

The Role of Macroeconomic Factors for Excess Returns: Evidence from a Group of Emerging Economies

Nicholas Apergis^a, George Artakis^b and Sofia Eleftheriou^{b*}

This study analyzes the dynamic relationship between excess returns and macroeconomic factors for a group of emerging markets spanning the period 1996-2009 and using the panel GMM estimator methodology, suggested by Arellano and Bond (1991). The empirical findings indicate that a number of macroeconomic factors play a significant role in explaining excess returns in our sample of emerging markets.

JEL Codes: O11, G11, C33

1. Introduction

Certain studies document the invalidation of a simple association between risk and return, as the CAPM predicts (Lakonishok and Shapiro, 1986). Moreover, Fama and French (1993) denote that more factors than firm's fundamentals and market risk could be responsible for determining a firm's financial aggregates, such as stock returns. Swanson *et al.* (2001) indicate that firm's fundamental signals provide value relevant information about the effects of certain macroeconomic variables on the market's expectation about changes in future cash flows and stock prices. Al-Qenae *et al.* (2002) investigate the effect of earnings and certain macroeconomic variables on stock prices for the Kuwait stock market. Their findings show that there exists a significant relationship between stock prices and earnings as well as macroeconomic variables, such as inflation and interest rates. By contrast, Johnson *et al.* (2000) do not find any relation between stock prices in 25 emerging economies and the extent of certain macroeconomic variables.

The absence of a simple association as it is predicted by the CAPM turns stronger for the case of emerging markets, which are less efficient and less liquid vis-à-vis the developed markets. Harvey (1995) shows that such markets are characterized by low betas, which make the evidence predicted by the CAPM less valid, while the simple CAPM model should incorporate country risk ratings as an additional explanatory variable in determining expected returns. Within a different strand of the investigation, Bekaert and Harvey (2000) and Sokalska (2001) argue that it is the local macroeconomic environment that seems to be more important in determining stock price movements.

a Department of Banking and Financial Management, University of Piraeus, 80 Karaoli and Dimitriou, 18534 Piraeus, Greece, Tel. +30-210-4142429, Email: napergis@unipi.gr

b Department of Business Administration, University of Piraeus, 80 Karaoli & Dimitriou, 18534 Piraeus, Greece, Tel. +30-2104142116, Email: gartik@unipi.gr

b* Corresponding author: Department of Business Administration, University of Piraeus, 80 Karaoli & Dimitriou, 18534 Piraeus, Greece, Tel. +30-210 4142429, E-mail: sofelef@unipi.gr and sofelef@otenet.gr

Apergis, Artikis & Eleftheriou

The primary goal of this study is to explore the role of macroeconomic factors in explaining excess returns for a group of emerging countries. Such economies usually attract the international investor's interest, while they are usually characterized by capital markets that offer very high returns, associated, however, with very high volatility of returns. The novelty of the study is that it uses a sample of countries never examined explicitly before in the relevant literature while it makes use of the panel GMM estimator methodology, suggested by Arellano and Bond (1991). The results of our study are expected to contribute to enrich the present literature and add significant value to investors, market practitioners as well as regulators. In particular, portfolio managers and investors are expected to find results useful for determining the future behavior and performance of the firms' excess returns, for identifying investment approaches, pursuing available investment opportunities, and reducing the likelihood of high value losses in the market. In addition, market regulators in those economies are expected to find the results useful in avoiding any unexpected catastrophes, controlling market strategies and assessing the degree to which the stock market in their countries may need to be reformed.

The remaining of this study is structured as follows. Section 2 describes the relevant literature, while Section 3 presents the data set used along with the empirical methodological approach. Section 4 reports the empirical analysis results. Finally, Section 5 concludes the paper.

