THE JOURNAL OF THE KOREAN ECONOMY, Vol. 6, No. 2 (Fall 2005), 297-311

Application of the IS-MP-IA Model and the Taylor Rule to Korea and Policy Implications*

Don P. Clark** · Yu Hsing***

This paper uses extended versions of the IS-MP-IA model (Hall and Taylor, 1997; Romer, 2000; Taylor, 2001) and the Taylor rule (1993, 1998, 1999) to conduct theoretical and empirical analyses of possible impacts of changes in exogenous macroeconomic variables on equilibrium output in Korea. Equilibrium output is found to be negatively associated with the expected inflation rate and the world interest rate, and positively influenced by deficit spending, home currency depreciation, and world output. The central bank plays a major role in determining the direction and magnitude of these impacts. Empirical findings enable us to better understand macroeconomic relationships and monetary policy in Korea.

JEL Classification: E52, F62, F41
Keywords: IS-MP-IA model, Taylor rule, aggregate supply, exchange rates, world interest rates, deficit spending

---

* Received March 7, 2005. Accepted October 3, 2005.
We are grateful to Mohammed Mohsin, Jean Gauger, and two referees for providing many helpful comments.

** Author for correspondence, Professor of Economics, Department of Economics, University of Tennessee, Knoxville, TN 37996-0550, USA, Tel: 1-865-974-3303, Fax: 1-865-974-4601, E-mail: dclark3@utk.edu

*** Charles Blackwell Endowed Professor in Economics, College of Business, Southeastern Louisiana University, Hammond, LA 70402, USA.

1. INTRODUCTION

Korea has made considerable economic progress in recent years even though confronted with many challenges. During the 1997 Asian financial crisis, the Korean won plunged 83.9 % from 888.10 wons per US dollar in 1997.M6 to 1,633 in 1998.M2, rebounding to 1,048 in 2004.M11. Substantial depreciation of the won caused financial instability, capital outflows, increased foreign debt, increased import prices, and other negative effects. On the other hand, won depreciation made Korean products more competitive on world markets. To defend the won's value and reduce capital outflows, the Bank of Korea followed a high interest rate policy. The money market rate was raised from a low of 11.19% in 1997.M6 to a high of 25.63% in 1998.M1.

The Korean government used expansionary fiscal policy to stimulate the sluggish economy. Deficit spending grew substantially from 69 billion wons in 1997 to 13,216 billion wons in 1998, and 15,512 billion wons in 1999. Despite expansionary fiscal policy, high interest rates and financial instability led to a negative growth rate of 6.85% in 1998.

Korea experienced a macroeconomic recovery in 1999 and 2000 following a period of implementing macro stabilization policies and structural reforms in the financial sector, labor markets, and the public sector. Real GDP grew at an annual rate of 9.49% in 1999, but slowed to 3.07% in 2003, and 2.75% in the first half of 2004. The unemployment rate declined from a high of 6.84% in 1998 to 3.40% in 2003. Partly in response to a declining world interest rate, the money market rate dropped to a low of 4.0% in 2003. The lending rate fell from a high of 15.28% in 1998 to 6.24% in 2003. Inflation became relatively stable. The inflation rate reached 3.55% in 2003 and was forecast to be 2.6% in 2005.

The Bank of Korea Act was revised in 1997, enhancing the legal independence of the Bank of Korea, imposing an inflation-target constraint on monetary policy, confining responsibilities to price stability, and transferred bank supervision and monitoring activities to a newly established

commission (Cargill, 2001). By imposing only one responsibility on the Bank of Korea, price stability, the new bank is likely to be more effective in maintaining price stability but less equipped to assist other areas such as maintaining financial stability.

According to a 2004 study conducted by the International Monetary Fund (IMF), the Korean economic environment was conducive to economic recovery. Large corporations were profitable, banks were financially sound, and market-based reforms would provide a foundation for real economic growth. Expansionary fiscal and monetary policies were recommended for stimulating spending by households, small and medium sized enterprises (SMEs), and larger corporations. Because gains from fiscal stimulus packages are often uncertain and take time to materialize, macroeconomic management should fall mainly on monetary policy. With inflationary expectations under control, there was scope for further easing of monetary policy to provide support for the real economy. The IMF also urged the Korean government to refrain from intervening in the foreign exchange market except for operations to moderate exchange rate fluctuations.

