variations in EMP are explained by the VAR system, together with its exogenous variables. The estimated coefficients of DC and MM are with the expected positive sign indicating that increases in both domestic credit and money multiplier raises the exchange market pressure. The coefficient of FP is with the correct sign reflecting the fact that increase in foreign prices would decrease the exchange market pressure largely by increasing foreign reserves. On the other hand, the coefficient of SP was with the wrong sign presumably reflecting the ex-post result of the shift in foreign exchange demand from the official market to the parallel market.

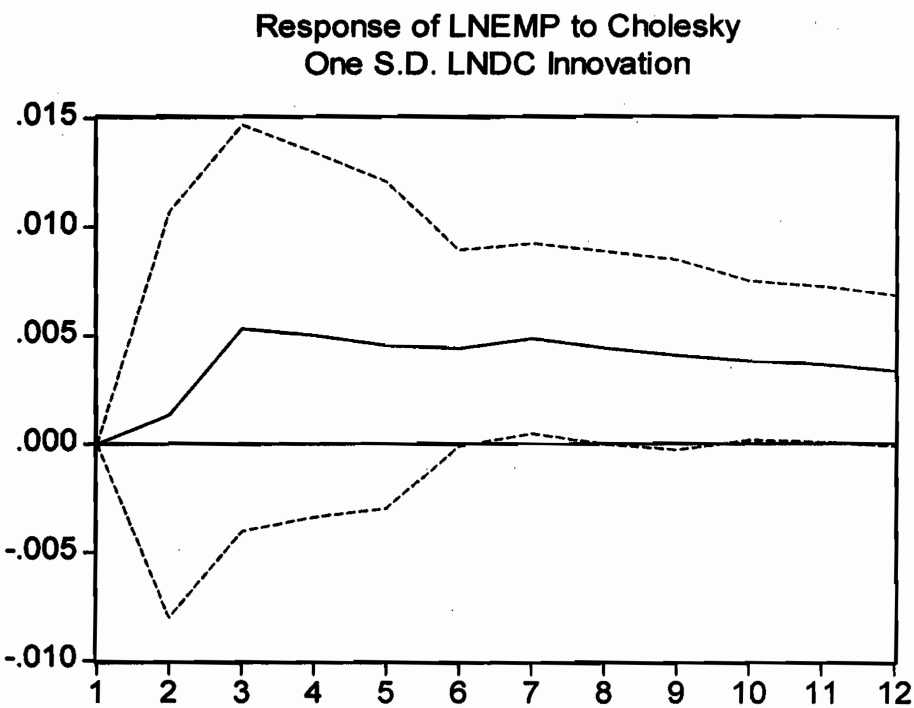
Table 2: VAR Estimation Results

Dependent Variable	EMP	DC
R-squared	0.24	0.01
Adj.R-squared	0.18	-0.06
F-Statistics	4.15	0.16
FP Coefficient	-0.03	0.09
t-statistics	-0.15	1.19
MM Coefficient	0.01	0.02
t-statistics	0.76	2.01
SP Coefficient	-0.06	0.09
t-statistics	-0.43	1.63

Source: Appendix 1.

Domestic credit shocks affect EMP positively as depicted in Fig 1. The positive response of EMP to domestic credit shocks is supportive of the conventional wisdom, where an expansionary shock to domestic credit builds up pressure on EMP, either by reducing reserves, depreciating the currency or some combination thereof.

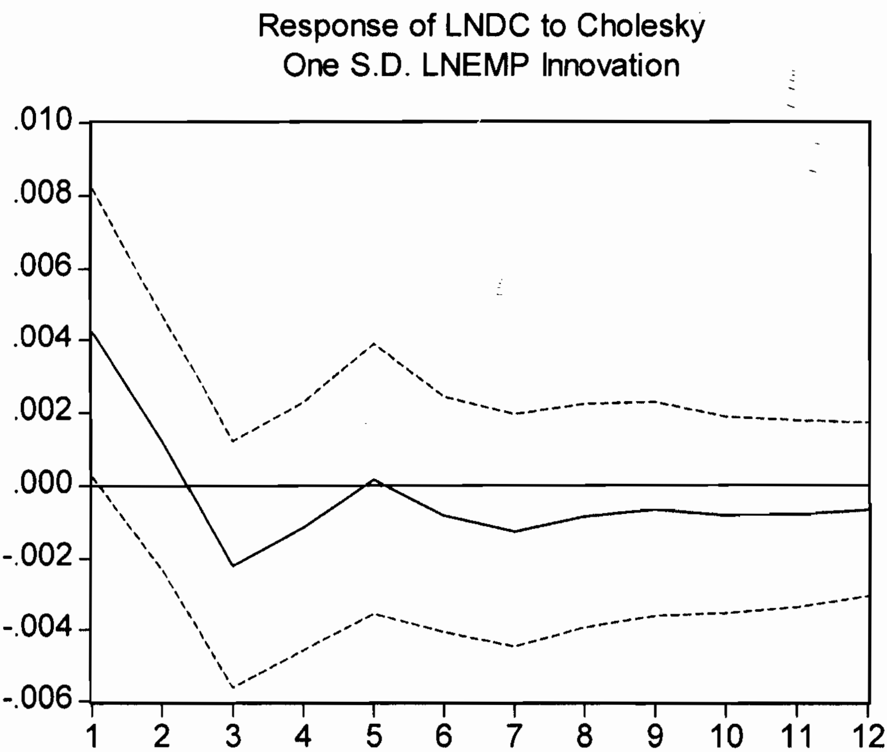
Figure 1: Response of Exchange Market Pressure to Domestic Credit



On the other hand, the domestic credit equation suffers from a low level of overall significance, with F-statistics of 0.15, R-squared of 0.01 and Adj. R-squared of -0.06. This presumably was due to the exclusion of major explanatory variables, such as economic growth and budget deficit.

