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MACROECONOMIC FACTORS AND PHILIPPINE STOCK RETURNS

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This study focuses on the role of macroeconomic fluctuations as risk factors that influence cross-sectional variability in stock returns. The study covered the listed firms represented in the Phisix for the period 1994-2000. It uses a multifactor asset pricing framework that is based on the inherent trade-off between risk and return that has been a basic principle of investment theory since at least Markowitz. Seven macroeconomic factors, in addition to excess market return, are identified as potential sources of significant risks to individual firms. Regression results indicate that fluctuations in all of these macroeconomic factors have significant influence on individual stock returns.

An exact formulation of the multifactor asset pricing model, however, fails to price the macroeconomic risk factors. Some possible explanations are offered for the poor results. The first one is that available macroeconomic data do not provide adequate measures of the underlying systematic risks that influence returns. This includes the possibility that some significant macroeconomic risk factors are omitted from the model because of lack of data. The second is that lack of market efficiency may result in excess profits that can be gained by arbitrage, violating the major assumption of the exact formulation of the multifactor model. Finally, large idiosyncratic risks that are not fully diversified away may be present in investor portfolios. These do not necessarily invalidate the model but they can lead to large pricing errors such that tests have little power to reject the null hypothesis that factor prices are zero. Thus, systematic risks due to macroeconomic factors, while significant, may not by themselves be able to fully explain observed variation in stock returns. Some areas for further research are indicated.

I. INTRODUCTION

The purpose of this study is to examine the role of macroeconomic risk factors in determining cross-sectional variations in stock returns. It uses a multifactor asset pricing framework that is based on the inherent trade-off between risk and return that has been a basic principle of investment theory since at least Markowitz (1952). In the context of asset pricing, risk is defined to be the volatility of stock returns measured by either the standard deviation or variance. Systematic risk represents that portion of volatility induced by unanticipated macroeconomic fluctuations and cannot be diversified away. Idiosyncratic risk is the difference between total volatility or risk and systematic risk. Based on standard investment theory, given enough assets in an investor's portfolio, idiosyncratic risks can be diversified away and can be ignored for pricing purposes. Thus, only systematic risk should matter in asset pricing.

However, the results of efficiency studies of the local stock market, for example Aquino (2002), indicate that the local bourse is probably only weak-form efficient. This suggests that excess profits can be made by trading on information indicating that arbitrage possibilities exist and some investors are prevented from holding their optimal

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portfolios. Anecdotal evidence also suggests the lack of diversification and the short-term orientation in individual and institutional investor portfolios. These sub-optimal conditions imply that idiosyncratic risk could also be priced to compensate rational investors for their inability to hold their optimal portfolios (Campbell, Lettau, Malkiel, and Xu, 2001).

This study is organized as follows: Section 2 discusses multifactor asset pricing models and the associated theoretical and empirical issues. Section 3 discusses the data and methodology used in the study. Section 4 discusses the extraction and selection of macroeconomic variables used in the analysis. Section 5 examines the impact of macro-economic fluctuations on stock returns. In Section 6, the hypothesis that the market prices the macroeconomic sources of systematic risk is tested. Section 7 concludes the study.

II. MULTIFACTOR MODELS: THEORETICAL AND EMPIRICAL ISSUES

Both the Arbitrage Pricing Theory (APT) introduced by Ross (1976) and the Intertemporal Capital Asset Pricing Model (ICAPM) introduced by Merton (1973) give a multifactor asset pricing model that, unlike the basic capital asset pricing model (CAPM) or the consumption-based CAPM, allows for factors other than market returns or aggregate consumption to explain cross-sectional variation in individual asset returns. The main difference between APT and ICAPM is that the factors in APT originally are traded portfolios and the factors in ICAPM are state variables.[1] In current empirical practice, however, this distinction is often ignored. For an economy with N assets, the unconditional form of the model assumes that the asset return generating process can be expressed in matrix notation as (see Campbell, Lo and MacKinlay, 1997):

$$(1)\quad R^{exc} = a + Bf + \varepsilon$$

$$(2)\quad E[\varepsilon] = 0$$

$$(3)\quad E[\varepsilon\varepsilon'] = \Sigma$$

where $R^{exc} = R - R_f$ is the (N x 1) vector of asset excess returns over the risk-free rate, a is the (N x 1) intercept vector, B is an (N x K) beta matrix, f is a (K x 1) vector of common factor realizations, and ε is the (N x 1) vector of disturbances. It is assumed that the common factors account for the common variation in returns such that the disturbance term for large well-diversified portfolios disappears. Thus, the disturbance terms must be sufficiently uncorrelated across assets (Σ is not necessarily diagonal).