2. Literature Review

The Arbitrage Pricing Theory (APT), as it was introduced by Ross (1976), initiated the use of variables that are associated with the macroeconomic environment of the firm. Chen *et al.* (1986) express the equity returns as a function of macroeconomic variables within their 'Macroeconomic Factor Model'. They conclude that stock returns are affected by certain macroeconomic variables mainly through the variables of the discount rate and expected dividends. The majority of relevant studies investigate the association between financial aggregates and macroeconomic variables for the U.S. (Clare and Thomas, 1994; Gjerde and Saettem, 1999; Flannery and Protopapadakis, 2002). Other studies pursue a similar investigation for the economies of East Asia (Bailey and Chang, 1996; Ibrahim and Aziz, 2003), while a third group of studies investigate the issue for groups of countries. Within this part of the literature, Bilson *et al.* (2001) suggest that consumer prices and real economic activity are not capable of explaining stock returns in a group of emerging economies, while exchange rates and money supply can do the job. Moreover, Wongbangpo and Sharma (2002) investigate the relevance of the macroeconomic environment in explaining stock returns for five ASEAN economies, while Rapach (2002) argues that inflation does not seem to be a significant variable in explaining stock price movements. Their results display that stock prices are positively related to output growth, which seems to be the sole macroeconomic variable that seems to be important. Tsoukalas (2003) finds a strong relationship between stock prices and the macroeconomic environment of firms listed on the Cypriot stock market. Chaudhuri and Smiles (2004) provide empirical support about a strong long-run relationship between stock prices and real macroeconomic activity, as it is described by real income, real private consumption and real oil prices for the Australian stock market, while Hammoudeh and Aleisa (2004) show that the primary determinants of stock prices are

Apergis, Artikis & Eleftheriou

inflation and variables associated with fiscal policy issues. In general, the findings of the majority of the above studies have generated mixed results, depending not only on the set of macroeconomic variables used, but also on the methodological approach followed.

3. Data and the Methodological Approach

The study makes use of quarterly data for a group of countries spanning the period 1996-2009. The data set includes stock market prices, proxied by the country's capital market index, while a number of manufacturing firms were used from each country along with their stock prices. Data was obtained from Bloomberg and the criterion of selected period was based on data availability. The Appendix provides information about the countries used along with the number of firms from each country from which those stock prices were obtained. The data set also includes a number of certain macroeconomic factors, such as the production capacity of the economy as it is proxied by GDP (Y) [the variable affects the value of firm's cash flows], the consumer price index (P) [the variable directly affects the nominal value of cash flows], the liquidity (M) in the economy as it is defined as M1, the short-term interest rate (R), the trade deficit (TR), as it is defined by the difference between exports and imports as a percentage of the country's GDP, and the government deficit (DEF), as a percentage of the country's GDP. Data on macroeconomic fundamentals was obtained from the IMF's International Financial Statistics (IFS) database. Only non-financial firms listed on stock exchanges are involved. The reason is that financial firms have, on average, higher leverage (Fama and French, 1995).

The focus of the empirical analysis is the impact of certain macroeconomic variables on excess stock returns. Our benchmark model planned to be tested in this study is an extension of the standard CAPM mode, expressed as:

$$r_{it} - r_t^f = b_0 + b_1 (r_t^m - r_t^f) + b_2 \Delta r_{1t} + b_3 \Delta r_{2t} + \dots + b_k \Delta r_{kt} + u_{it}$$

where $i = 1, \dots, N$ for each firm in the i th country in the panel, $t = 1, \dots, T$ refers to the time period, r_{it} is the variable of stock returns for the stock i , r_t^f is the risk-free rater, r_t^m is the returns of the local market index, while the r_{kt} denote macroeconomic factors. Finally, Δ denotes first differences and u 's are random variables, i.e. white noises with $N(0, \sigma^2)$. The parameter b_1 is expected to be positive. The model has been estimated using the panel GMM estimator, suggested by Arellano and Bond (1991), while only statistically significant lags are used in the estimation.

4. Empirical Results

4.1 Panel Unit Root Tests

At the outset, the statistical properties of all the variables under investigation are examined by testing for the presence of unit roots. There are a variety of panel unit root tests, which include Maddala and Wu (1999), Hadri (2000), Levin *et al.* (LLC, 2002), Im *et al.* (IPS, 2003), and Carrion-i-Silvestre *et al.* (2005), among others. The results in Table 1 point out that the hypothesis that all the macroeconomic variables under study contain a

Apergis, Artikis & Eleftheriou

unit root, is accepted at the 1% significant level in all tests, suggesting that these variables are I(1). By contrast, excess returns for individual stocks as well as for market indexes are shown to be I(0) variables.