As a policy reaction function, except in the initial cases, EMP shocks affect domestic credit negatively (though the coefficients are insignificant)(see Appendix 2 and Fig 2). This result suggests that the NBE responds to increased EMP by withdrawing liquidity from the banking system (i.e by contracting money supply). This finding seems plausible given the un-sterilized nature of NBE's intervention in the foreign exchange market.

Figure 2: Responses of Domestic Credit to Exchange Market Pressure



5. Conclusion and policy implications

With the introduction of the auction system on May 1, 1993 and the subsequent replacement of the auction system by the daily inter-bank foreign exchange market in October, 2001, the exchange rate regime of Ethiopia is officially classified as managed floating. Under this regime, the NBE allows some exchange rate flexibility but often intervenes in the foreign exchange market(mainly through sale of foreign exchange) to influence the path of the exchange rate. In such circumstances, neither the reserve changes nor the exchange rate movements capture the extent or nature of the exchange market pressure. Indeed, monetary authorities should focus on the exchange market pressure, rather than on changes in exchange rates or foreign exchange reserves alone (Tanner, 2001).

A recent study that estimated an index of the EMP for Ethiopia over the period November, 2001 to December, 2005 found that in majority of the cases (in 42 months out of 49 months considered), the Ethiopian foreign exchange market was characterized by depreciation pressures (Abebe, 2006). A critical issue under such circumstances is the identification of the sources of exchange market pressure in Ethiopia.

The objective of this study is, therefore, to examine empirically the impact of monetary policy on exchange market pressure (EMP) in Ethiopia using monthly data from August 1993 to December 2005 by applying the Griton-Roper (1977) model of exchange market pressure.

The results of the study should be interpreted with caution as the data used in the analysis are monthly data. The single equation model result reveal that measure of the stance of monetary policy, i.e domestic credit growth, has powerful impact on EMP. Domestic credit has a significant and positive impact on EMP. The coefficient of domestic credit was 0.93 implying that as the domestic credit increases by 10 percent, foreign reserve decreases by 9.3 percent or exchange rate depreciates by the same amount, or a combination thereof. The result also shows that the coefficient of foreign prices is negative (0.83) and significant indicating that an increase in foreign prices increases the foreign reserves or appreciates the domestic currency. On the other hand, the coefficient of money multiplier was positive in line with theoretical expectations (though insignificant). The study also indicated that the monetary authority tend to absorb more of the exchange market pressure by drawing down of reserves as the sensitivity variable Q is statistically significant with a negative sign.

The VAR test provides further evidence supporting the claim that domestic credit has a positive impact on exchange market pressure. The estimated IRF as well indicate a positive response of EMP due to a shock in domestic credit, implying that an expansionary monetary policy increases EMP in line with the traditional theory.

The paper also provides evidences of the fact that the NBE responds to increases of EMP by contracting domestic credit. This finding largely reflects the un-sterilized nature of NBE's intervention in the foreign exchange market.

The main policy implication of the findings of this study is that the NBE can reduce EMP by containing the pace of domestic credit expansion.

References

Abebe, Deressa. 2006. Measuring exchange market pressure and the degree of NBE's intervention in the foreign exchange market. A paper presented to the 9th in-house presentation forum of the Economic Research and Monetary Policy Directorate, National Bank of Ethiopia, January 2006.

Andualem, Berhanu. 1996. The behavior and dynamics of the real exchange rates of the Birr (1960-1991). Unpublished Masters Thesis, Addis Ababa

Connolly, Michael and Jose Dantas Da, Silveira, 1979. "Exchange Market Pressure in Postwar Brazil: An application of the Girton-Roper Monetary Model," *American Economic Review*, Vol.9, No.3, PP 448-454

Engle, Robert E, and Clive W.J., Granger, 1987. "Cointegration and Error Correction: Representation, Estimation and Testing" *Econometrica*, 55 pp 251-276.

Girton, Lance, and Don Roper. 1977. A monetary model of exchange market pressure applied to the post-war Canadian experience, *American Economic Review*, 67(4): 537-48

Glick, Reuven and Michael Hutchison. 1989. Exchange rates and monetary policy. Federal Reserve Bank of San Francisco *Economic Review*, No.2

Haile Kebret, 2001. Monetary policy and the monetary approach to the balance of payments: The case of Ethiopia (1968/69-1999/00). Unpublished Masters Thesis, Addis Ababa.

