EFFECTS OF MACROECONOMIC POLICIES AND STOCK MARKET PERFORMANCE ON THE ESTONIAN ECONOMY

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Abstract:
Based on a general equilibrium model, this study finds that real output in Estonia is positively associated with real quantity of money and negatively influenced by real depreciation of the kroon, real stock prices, and the expected inflation rate. Government deficit spending is found to be insignificant. Policy implications are that fiscal discipline pursued by the Estonian government is appropriate, that a stronger currency may better serve Estonia, and that the wealth effect of an increase in the stock price on real money balances is greater than the substitution effect.

Keywords: real depreciation, deficit spending, stock prices, wealth effect, substitution effect

JEL Classification: E5, E6, O52, P24

1. Introduction

Since its independence in 1991, the Estonian economy has made a significant reform progress. To meet government expenditures and to make transition to the market economy in the post-Soviet economy, M1 money rose 309.85 % in 1992 and 83.15 % in 1993. Since then, money growth has slowed down and reached 9.32 % in 2002 and 12.95 % in 2003. As a result of rapid money growth in the early 1990s, the inflation rate rose 89.83 % in 1993 and 47.65 % in 1994 and hurt many people with fixed income by reducing their spending power considerably. In recent years, the inflation rate has continued to decline and reached a low of 1.33 % in 2003, which falls within the EU standard of 2.0 %. The very high inflation rates in 1993 and 1994 caused real gross domestic product (GDP) to decline by 1.6 % in 1994. However, the economy adjusted quickly and real GDP continued to grow more than 4.0 % annually except for 1999. The stock market performance can be represented by a *U*-shaped curve, beginning at 200.48 in 1997 (2000 = 100), reaching to the bottom of 75.91 in 1999, and then gradually climbing to 171.05 in 2003. Exchange rate mo-

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vements can be described by a bell shape, increasing from 12.91 in 1992 to 17.69 in 2001 and then declining to 12.41 in 2003. It may be interesting to examine whether the recent decline in the exchange rate or appreciation of the kroon would help or hurt the Estonian economy. The lending rate has declined in the long run from a high of 33.66 % in 1993 to a low of 5.51 % in 2003, thus encouraging households and businesses to borrow and spend. The Estonian government has shown fiscal discipline. Its government deficit/GDP ratio reached a high of 4.28 % in 1999, and it has improved its fiscal standing since then with a government surplus/GDP ratio of 2.44 % in 2002, which is below the 3.00 % threshold required by the Maastricht Treaty of 1992 and the Stability and Growth Pact of 1997. Its government debt/GDP ratio declined from 8.6 % in 1995 to 5.8 % in 2002, which is well below the Maastricht criterion of 60 %.

Several recent studies on Estonia and some of the accession countries examined the subjects of the transition to the market economy (see Brown, 1993; Reardon, 1993, 1996; Krivogorsky and Eichenseher, 1996); labour market adjustments (see Eamets, 1994); monetary reform (see Sorg, 1994); the exchange rate policy and the currency board (see Sorg, 1998); twin deficits (see Izák, 2002); pros and cons of the EU accession (see Pautola and Sutela, 1998; Kuus, 1998); costs and benefits of the adoption of the euro (see Dědek, 2003; Janáček and Janáčková, 2004); financial reform (see Hansson, 1995; Buch, 1997; Cavalcanti and Oks, 1999); macroeconomic analysis of Estonian prospects (see Basdevant and Kaasik, 2003); evaluation of Estonia's economic policy and recommendations to balance the budget in the business cycle instead of annually, to pursue budget surplus via a tight fiscal policy to help reduce current account deficit which was largely financed by debt instead of foreign direct investment, to avoid off-budget financial operations, to pursue tax cuts with corresponding spending cuts, and to use budget surplus to finance pension for an aging population (see IMF, 2003, 2004); Estonian efforts to drop the ruble and to reform the kroon, to privatize assets and land, to pursue bank reform, to adopt trade liberalization, and to move quickly to the market economy (see Reed, 1999); challenges and macroeconomic effects of the EU accession such as lower prices and more consumption of consumer goods and more business opportunities (see Campoy and Rhoads, 2004); among others.