Table 1: Panel Unit Root Tests

IPS Panel Unit Root Tests		
Variables	Without Trend	With Trend
y	-2.11(3)	-2.28(3)
Δy	-5.30(1)*	-5.66(2)*
m	-1.09(2)	-1.36(2)
Δm	-4.93(2)*	-5.18(2)*
def	-1.71(2)	-1.94(2)
Δdef	-4.83(1)*	-4.97(1)*
p	-1.83(3)	-1.94(3)
Δp	-5.48(1)*	-5.82(1)*
tr	-2.13(2)	-2.34(2)
Δtr	-5.21(1)*	-5.74(1)*
$r_i - r^f$	-7.71(2)*	-7.84(2)*
$r_t^m - r_t^f$	-6.58(2)*	-6.82(1)*
LLC Panel Unit Root Tests		
Variables	With Trend	
y	-2.03	
Δy	-5.28*	
m	-1.14	
Δm	-4.84*	
def	-1.55	
Δdef	-4.94*	
p	-1.62	
Δp	-5.27*	
tr	-2.19	
Δtr	-5.38*	
$r_i - r^f$	-6.42*	
$r_t^m - r_t^f$	-6.94*	

Table 1: Panel Unit Root Tests (Continued)

Handri (hom) Panel Unit Root Tests

Variables	With Trend
y	22.03*
Δy	1.09
m	15.24*
Δm	1.14
def	16.55*
Δdef	1.44
p	17.62*
Δp	1.18
tr	22.19*
Δtr	1.34
$r_i - r^f$	1.37
$r_t^m - r_t^f$	1.23

Handri (het) Panel Unit Root Tests

Variables	With Trend
y	20.32*
Δy	1.14
m	13.22*
Δm	1.07
def	12.73*
Δdef	1.39
p	14.02*
Δp	1.25
tr	18.14*
Δtr	1.27
$r_i - r^f$	1.41
$r_t^m - r_t^f$	1.37

Fisher-ADF

Variables	
y	20.45
Δy	104.46*
m	17.83
Δm	98.77*
def	18.51
Δdef	92.34*
p	17.63
Δp	112.52*
tr	19.75
Δtr	108.75*
$r_i - r^f$	112.57*
$r_t^m - r_t^f$	108.47*

Table 1: Panel Unit Root Tests (Continued)

Fisher-PP

Variables	
y	24.58
Δy	117.17*
m	19.72
Δm	99.93*
def	21.56
Δdef	97.88*
p	19.59
Δp	119.69*
tr	24.17
Δtr	129.82*
$r_i - r_i^f$	116.55*
$r_t^m - r_t^f$	113.07*

Numbers in parentheses are the augmented lags included in the unit root test, while Δ denotes first differences. * denotes statistical significance at 1%

4.2 Dynamic Heterogeneity

An issue that it is of major concern is the heterogeneity of the firms included in this data set. In particular, through time and across countries, the effect of accounting information on stock returns was investigated. In the statistical framework of this study we first test for heterogeneity and then by controlling for it through appropriate techniques (Holtz-Eakin, 1986; Holtz-Eakin *et al.*, 1985). The dynamic heterogeneity, i.e. variation of the intercept over countries and time, across a cross-section of the relevant variables can be investigated as follows: In the first step, an ADF(n) equation for each relationship in the panel is estimated; then, the hypothesis of whether regression parameters are equal across these equations is tested. Next, a similar test of parameter equality is performed by estimating a n-order autoregressive model for each of the relationships under investigation. Standard Chow-type F tests under the null of parameter equality across all relationships are also performed. Heterogeneity in cross-sectional parameters is indicated if the results reject the null hypothesis. Finally, homogeneity error variance across groups is also examined as another measure of dynamic heterogeneity. White's tests for group-wise heteroscedasticity are employed to serve this objective. The results of this procedure are reported in Table 2. The empirical findings indicate that the relationship under consideration is characterized by heterogeneity of dynamics and error variance across groups, supporting the employment of panel analysis.