Given this structure, Ross (1976) shows that the absence of arbitrage implies that the following relation can approximate the expected returns for the N assets

$$(4)\quad E[R^{exc}] \approx B\lambda,$$

where $E[R^{exc}]$ is the (N x 1) vector of expected asset excess returns and λ is the (K x 1) vector of factor risk premia. The risk premium of an individual factor is the compensation or additional price demanded by an investor for an extra unit of that risk factor associated with the asset. The beta of the asset for that factor represents the asset's sensitivity to that factor. Thus, the expected return on an asset is equal to the return to a risk-free asset (or zero-beta asset) plus the sum of the individual factor premia weighted by the asset betas as shown in (4). In exact APT models, this relationship becomes an equality.

The difference between the left-hand-side and the right-hand-side in equation (4) for finite N is the vector of pricing errors $v = E[R^{exc}] - B\lambda$. Ingersoll (1987, Chapter 7) showed that even in the presence of idiosyncratic risks, the APT would hold and the pricing errors tend to zero as N goes to infinity. However, Ingersoll also showed that for a finite number of assets the pricing errors would be larger as idiosyncratic risks were larger.

Like the basic single-factor CAPM, the multifactor model has been subjected to an entire literature of testing. Huberman (1989), Campbell, Lo and MacKinlay (1997) and Cochrane (2001) cover various approaches to estimating and testing APT and multifactor models as well as reviews of the econometric evidence in the U. S. market. Estimating and testing multifactor models are generally based on the exact version, that is, $E[R^{exc}] = B\lambda$. It is extremely difficult to discuss the issues concerning the estimation and testing of multifactor models in limited space but the following points cover the essentials:

(a) There are two general modeling approaches. The first, based on the APT, assumes that the vector of factors f in equation (1) is unobservable (at least initially). These are identified using multivariate statistical methods such as maximum likelihood or principal components factor analysis. The number of factors is also determined by the procedure used. The identities of the factors are subjectively determined by their factor loadings and given meanings usually in terms of the characteristics of the mimicking portfolios of stocks with similar statistical properties as the factors.[2] The second approach, in line with the ICAPM, predetermines the number and identities of the factors either based on theory or prior empirical evidence. Factors are usually macroeconomic variables or firm characteristics (e.g., size, book-to-market ratios, etc.). The approach in this paper is based on the second in the sense that macroeconomic variables are used as factors. However, factor analysis under the first approach is used to help identify the factors.

(b) There are two general approaches in estimating the factor loading matrix B and the vector of risk premia λ. The first is the so-called two-pass procedure (Fama and MacBeth, 1973) where B is estimated row by row using ordinary least squares (OLS) in equation (1) using time series data and λ is estimated cross-sectionally in equation (4). The second approach is to simultaneously estimate B and λ as a system of simultaneous equations. The latter approach is used in this study.[3]

(c) The testing procedures generally follow the estimation procedure used. In general, the procedures involve testing whether the intercept vector in a regression using equation (4) is zero or, if the gross returns are on the left-hand-side, whether the intercepts are uniformly equal to the risk-free interest rate. Then, the λ's are tested, jointly or individually, for significance. If they are significant, the factors are deemed priced by the market. Finally, additional factors are added, usually the individual stock's own return volatility, to determine if the factors already included account for all observed variation in expected returns.

The results of testing the multifactor models in the U. S. have been inconclusive (Huberman, 1989; Goyal and Santa-Clara, 2001) although the performance of multifactor models has been better than the CAPM. A typical conclusion by reviewers of empirical results is that of Haugen (1997) who states that "empirical testing of the APT is at an early stage of development, and there is no conclusive evidence either supporting or contradicting the model." In the Philippines, mention must be made of Mangaran's 1993 study where he tested the APT for the periods 1972-1981 and 1982-1991. His risk factors are four unobserved portfolios found significant in each period which were extracted using maximum likelihood factor analysis. The overall results are mixed with only a few of the extracted risk factors found significant or priced.

III. DATA AND METHODOLOGY

Monthly data on stock prices and cash and stock dividends for 1994-2000 are from the Philippine Stock Exchange. Let P_t denote end of month prices, D_t the cash dividends per beginning share, and SDV_t the stock dividends as proportion of existing shareholdings, monthly simple returns for stock i are computed as follows:

$$R_{it} = \frac{P_t \times (1 + SDV_t) + D_t - P_{t-1}}{P_{t-1}}.$$

If cash dividends are declared after the payment of stock dividends (which did not apply to the data), the appropriate adjustments have to be made.

Philippine macroeconomic data are from the National Economic and Development Authority (NEDA), the Philippine Institute for Development Studies (PIDS) website and the Bangko Sentral ng Pilipinas (BSP) Statistical Bulletins. U. S. economic data are from the Federal Reserve Bank of St. Louis website.