Several recent studies have investigated the effectiveness of monetary and fiscal policies used by Korea. Dueker and Kim (1999) estimated a monetary policy feedback rule for Korea to investigate the issue of monetary targeting. Results suggest the Bank of Korea used an inflation target rate of 6% after 1983. The Bank of Korea did not appear to target real GDP growth except for a period in the mid-1980s when the economy was overheating. Choi (2003) concluded that inflation targeting could contribute to greater economic stability in Korea. A forward-looking rule for monetary policy was preferred to a backward-looking rule. Inflation targeting enhances price and output stability and fosters a healthy development of the capital market. Han (2003) found that the Bank of Korea's foreign exchange market interventions during the Asian crisis did not affect market volatility and were not successful in preventing the won from depreciating. Hsing and Lee (2004) applied the VAR model to estimate a monetary policy reaction function for the Bank of Korea. The central bank's call rate was found to

respond positively to a shock to the output gap, inflation gap, stock price gap, exchange rate gap and the lagged call rate. The exchange rate gap and the inflation gap were more influential in explaining the variance of the call rate in the short run. Long run variation in the call rate was primarily determined by the stock market gap and output gap.

Lee (2001) evaluated the IMF's role in the Asian financial crisis and concluded the IMF underestimated the extent of the economic slowdown. This led to excessive tightening of monetary and fiscal policies that contributed to the recession. When the IMF reversed its position and recommended expansionary policies in early 1998, the economic slowdown was already underway. Kim (2000) studied the effects of the high interest rate policy prescribed by the IMF and concluded that the IMF prescription was misguided and did not achieve the desired objectives. Pobre (2003) found that tight monetary policy significantly affected investment and consumption expenditures, which, in turn, were major causes of the economic slowdown during the 1997 Asian crisis.

Other studies have explored the efficacy of fiscal policy in Korea. Abizadeh and Yousefi (1998) investigated the impact of government spending on Korea's economic development and concluded that government expenditures did not affect economic growth. Chang, Liu, and Thompson (2002) examined historical relationships among government spending, taxes, and output in Korea using cointegration and vector autoregression techniques. Because Korea has used a spend-and-tax policy, fiscal policy has had a zero to negligible impact on real output. Moderate output increases from deficit spending were followed by higher taxes. Fiscal policy was not recommended as a way to stimulate output. Dua, Rashid, Aneesa, and Salvatore (2000) believe that more government spending and lower income tax rates would contribute to economic growth in Korea.

Recently, several well-known scholars employed the IS-MP-IA model (Hall and Taylor, 1997; Romer, 2000; Taylor, 2001) in macroeconomic analyses to investigate the inflation-output relationship and to better capture monetary policy by focusing on the interest rate rather than on growth in the

money supply. Central banks in most industrialized nations focus on the interest rate on loans between banks in their short-run policy making. Friedman (2003) examined macroeconomic analysis issues such as the role of credit markets and how interest rates are determined by the central bank without using the LM curve. No previous studies have applied the IS-MP-IA model to investigate determinants of economic growth in Korea.

The present paper uses extended versions of the IS-MP-IA model and the Taylor (1993, 1998, 1999) rule to conduct theoretical and empirical analyses of impacts of changes in exogenous macroeconomic variables on the Korean economy. The IS-MP-IA model is a useful tool for investigating determinants of economic growth in Korea because Korea actively implemented monetary, fiscal, and exchange rate policies to stimulate the economy during and after the Asian financial crisis. Results will be used to evaluate the effectiveness of monetary and fiscal policies in Korea.

Our paper has several distinguishing features. This paper is the first attempt to use the IS-MP-IA model to investigate macroeconomic impacts of exogenous shocks on the Korean economy. The Taylor rule is expanded to include the inflation gap, output gap, exchange rate gap, and the world interest rate. The nominal exchange rate enters into the expectations-augmented aggregate supply function. Currency depreciation is expected to cause domestic inflation. An expanded IS-MP-IA model that accounts for international trade in the IS function, the exchange rate and the world interest rate in the MP function, and the exchange rate in the IA function will enable us to better understand macroeconomic relationships and monetary policy in Korea.