Table 2: Tests of Dynamic Heterogeneity across Groups

Specification	ADF(3)	AR(3)	White's Test
	28.16*	38.92*	68.37*

Apergis, Artikis & Eleftheriou

ADF(3) reports the parameter equality test (F-test) across all relationships in the panel. AR(3) displays the F-test of parameter equality conducted in a third-order autoregressive model of the relationships. White's test reports the White's test of equality of variances across the investigated relationships in the panel. Δ denotes first differences. * denotes statistical significance at 1%.

4.3 GMM Results

The results concerning the GMM estimations are summarized in Table 3. The GMM estimator, suggested by Arellano and Bond (1991), ensures both efficiency and consistency since all slope coefficients are estimated simultaneously. The reported Sargan test ensures the validity of instruments used. In our model the coefficients are shown to have the expected theoretical signs and they are statistically significant at the 1 percent significance level. The empirical findings lead us to the following observations:

- ▶ The empirical evidence with respect to the impact of inflation on stock prices is inconclusive. In particular, Chen *et al.* (1986), Flannery and Protopapadakis (2002) and Wongbangpo and Sharma (2002) argue that inflation is negatively associated with stock returns. In the same framework, Maysami and Koh (2000) argue that higher inflation usually leads to upcoming tighter economic policies that are expected to have a negative impact on financial aggregates. By contrast, according to Clare and Thomas (1994) and Ibrahim and Aziz (2003), this association turns out to be positive, which is probably explained by the inadequacy of the hedging role of stocks against inflation. Our results indicate that inflation is a factor that has a positive impact on excess stock returns in our emerging economies sample.
- ▶ Evidence in the literature displays that there is a positive association between output and stock returns (Park, 1997). This association is mainly due to the reaction of stock market participants to macroeconomic variables tight to higher (lower) output, such as high (low) employment, which in turn, are positively related to earnings and future business conditions. Hassapis and Kalyvitis (2002) also show that there exists a positive association between stock returns and future growth, which is probably due to the link between anticipated economic growth and the current price of capital. Our empirical findings confirm the above arguments by reporting a positive association between income and excess stock returns.
- ▶ Mukherjee and Naka (1995) and Cheung and Ng (1998) report a positive association between money supply and stock prices, on the grounds that money supply changes have a positive impact on real economic activities variables. Gan *et al.* (2006) also display that opportunity costs of holding cash rise with higher interest rates and the trade-off to holding other interest-bearing assets would lead to lower stock prices and returns. Our empirical findings are consistent with these arguments by displaying a positive relationship between excess stock returns and money supply.
- ▶ In terms now of budget deficits, the relationship between stock prices and such deficits is important, because large deficits tend to undermine investors' confidence through the inability of firms to raise capital on favorable terms. At the same time, large budget

Apergis, Artikis & Eleftheriou

deficits affect stock prices through their impact on inflation as well as through expected future taxes and rising interest rates. Bulmash and Trivoli (1991) find a positive association between such deficits and stock returns. Adrangi and Allender (1998) provide evidence that a negative association between stock returns and budget deficits in many countries is documented. The empirical results of this study reveal a positive association between government deficits and excess stock returns, implying that in emerging economies these deficits act as a boost-up mechanism for the economy, thus, leading to higher stock returns.

► The current literature on the link between stock prices and the trade account deficit is small. Very few authors discuss the association between stock price shocks and global imbalances, such as Fratzscher *et al.* (2007), Barnett and Straub (2008) and Fretzschler and Straub (2009). The literature generates mixed results across countries. In our case, the association turns out to be positive, probably indicating that the presence of a trade deficit is expected to depreciate the domestic currency, thus, leading to higher exports and higher growth.

► The relationship between stock returns and interest rates is negative, a piece of evidence supported by Chen (1991), Gjerde and Saettem (1999) and Maysami and Koh (2000). This negative association implies that interest rates represent not only the opportunity cost of investments in the stock exchange market, but also higher borrowing costs from the banking sector, considering that our economies under study are a part of a bank-based borrowing system.

► The constant term turns out to be statistically insignificant, implying that by introducing the macroeconomic factors in the CAPM model keeps pricing errors very low.

► Finally, the local indices are shown to be statistically insignificant, indicating that this factor as well is capable of explaining some of the volatility of stock returns.