The purpose of this paper is to examine how the fiscal policy, the monetary policy, the exchange rate policy, and the stock market performance would affect real output for Estonia. As the IMF (2004) stated, "Credible and prudent macroeconomic and structural policies will be important in the period ahead to make certain that the Estonian economy remains competitive, to ensure a smooth entry into the ERM II and, ultimately, to successfully adopt the euro." As Eesti Pank (the central bank of Estonia) indicated, its main objectives are to protect the integrity and value of the Estonian kroon, to promote the stability and efficiency, to support the development of the financial system, and to meet the cash demand of the public. Therefore, more understanding of the interrelationships among the major macroeconomic variables and of their potential impacts on real output would be important for Estonia to maintain price stability, full employment, and fiscal sustainability.

This paper deals with several different aspects. First, a general equilibrium approach is employed in developing a macroeconomic model in that the commodity market, the money market, and aggregate supply are considered simultaneously. Second, the stock price is considered in the consumption and investment functions to test the wealth effect, Tobin's q theory, and the balance-sheet channel (see Mishkin, 1995; Bernanke and Gertler, 1995; Kuttner and Mosser, 2002). It is also included in the money demand function to test the wealth effect and the substitution effect. Third, the exchange rate is considered in the net exports sector and the money

demand function to determine whether appreciation or depreciation of the kroon would help or hurt the Estonian economy and whether the substitution effect or the wealth effect of exchange rate changes would reduce or increase the demand for money.

2. Theoretical Model

Suppose that the consumption function is determined by disposable income, the real interest rate and stock values, that the investment function is influenced by output, the real interest rate and stock values, that net exports are affected by the real exchange rate, that the demand for real money balances is a function of the nominal interest rate, real output, stock values and the nominal exchange rate, and that the inflation rate is impacted by the expected inflation rate, the deviation of actual output from potential output (output gap) and the nominal exchange rate. The commodity market equilibrium, the money market equilibrium, and aggregate supply can be expressed as

$$Y = C(Y - T, R - \pi^e, S) + I(Y, R - \pi^e, S) + G + NX[e(P^*/P)] \tag{1}$$

$$M = L(R, Y, S, e) \tag{2}$$

$$\pi = \pi^e + \alpha(Y - Y^*) + \beta e \tag{3}$$

where Y = real GDP for Estonia, C = consumption function, T = government taxes, R = the nominal interest rate, π^e = the expected inflation rate, S = stock prices, I = the investment function, G = government spending, NX = next exports, e = the nominal exchange rate (kroons per USD), P^* = the price level in the U.S., P = the price level in Estonia, M = real quantity of money, L = demand for real money balances, Y^* = potential output.

Assume that equations in (1) have continuous partial derivates. Suppose that

$$C_Y > 0, \ C_T < 0, \ C_R < 0, \ C_S > 0, \ I_Y > 0, \ I_R < 0, \ I_S > 0, \ NX_e > 0,$$
$$L_R < 0, \ L_Y > 0, \ L_S > 0 \text{ or } < 0, \ L_e > 0 \text{ or } < 0, \tag{4}$$
$$\pi_Y = \alpha, \ \pi_e = \beta$$

The endogenous-variable Jacobian is given by

$$|J| = -L_R(1 - C_Y - I_Y) - L_Y(C_R + I_R) > 0 \tag{5}$$

Applying the implicit-function theorem, equilibrium output can be written as

$$\overline{Y} = \overline{Y}[M, G, T, e(P^*/P), S, \pi^e] \tag{6}$$

An increase in M is expected to raise equilibrium output in the short run through the interest rate channel, the exchange rate channel, other asset price effects (the wealth effect and Tobin's q theory), and the credit channel (the bank lending channel and the balance-sheet channel) (see Mishkin, 1995; Kuttner and Mosser, 2002). The relative importance of these effects or channels may vary. For example, Taylor (1995) emphasized the importance of the interest rate channel whereas Bernanke and Gertler (1995) maintained that the transmission mechanism of monetary policy would be the credit channel.

More government deficit spending is expected to shift aggregate demand to the right and cause output to rise in the short run. However, scholars disagreed on the magnitude and the timing of the impact of deficit spending on output (see Ramsey and Shapiro, 1998; Blanchard and Perotti, 1999; Taylor, 2000; Burnside, Eichenbaum and Fisher, 2000). Elmendorf and Mankiw (1999) maintained that government debt

crowds out capital stock and reduces output in the long-term. The Ricardian-equi-valence theory (see Barro, 1989) proposed that deficit-financed spending may have a neutral effect in the long-run. Mandel and Tomšík (2003) found that consumers did not reduce spending in response to increased government deficit. Instead, consu-mers cut spending due to a higher interest rate caused by an internal imbalance.