Hallwood, C. Paul and Ian W. Marsh. 2003. Exchange market pressure on the pound-dollar exchange rate: 1925-1931.

IMF. 1984. Exchange rate volatility and world trade, Occasional Paper No. 28, Washington, D.C.

Kamaly, Ahmed and Nese Erbil. 2000. A VAR analysis of exchange market pressure: A case study for the MENA region, Working Paper 2025. Economic Research Forum.

Kim, Inchul. 1985. Exchange market pressure in Korea: An application of the Girton-Roper Monetary Model. *Journal of Money, Credit, and Banking*, Vol. 17, No.2 (May 1985)

Mcnown, Robert and Myles S. Wallace. 1994. Cointegration tests of the monetary exchange rate model for three high inflation economies. *Journal of Money, Credit and Banking*, ol.26. No.3, PP 396-410.

Melesse, Minale. 2001. Determinants of equilibrium real exchange rate in Ethiopia, NBE Staff Working Paper, ERD/SWP/002/2001.

Neely, Christopher J. and Lucio Samo. 2002. How well do monetary fundamentals forecast exchange rates? *The Federal Reserve Bank of St. Louis Review*, September/October, 2002.

Shiva, Reza and Bahmani-Oskooee, 1998. "A method of Detecting Whether a Central Bank Engages in the Black Market for Foreign Exchange: Evidence from Iran," *Economics Letters*, Vol.60 pp 97-103

Tanner, Evan. 2001. Exchange market pressure and monetary policy: Asia and Latin America in the 1990s. *IMF Staff Papers*, Vol. 47, No. 3, International Monetary Fund.

Teferi, Mequaninte. 2005. Estimating the equilibrium exchange rate of Ethiopia: dynamic OLS approach, A Paper presented to the 9th In-House Presentation Forum of the Economic Research and Monetary Policy Directorate, National Bank of Ethiopia, January 2006.

Thomton, John. 1995. Exchange market pressure in Costa Rica, 1986-92: An application of the Girton-Roper Model." *International Economic Journal*, Volume 9, Number 1, Spring 1995.

Younus , Sayera. 2005. Exchange market pressure and monetary policy. Working Paper Series: WP 0603, Policy Analysis Unit (PAU), Research Department, Bangladesh Bank.

Appendix 1: VAR Estimation Results

Sample (adjusted): 1993M12 2005M12

Included observations: 145 after adjustments

Standard errors & t-statistics in parentheses

	LNEMP	LNDC
LNEMP (-1)	0.287629	0.006741
	(0.07282)	(0.03078)
	(3.94961)	(0.21900)
LNEMP(-2)	-0.105854	-0.066769
	(0.05643)	(0.02385)
	(-1.87573)	(-2.79925)
LNEMP(-3)	0.159937	-0.010263
	(0.05249)	(0.02218)
	(3.04712)	(-0.46262)
LNEMP(-4)	0.023393	-0.000429
	(0.05338)	(0.02256)
	(0.43827)	(-0.01904)
LNDC(-1)	0.056533	0.194770
	(0.19695)	(0.08324)
	(0.28704)	(2.33976)
LNDC(-2)	0.196590	0.296919
	(0.19755)	(0.08350)
	(0.99514)	(3.55604)
LNDC(-3)	0.095469	0.143978
	(0.19594)	(0.08282)
	(0.48724)	(1.73853)
LNDC(-4)	0.045422	0.232570
	(0.19740)	(0.08343)
	(0.23010)	(2.78749)
LNFP	-0.026453	0.087178
	(0.17340)	(0.07329)
	(-0.15255)	(1.18950)
LNMM	0.014633	0.016491
	(0.01938)	(0.00819)
	(0.75518)	(2.01367)
LNSP	-0.060342	0.096017
	(0.13910)	(0.05879)
	(-0.43379)	(1.63313)
R-squared	0.236572	0.011933
Adj. R-squared	0.179599	-0.061804
F-statistic	4.152400	0.161827

Appendix 2: IRF of Domestic Credit Shock (DC) on EMP

Period	EMP
1	0.000000
	(0.00000)
2	0.001342
	(0.00468)
3	0.005316
	(0.00468)
4	0.005013
	(0.00420)
5	0.004535
	(0.00376)
6	0.004396
	(0.00226)
7	0.004844
	(0.00219)
8	0.004410
	(0.00222)
9	0.004072
	(0.00219)
10	0.003815
	(0.00183)
11	0.003643
	(0.00179)
12	0.003331
	(0.00174)

Appendix 3: IRF of Exchange Market Pressure (EMP) on Domestic Credit (DC)

Period	DC
1	0.004245
	(0.00199)
2	0.001212
	(0.00175)
3	-0.002202
	(0.00171)
4	-0.001158
	(0.00171)
5	0.000163
	(0.00186)
6	-0.000830
	(0.00162)
7	-0.001272
	(0.00161)
8	-0.000861
	(0.00154)
9	-0.000674
	(0.00147)
10	-0.000834
	(0.00135)
11	-0.000803
	(0.00128)
12	-0.000684
	(0.00119)