Table 3: GMM Results

Dependent Variable	Coefficient	t-statistic
b_0	0.047	1.12
$b_{1(rm-rf)}$	0.026	4.59*
$b_{2(p)}$	0.326	4.71*
$b_{3(y)}$	0.178	4.82*
$b_{4(m)}$	0.306	5.94*
$b_{5(tdef)}$	0.247	8.05*
$b_{6(tr)}$	0.426	5.24*
$b_{7(R)}$	-0.142	5.48*
R-squared 0.71		
Sargan test 0.917 [p-value=0.46]		

* denotes statistical significance at 1%.

5. Conclusions

Our study investigated the relationship between excess stock returns and the macroeconomic environment for a sample of emerging economies. The empirical results recommend that potential investors should pay attention to information emerging from the macroeconomic environment. In addition, the monetary authorities should also benefit from the empirical findings of this study, especially those that implement an inflation-targeting based monetary policy, considering the close ties of the stock market with the macroeconomic environment. A future research agenda could use an expanded set of macroeconomic variables, which might provide alternative information contents about their impact on excess stock returns.

References

- Adrangi, B and Allender, M 1998, Budget deficits and stock prices: international evidence, *Journal of Economics and Finance*, Vol. 22, pp. 57-66.
- Al-Qenae, R, Li, C and Wearing, B 2002, The information content of earnings on stock prices: the Kuwait stock exchange, *Multinational Finance Journal*, Vol. 6, pp. 197-221.
- Arellano, M and Bond, S 1991, Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of Economic Studies*, Vol. 58, pp. 277-297.
- Bailey, W and Chung, YP 1996, Risk and return in the Philippine equity market: a multifactor exploration, *Pacific-Basin Finance Journal*, Vol. 4, pp. 197-218.
- Barnett, A and Straub, R 2008, What drives U.S. current account fluctuations?, ECB Working Paper, No. 959.
- Bekaert, G and Harvey, C 2000, Foreign speculators and emerging equity markets, *Journal of Finance*, Vol. 55, pp. 565-613.
- Bilson, CM, Brailsford, TJ and Hooper, VJ 2001, Selecting macroeconomic variables as explanatory factors of emerging stock market returns, *Pacific-Basin Finance Journal*, Vol. 9, pp. 401-426.
- Bulmash, S and Trivoli, G 1991, Time-lagged interactions between stock prices and selected economic variables, *Journal of Portfolio Management*, Vol. 17, pp. 61-67.
- Chen, NF 1991, Financial investment opportunities and the macroeconomy, *Journal of Finance*, Vol. 46, pp. 529-554.
- Chen, NF, Roll, R and Ross, SA 1986, Economic forces and the stock market, *Journal of Business*, Vol. 59, pp. 383-403.
- Cheung, YW and Ng, LK 1998, International evidence on the stock market and aggregate economic activity, *Journal of Empirical Finance*, Vol. 5, pp. 281-296.
- Chaudhuri, K and Smiles, S 2004, Stock market and aggregate economic activity: evidence from Australia, *Applied Financial Economics*, Vol. 14, pp. 121-129.
- Cjerde, O, Knivsfla, KH and Soettem, F 2005, The Value relevance of financial reporting on the Oslo stock exchange over the period 1964-2003, Working Paper, Norwegian School of Economics and Business Administration, Norway.
- Clare, AD and Thomas, SH 1994, Macroeconomic factors, the APT and the UK stock market, *Journal of Business Finance and Accounting*, Vol. 21, pp. 309-330.