The effect of a change in the nominal exchange rate on equilibrium output can be expressed as

$$\frac{\partial \overline{Y}}{\partial(e)} = \left[-L_R NX_e \left(P^*/P\right) + L_e \left(C_R + I_R\right)\right]/|J|$$

$$> 0 \ if \ \left|-L_R NX_e \left(P^*/P\right)\right| > \left|L_e \left(C_R + I_R\right)\right|$$

$$< 0 \ if \ \left|-L_R NX_e \left(P^*/P\right)\right| < \left|L_e \left(C_R + I_R\right)\right|$$

(7)

As shown, the impact may be positive or negative, depending upon whether in-creased net exports would be higher or smaller than decreased consumption and investment spending due to the change in real money balances caused by currency depreciation. The sign for L_e is negative if the substitution effect is bigger than the wealth effect, and vice versa (see Arango and Nadiri, 1981; Bahmani-Oskooee and Ng, 2002). Bahmani-Oskooee and Miteza (2003) indicated that the overall impact of currency devaluations depends on the formulation of an economic model, the country under study, the econometric technique used in empirical work, the short run versus the long run, and other related factors.

The impact of a change in stock prices on equilibrium output can be written as

$$\frac{\partial \overline{Y}}{\partial(S)} = \left[-L_R \left(C_S + I_S\right) + L_S \left(C_R + I_R\right)\right]/|J|$$

$$> 0 \ if \ \left|-L_R \left(C_S + I_S\right)\right| > \left|L_S \left(C_R + I_R\right)\right|$$

$$< 0 \ if \ \left|-L_R \left(C_S + I_S\right)\right| < \left|L_S \left(C_R + I_R\right)\right|$$

(8)

In equation (8), the sign for $\dfrac{\partial \overline{Y}}{\partial(S)}$ depends upon the effects of the wealth effect in the consumption function and Tobin's q theory or the balance-sheet channel in the investment function and whether the substitution effect of increased stock valu-es on real money balances is bigger than the wealth effect (see Friedman, 1988; Choudhry, 1996). If $L_S < 0$, it suggests that the substitution effect is bigger than the wealth effect; and if $L_S > 0$, it indicates that the wealth effect is bigger than the sub-stitution effect.

3. Empirical Results

The sample consists of quarterly data covering the period 1996:Q3 to 2003:Q4. Earlier data for government deficits are not available. All the data were obtained from the *International Financial Statistics* published by the International Monetary Fund and the Ministry of Financial Affairs in Estonia. Real GDP, real M1 money, real go-vernment taxes, and real government spending are expressed in millions kroons. The expected inflation rate is the weighted average of past four quarters based on the formula employed by Davidson and MacKinnon (1985). The real exchange rate

is the nominal exchange rate in terms of kroons per USD adjusted for relative prices for the U.S. and Estonia. Share stock prices are index numbers with 2000 as the base year. Except for real GDP, the consumer price index (CPI) is employed to calculate real values. To reduce a high degree of multicollinearity, real government deficit spending defined as $D = (G-T)/CPI \cdot 100$ is employed in empirical work.

The GARCH process (see Engle, 1982, 2001) is applied to examine the properties of error variance. As shown, the coefficient of ARCH(1) is insignificant whereas the coefficient of GARCH(1) is significant, indicating that error variance is a function of past error variance. As indicated in table, 92.07 % of the variation in real GDP can be explained by the five right-hand side variables. The Durbin-Watson test suggests that the absence of autocorrelation cannot be rejected. Real GDP has a positive relationship with real M1 money and a negative relationship with real depreciation, real share stock prices, and the expected inflation rate. The impact of government deficit spending on real output is insignificant, suggesting that the Ricardian-equivalance theory (see Barro, 1989) is expected to hold. Specifically, when real M1 money rises by one million kroon, real GDP would increase by 0.63 million kroons. If the real exchange rate rises by 1 unit, real output would decline by 293.53 million kroons or 1.26 % at the mean value. An increase in real share stock prices by 1 unit would reduce real output by 4.08 million kroons. A one percentage point increase in the expected inflation rate would reduce real GDP by 157.65 million kroons or 0.675 % at the mean value.