2. THEORETICAL MODEL

Suppose household consumption spending is a function of disposable income and the real interest rate. Output and the real interest rate determine investment spending. National and world output, and the real exchange rate

influence net exports. The interest rate is affected by the inflation gap, output gap, exchange rate gap, and the world interest rate. Let the inflation rate be a function of the expected inflation rate, the output gap, and the exchange rate. Extending Romer (2000) and the Taylor rule (1993, 1998, 1999), the open-economy IS function, the monetary policy (MP) function, and the inflation adjustment (IA) or the expectations-augmented Phillips curve can be expressed as

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

$$R = R(\pi - \theta, Y - Y^*, e - \delta, R^W), \tag{2}$$

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

where Y = real GDP in Korea, C = the consumption function, T = government tax revenues, R= the real interest rate, I= the investment function, G= government spending, NX= net exports, e= the nominal exchange rate (units of the Korean won per US dollar), P^f= the price level in the US, P= the price level in Korea, Y^W = world output, π= the inflation rate, θ= the target inflation rate, Y^* = potential output, δ= the target exchange rate, WY= the world interest rate, π^* = the expected or core inflation rate, and α, β= parameters with positive values.

Equation (2) characterizes the Bank of Korea's monetary policy. According to a Bank of Korea (2003) publication and Eichengreen (2004), the Monetary Policy Committee can raise or lower the overnight call rate, or the policy interest rate, on a monthly basis in response to the inflation gap, output gap, exchange rate gap, and the world interest rate. When the inflation gap, output gap, exchange rate gap, or the world interest rate rises (falls), the Bank of Korea considers raising (lowering) the overnight call rate. Price stability is the primary objective of monetary policy. The Bank of Korea has pursued inflation targeting with a medium-term inflation target of

2.5%. Inflation targeting has provided a sound basis for the conduct of monetary policy in Korea.

Suppose that the above equations have continuous partial derivatives. Let

$$C_Y > 0,\ C_R < 0,\ I_Y > 0,\ I_R < 0,\ NX_e > 0,\ NX_Y < 0,\ NX_{WY} > 0,$$

$$R_\pi > 0,\ R_Y > 0,\ R_e > 0,\ R_{R^W} > 0,\ \pi_Y = \alpha,\ and\ \pi_e = \beta.$$

The endogenous-variable Jacobian can be given by

$$|J| = \begin{vmatrix} (1 - C_Y - I_Y - NX_Y) & -(C_R + I_R) & 0 \\ -R_Y & 1 & -R_\pi \\ -\alpha & 0 & 1 \end{vmatrix} \tag{4}$$

$$= (1 - C_Y - I_Y - NX_Y) - \alpha(C_R + I_R)R_\pi - R_Y(C_R + I_R) > 0.$$

Applying the implicit-function theorem, we can write the equilibrium value of $\overline{Y}$ as an implicit function of the following exogenous variables and parameters:

$$\overline{Y} = \overline{Y}\ [G, T, e(P^f / P), R^W, WY; Y^*, \pi^*, \alpha, \beta, \theta, \delta]. \tag{5}$$

We expect that $\overline{Y}$ is positively related to G and WY and negatively related to T, R^W, and π^* (Apergis, 2004). Barro (1989) suggested that deficit-finance spending might have a neutral effect on real output in the long run. Other studies (Edwards, 1986; Upadhyaya, 1999; Chou and Chao, 2001; Bahmani-Oskooee and Miteza, 2002, 2003) showed that the impact of a change in $e(P^f / P)$ on $\overline{Y}$ is ambiguous, and depends upon the specific country under study, specification of the model, methodology employed in empirical work, and whether one considers short run or long run impacts.

Based on comparative-static analysis, the impact of a change in the nominal exchange rate on $\overline{Y}$ is given by equation (6). The net impact of currency depreciation on equilibrium output depends upon whether the positive effect of increased net exports is greater than the negative effects of reduced consumption and investment spending due to the increased real interest rate enacted by the central bank.