Apergis, Artikis & Eleftheriou

- Fama, EF and French, KR 1995, Size and book-to-market factors in earnings and returns, *Journal of Finance*, Vol. 50, pp. 131-155.
- Fama, EF and French, KR 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics*, Vol. 33, pp. 3-56.
- Flannery, MJ and Protopapadakis, AA 2002, Macroeconomic factors do influence aggregate stock returns, *Review of Financial Studies*, Vol. 15, pp. 751-782.
- Fratzscher, M and Straub, R 2009, Asset prices and current account fluctuations in G7 economies, ECB Working Paper, No. 1014.
- Fratzscher, M, Juvenal, L and Sarno, L 2007, Asset prices, exchange rates and the current account, ECB Working Paper, No. 790.
- Gan, C, Lee, M, Young, HWA and Zhang, J 2006, Macroeconomic variables and stock market interaction: New Zealand evidence, *Investment Management and Financial Innovations*, Vol. 3, pp. 5-20.
- Gjerde, O and Saettem, F 1999, Causal relations among stock returns and macroeconomic variables in a small open economy, *Journal of International Financial Markets, Institutions and Money*, Vol. 9, pp. 61-74.
- Hadri, K 2000, Testing for stationarity in heterogeneous panel data, *Econometric Journal*, Vol. 3, pp. 148-161.
- Hammoudeh, S and Aleisa, E 2004, Dynamic relationships among GCC stock markets and NYMEX oil future, *Contemporary Economic Policy*, Vol. 22, pp. 250-269.
- Harvey, CR 1995, Predictable risk and returns in emerging markets, *Review of Financial Studies*, Vol. 8, pp. 773-816.
- Hassapis, C and Kalyvitis, S 2002, Investigating the links between growth and real stock price changes with empirical evidence from the G-7 economies, *Quarterly Review of Economics and Finance*, Vol. 42, pp. 543-575.
- Holtz-Eakin, D 1986, Testing for individual effects in dynamic models using panel data, NBER Technical Paper Series", No. 57.
- Holtz-Eakin, D, Newey, W and Rosen, H 1985, Implementing causality tests with panel data with an example from local public finance, NBER Technical Working Paper, No. 48.
- Im, KS, Pesaran, MH and Shin, Y 2003, Testing for unit roots in heterogeneous panels, *Journal of Econometrics*, Vol. 115, pp. 53-74.
- Johnson, S, Boone, P, Breach, A and Friedman, E 2000, Corporate governance in the Asian financial crisis, *Journal of Financial Economics*, Vol. 58, pp. 141-186.
- Lakonishok, J and Shapiro, A 1986, Systematic risk, total risk, and size as determinants of stock market returns, *Journal of Banking and Finance*, Vol. 10, pp. 115-132.
- Levin, R, Lin, CF and Chu, C 2002, Unit root tests in panel data: asymptotic and finite sample properties, *Journal of Econometrics*, Vol. 108, pp. 1-24.
- Maddala, GS and Wu, S 1999 A comparative study of unit root tests with panel data and a new simple test, *Oxford Bulletin of Economics and Statistics*, Vol. 61, pp. 631-652.
- Maysami, RC and Koh, TS 2000, A vector error correction model of Singapore stock market, *International Review of Economic and Finance*, Vol. 9, pp. 79-96.
- Mukherjee, TK and Naka, A 1995, Dynamic relations between macroeconomic variables and the Japanese stock market: an application of a vector error correction model, *Journal of Financial Research*, Vol. 18, pp. 223-237.

Apergis, Artikis & Eleftheriou

- Park, S 1997, Rationality of negative stock-price responses to strong economic activity, *Financial Analysts Journal*, Vol. 53, pp. 52-56.
- Rapach, DE 2002, The long-run relationship between inflation and real stock prices, *Journal of Macroeconomics*, Vol. 24, pp. 331-351.
- Ross, SA 1976, The arbitrage theory of capital asset pricing, *Journal of Economic Theory*, Vol. 13, pp. 341-360.
- Sokalska, M 2001, What drives equity returns in Central and Eastern Europe, Working Paper, Warsaw School of Economics.
- Swanson, E, Rees, L and Juarez-Valdes, L 2001, The contribution of fundamental analysis in the presence of inflation and a currency devaluation, Working Paper, Texas A & M University.
- Tsoukalas, D 2003, Macroeconomic factors and stock prices in the emerging Cypriot equity market, *Managerial Finance*, Vol. 29, pp. 87-92.
- Wongbangpo, P and Sharma, SC 2002, Stock market and macroeconomic fundamental dynamic interactions: ASEAN-5 countries, *Journal of Asian Economics*, Vol. 13, pp. 27-51.

Apergis, Artikis & Eleftheriou

Appendix

Countries	Number of firms
Argentina	175
Brazil	284
Chile	128
Czech	235
Egypt	42
India	570
Indonesia	355
Israel	140
Malaysia	367
Mexico	322
Pakistan	60
Peru	55
Philippines	110
Thailand	158
South Africa	140
Venezuela	85