Estimated Regression for the Estonian Output

Dependent variable: $\bar{Y}$
Method: ML - ARCH (Marquardt)
Sample: 1996:Q3 2003:Q4
Included observations: 30

Convergence achieved after 17 iterations
Bollerslev-Wooldrige robust standard
errors & covariance
Variance backcast: ON

	Coefficient	Std. error	z-statistic	Prob.
C	16649.96	290.2714	57.35997	0.0000
M	0.627828	0.008051	77.98516	0.0000
D	0.182359	0.205386	0.887883	0.3746
ε	-293.5254	2.285151	-128.4490	0.0000
S	-4.082976	2.024265	-2.017017	0.0437
π^e	-157.6488	63.88222	-2.467805	0.0136
Variance equation				
C	433889.8	64315.09	6.746315	0.0000
ARCH(1)	-0.316809	0.230086	-1.376911	0.1685
GARCH(1)	0.574092	0.042987	13.35498	0.0000
R-squared	0.920741	Mean dependent var.		23340.63
Adjusted R-squared	0.890547	S.D. dependent var.		3038.724
S.E. of regression	1005.322	Akaike info criterion		16.57856
Sum squared resid.	21224133	Schwarz criterion		16.99892
Log likelihood	-239.6784	F-statistic		30.49420
Durbin-Watson stat.	2.345588	Prob(F-statistic)		0.000000

Note: $Y-$ is equilibrium GDP, M is real M1 money, D is real government deficit spending, ε is the real exchange rate defined as $e(P'/P)$, S is real stock price index, π^e is the expected inflation rate.

Several comments can be made. First, the central bank of Estonia needs to continue to contain inflation and maintain price stability because of the cost of a higher

expected inflation. The small inflation rate of 1.33 % in 2003 suggests that the inflation rate was mild and in line with the guidelines of the EU. Second, government deficit spending may not be an effective tool to stimulate the economy due to the Ricardian-equivalence hypothesis that deficit-financed government spending may have a neutral effect in the long run. The interesting finding that real depreciation would hurt real output may indicate that the often used trade policy to devalue a currency to stimulate net exports and aggregate demand may not apply to Estonia. The recent currency appreciation has been from 18.65 in 2000, M10 to 12.96 in 2004. M8 seems to suggest that it moved to the right direction and would work to help raise the Estonian output. While increased stock prices are expected to stimulate consumption and investment expenditures due to the wealth effect, Tobin's *q* theory, and the balance-sheet channel, the negative sign of real stock prices suggest that in the money demand function, the wealth effect is higher than the substitution effect. Hence, in examining the overall impact of stock market performance, the role of stock values in money demand needs to be considered.

4. Conclusions

This paper examined the impacts of macroeconomic policies and stock market performance on real output for Estonia. I find that more real M1 money, real appreciation of the kroon, a lower real share stock price, a lower expected inflation rate would raise real output and that the impact of more government deficit spending is insignificant. Hence, the neutrality of Ricardian equivalence for Estonia is expected to hold. The significant impact of real quantity of money on output is expected. However, the finding of the negative sign for the depreciation of the real exchange rate and real share stock prices would have important policy implications. Although the appreciation of the kroon is expected to hurt net exports, the Estonian government has been pursuing an appropriate exchange rate policy in promoting its overall well-being. In evaluating the overall impact of stock values on output, we should pursue a general equilibrium approach to consider both the commodity market and the money market. The unclear relationship between the demand for real money balances and the stock price indicates that the government may need to be cautious in predicting the potential impact of stock market performance on output. Because of the loss of monetary policy autonomy and exchange rate flexibility after the accession and the adoption of the euro and because of Ricardian equivalence, it seems that to improve the economy in the long run, the government may focus more on enhancing human capital, capital equipment, and worker productivity so that the living standard would rise and its product would be more competitive in the world market.

There may be areas for further research. When more sample observations are available, regression parameters may be re-estimated and compared with the results in this study. Recently, Romer (2000) proposed the IS-MP-IA model which focuses on the output-inflation relationship and the monetary policy function based on the Taylor-rule (1993, 1999) specification. This model may be considered and compared to determine which model may fit Estonia better. Different expected inflation rates may be estimated and considered. If the data are available, other types of wealth or assets can be considered.

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