$$\begin{aligned}\frac{\partial \overline{Y}}{\partial e} &= \frac{\begin{vmatrix} NX_e(P^f/P) & -(C_R+I_R) & 0 \\ R_e & 1 & -R_\pi \\ \beta & 0 & 1 \end{vmatrix}}{|J|} \\ &= \frac{NX_e(P^f/P)+\beta R_\pi(C_R+I_R)+R_e(C_R+I_R)}{|J|} \\ &> 0 \ \textit{if} \left|NX_e(P^f/P)\right| > \left|\beta R_\pi(C_R+I_R)+R_e(C_R+I_R)\right| \text{ or} \\ &< 0 \ \textit{if} \left|NX_e(P^f/P)\right| < \left|\beta R_\pi(C_R+I_R)+R_e(C_R+I_R)\right|.\end{aligned} \tag{6}$$

The impacts of a change in the expected or core inflation rate and the world interest rate are given by equation (7) and (8). As shown, the impact of a higher expected inflation rate or a higher world interest rate on equilibrium output depends upon reduced consumption and investment spending due to an increased interest rate made by the central bank in response to a higher inflation rate or world interest rate.

$$\frac{\partial \overline{Y}}{\partial \pi^*} = \frac{\begin{vmatrix} 0 & -(C_R+I_R) & 0 \\ 0 & 1 & -R_\pi \\ 1 & 0 & 1 \end{vmatrix}}{|J|} = R_\pi(C_R+I_R) \ / \ |J| \ < \ 0, \tag{7}$$

and

$$\frac{\partial \bar{Y}}{\partial R^W} = \frac{\begin{vmatrix} 0 & -(C_R + I_R) & 0 \\ R_{R^W} & 1 & -R_\pi \\ 0 & 0 & 1 \end{vmatrix}}{|J|} = \frac{R_{R^W}(C_R + I_R)}{|J|} < 0. \qquad (8)$$

3. EMPIRICAL STRATEGY AND RESULTS

Our data sample ranges from 1974.Q1 to 2003.Q3 with a total of 119 observations. Data for variables were taken from *International Financial Statistics* published by the International Monetary Fund. Y is measured in billion wons at 1995 prices. Following Romer (2000, p. 167), π_{t-1} is used to represent π^*. To avoid a high degree of multicollinearity, real government deficit spending, defined as $D = G - T$, is employed in our empirical work. D is measured in billion wons. ε is derived from the nominal exchange rate in terms of the Korean won per US dollar and is adjusted for relative price levels in the US and Korea. Hence, an increase of ε is a depreciation of the won. The US federal funds rate and world industrial output are chosen to represent R^W and Y^W. Potential output is assumed to be constant in the short run.

Critical values for the ADF unit root test are -3.486, -2.886, and -2.580 at the 1%, 5%, and 10% levels, respectively. Our results show that all variables have unit roots in levels except for D at the 5% level, and that all variables are stationary in first difference at the 5% level. In determining whether the null hypothesis of a zero cointegrating relationship can be rejected in favor of one cointegrating relationship, the Johansen test shows the trace statistic is 208.263 compared with the critical value of 103.180 at the 1% level. Hence, all the variables have a long-term stable relationship. Results from the vector error correction model (VECM) are presented below to show short-run dynamics with two lag intervals. Figures in parentheses are t-ratios. The first term is the error correction term, and the last term is the constant term.

$$\Delta\overline{Y} = -0.1530 - 0.407\Delta\overline{Y}_{t-1} - 0.123\Delta\overline{Y}_{t-2} - 827.356\Delta\pi_{t-2} - 576.171\Delta\pi_{t-3}$$
$$(-4.963)\quad (-3.248)\quad (-1.027)\quad (-3.696)\quad (-2.983)$$

$$+ 0.476\,\Delta D_{t-1} + 0.258\Delta D_{t-2} - 20.989\Delta\varepsilon_{t-1} - 20.333\Delta\varepsilon_{t-2} - 38.702R^{W}$$
$$(1.625)\quad (1.053)\quad (-3.066)\quad (-2.919)\quad (-0.189)$$

$$+ 432.215WY - 36{,}640.580$$
$$(5.063)\quad (-4.670)$$

$$\overline{R^2} = 0.581, \quad F = 13.504$$

Table 1 Estimated Real GDP for Korea

Dependent Variable: $\overline{Y}$
Method: Least Squares
Sample: 1974:1 - 2003:3
Included observations: 119
Convergence achieved after 10 iterations

Variable	Coefficient	Std. Error	*t*-Statistic	Prob.
C	-11,3057.600	16,462.550	-6.868	0.0000
π^*	-389.461	69.953	-5.567	0.0000
D	1.276	0.109	11.705	0.0000
ε	11.917	5.807	2.052	0.0425
R^W	-1,022.294	442.172	-2.312	0.0226
WY	1,975.492	169.017	11.688	0.0000
AR(1)	0.838	0.058	14.435	0.0000
R-squared	0.982	Mean dependent variable		64,909.820
Adjusted R-squared	0.981	S.D. dependent variable		36,416.730
S.E. of regression	5,070.051	Akaike info criterion		19.957
Sum squared resid	2.88E+09	Schwarz criterion		20.121
Log likelihood	-1,180.448	*F*-statistic		995.9649
Durbin-Watson statistic	2.381	Prob(*F*-statistic)		0.000
Inverted AR Roots	0.84			

Results from our regression analysis are reported in table 1. The estimated coefficient for AR(1) of 0.838 is significant at the 1% level. A D-W statistic value of 2.381 indicates that the absence of autocorrelation cannot be rejected. All coefficients are significant at the 1% or 5% level. Our findings suggest a lower expected inflation rate, more deficit spending, depreciation of the won, a lower federal funds rate, and greater world output will raise real output in Korea.

Specifically, a one-percentage point increase in the expected inflation rate would reduce real GDP by 389.461 billion wons. If real deficit spending rises by one billion won, real GDP is expected to increase by 1.276 billion wons. An increase in the real exchange rate of one unit would raise real GDP by 11.917 billion wons. A one-percentage point increase in the world interest rate would reduce real GDP by 1,022.294 billion wons. When the world output index rises one unit, real GDP would rise 1,975.492 billion wons.

These findings hold important implications for policymaking in Korea. First, the negative effect of a higher expected inflation rate on real output indicates the Bank of Korea should continue to focus on maintaining price stability and contain inflation. According to our estimates, a one-percentage point increase in the expected inflation rate would reduce real output by 0.54%. Second, the estimated deficit spending multiplier of 1.276 is not large. Our finding that fiscal policy is not very effective is consistent with those reported by Abizadeh and Yousefi (1998), and Chang, Liu, and Thompson (2002). The relatively small magnitude of the deficit spending multiplier suggests the government should place little reliance on the use of expansionary fiscal policy. Third, real depreciation of the won can be expected to raise net exports, aggregate demand, and real output. Because a 6.44% depreciation of the won is required to increase real output in Korea by one percent, the Bank of Korea should determine whether the negative effects associated with real won depreciation would justify the increase in real output. Finally, the relatively low world interest rate and recovery of the world economy can be expected to stimulate the Korean economy. A one-

percentage point increase in the world interest rate would reduce real output in Korea by 1.42%. When formulating monetary policy, the Bank of Korea should closely monitor trends in US monetary policy. A one unit increase in world output would raise real output in Korea by 2.74%. As the world economy grows, Korea will enjoy expanded export opportunities.

4. SUMMARY AND CONCLUSIONS

This paper has applied the extended IS-MP-IA model to investigate possible impacts of changes in exogenous variables on an open economy with a managed floating exchange rate. Comparative-static analysis suggests that currency depreciation may be expansionary or contractionary. Empirical results for Korea show that a lower expected inflation rate, more deficit spending, depreciation of the won, a lower federal funds rate, and greater world output can be expected to increase output in Korea. The central bank's monetary policy (MP) function plays a significant role in determining the direction and/or magnitude of these impacts. An extended IS-MP-IA model that accounts for international trade in the IS function, the exchange rate and the world interest rate in the MP function, and the exchange rate in the IA function enables us to better understand macroeconomic relationships and monetary policy in Korea.

REFERENCES

Abizadeh, Sohrab and Mahmood Yousefi, "An Empirical Analysis of South Korea's Economic Development and Public Expenditures Growth," *Journal of Socio-Economics*, 27(6), 1998, pp. 687-700.

Apergis, Nicholas, "Inflation, Output Growth, Volatility and Causality: Evidence from Panel Data and the G7 Countries," *Economics Letters*, 83(2), May 2004, pp. 185-191.

Bahmani-Oskooee, Mohsen and Ilir Miteza, "Are Devaluations Expansionary or Contractionary? A Survey Article," *Economic Issues*, 8(2), September 2003, pp. 1-28.

_____, "Do Nominal Devaluations Lead to Real Devaluations in LDCs?" *Economics Letters*, 74(3), February 2002, pp. 385-391.

Bank of Korea, "Monetary Policy in Korea," http://www.bok.or.kr, January 16, 2003, pp. 1-161.

Barro, Robert J., "The Ricardian Approach to Budget Deficits," *Journal of Economic Perspectives*, 3(2), Spring 1989, pp. 37-54.

Cargill, Thomas F., **"**Central Bank Independence in Korea," *Journal of the Korean Economy,* 2(1), Spring 2001, pp. 1-33.

Chang, Tsangyao, Wen R. Liu, and Henry Thompson, "The Viability of Fiscal Policy in South Korea, Taiwan, and Thailand," *ASEAN Economic Bulletin*, 19(2), August 2002, pp. 170-177.

Choi, Gongpil, "Structural Changes and the Scope of Inflation Targeting in Korea," *International Economic Journal*, 17(3), Autumn 2003, pp. 113-142.

Chou, Win L. and Chi-Chur Chao, "Are Currency Devaluations Effective? A Panel Unit Root Test," *Economics Letters*, 72(1), July 2001, pp. 19-25.

Dua, Parmi, Aneesa I. Rashid, and Dominick Salvatore, "The Impact of Financial and Fiscal Variables on Economic Growth: The Case of India and Korea," *International Economic Journal*, 14(2), Summer 2000, pp. 133-150.

Dueker, Michael J. and Gyuhan Kim, *Journal of International Financial Markets, Institutions, and Money*, 9(1), January 1999, pp. 19-31.

Edwards, Sebastian, "Are Devaluations Contractionary?," *Review of Economics and Statistics*, 68(3), August 1986, pp. 501-508.

Eichengreen, Barry, "Monetary and Exchange Rate Policy in Korea: Assessments and Policy Issues," Centre for Economic Policy Research, Discussion Paper Series, No. 4676, 2004.

Friedman, Benjamin, "The LM Curve: A Not-So-Fond Farewell," NBER Working Paper, 2003.

Hall, Robert E. and John B. Taylor, *Macroeconomics*, Fifth Edition, New York: W. W. Norton, 1997.

Han, Young-Wook, "Long Memory Property and Central Bank Intervention During the Currency Crisis in the Daily Korean Won-Dollar Exchange Rates," *Journal of the Korean Economy*, 4(1), Spring 2003, pp. 93-116.

Hsing, Yu L. and Sang H. Lee, "Estimating the Bank of Korea's Monetary Policy Reaction Function: New Evidence and Implications," *Journal of the Korean Economy*, 5(1), Spring 2004, pp. 1-16.

International Monetary Fund, *Republic of Korea – Concluding Statement of the 2004 Article IV Consultation Mission*, October 28, 2004.

Kim, Ginil, "Did the IMF-Prescribed High Interest Rate Policy Really Work in Korea? An Empirical Test," *Asia Pacific Journal of Economics and Business*, 4(2), December 2000, pp. 95-106.

Lee, Hyun-Hoon, "The IMF Rescue Program in Korea: What Went Wrong?," *Journal of the Korean Economy*, 2(1), Spring 2001, pp. 69-86.

Pobre, Mervin L., "Sources of Shocks and Monetary Policy in the 1997 Asian Crisis: The Case of Korea and Thailand," *Osaka Economic Papers*, 53(3), December 2003, pp. 362-373.

Romer, David, "Keynesian Macroeconomics without the LM Curve," *Journal of Economic Perspectives*, 14(2), Spring 2000, pp. 149-169.

Taylor, John B., *Economics*, Third Edition, Boston: Houghton Mifflin, 2001.

_____, *Monetary Policy Rules*, Chicago: University of Chicago Press, 1999.

_____, "Applying Academic Research on Monetary Policy Rules: An Exercise on Transnational Economics," *Manchester School*, 66, Supplement, 1998, pp. 1-16.

_____, "Discretion Versus Policy Rules in Practice," Carnegie-Rochester Conference Series on Public Policy, 39, 1993, pp. 195-214.

Upadhyaya, Kamal P., "Currency Devaluation, Aggregate Output, and the Long Run: An Empirical Study," *Economics Letters*, 64(2), August 1999, pp. 197-202.