In estimating the systematic and idiosyncratic components of total risk, it is assumed that a fixed number of macroeconomic variables are the sources of systematic risks. The macroeconomic variables chosen as risk factors were identified from past studies and partly by factor analysis and regression methods from a comprehensive list of candidate macroeconomic variables that were prepared based on availability of published statistics and the results of previous empirical investigations. The selection process is discussed in detail in the next section.

Given the macroeconomic variables, seemingly unrelated regression (SUR) estimation is used where the factor prices λ in pricing equation (4) are estimated together with the betas in equation (1). This is also to allow for contemporaneous correlation between error terms across assets in equation (1). The model is tested for goodness-of-fit using a likelihood ratio test. Then the factor prices λ are tested for significance.

IV. EXTRACTION AND SELECTION OF MACROECONOMIC VARIABLES

Fluctuations in the realizations of macroeconomic variables affect returns through investors' perception that the underlying risks they represent have changed. Thus, observed changes in macroeconomic data can be interpreted as proxies for the unobserved macroeconomic risks. In the U.S., extensive research (Burmeister, Roll and Ross, 1998) has shown that five factors explain much of the variation in stock returns: confidence risk, time horizon risk, inflation risk, business cycle risk, and market timing risk. The purpose of this section is to determine which set of reported macroeconomic statistics can best represent these risks and, in the Philippine setting, whether there are other latent risks that can also contribute to explaining stock returns.

A comprehensive list of candidate macroeconomic state variables is prepared here based on the results of previous investigations and availability of Philippine data. Table 1 lists down the macroeconomic variables used in selected papers. All of these studies covered the U. S. stock market except that of Ferson and Harvey (1994) which covered eighteen countries (16 OECD countries plus Singapore, Malaysia and Hong Kong). The list of candidate variables is later shortened as they are subjected to statistical analysis.

One of the earliest studies relating macroeconomic forces to stock market returns is by Chen, Roll and Ross (1986). They used a two-pass procedure originated by Fama and MacBeth (1973) to test the influence of macroeconomic variables on U. S. stock market returns from 1958-1984. The variables were selected based on past empirical studies by the authors and statistical analysis. The inclusion of consumption changes is to test the validity of the basic Consumption CAPM, and the inclusion of oil prices is to test the popular notion that unanticipated movements in oil prices is a major source of risk in the financial markets.

In a previous study (Aquino, 2002), the significance of the exchange rate, real exchange rate, aggregate consumption, aggregate export, real money supply, real GDP, real domestic interest rate measured by the 91-day treasury bill rate, and real foreign interest rate measured by the London interbank offered rate (LIBOR) minus inflation rate as co-integrating variables with stock returns was noted. It is particularly problematic that aggregate consumption, GDP and exports are only available as quarterly series. However, these variables are highly correlated with combinations of the variables representing real money balances, nominal exchange rate, real exchange rate, and an index of industrial production.

On the basis of the above and the available monthly macroeconomic data series, and after testing for stationarity, the following variables are selected for further analysis:

ib_t – the interbank call loan rate

π_t^u – a measure of unexpected inflation

sp_t – U.S. Standard and Poor's (S&P) 500 stock market index

Δrm_t – monthly change in real money balances (M2)

Δo_t – monthly change in the index of the value of industrial production

rs_t^f – spread between the 90-day LIBOR and the 91-day treasury bill

Δe_t – change in the end of month nominal exchange rate

Δrer_t – change in the end of month real exchange rate

Δr_t^d – monthly change in the 91-day treasury bill

rs_t^d – spread between the 364-day treasury bill and the 91-day treasury bill

Δop_t – monthly change in the U.S. dollar price per barrel of crude oil

$\Delta \pi_t^e$ – monthly change in a measure of expected inflation

$\Delta o12_t$ – change in the annual growth rate of the value of industrial production

Some comments on the selection of variables are appropriate. Most of the variables used in the U.S. studies (or their equivalent in the Philippine context) are included except for those representing time horizon (measured by the term premium) and confidence (measured by the default spread) risks. For time horizon risk, the closest measure one can have for the Philippines is the difference between the 364-day treasury bill rate and the 91-day treasury bill rate. There are also variables that are generally not included in U.S. studies but included here. For example, a foreign stock index, the U.S. S&P 500, is included because of the popular notion that Philippine stock returns are sensitive to movements in U.S. macroeconomic variables and the U.S. stock market. Because of the extreme sensitivity of the Philippine economy to international economic developments, nominal and real exchange rate measures and an interest rate parity measure represented by the spread between the 90-day LIBOR and the 91-day treasury bill are included in the list.

Expected inflation is obtained from a vector autoregression (VAR) of nine macroeconomic variables. The nine macroeconomic variables are actual inflation rate, index of industrial production, interbank call rate, exchange rate, real exchange rate, real money balances (M2), 364-day treasury bill rate, 91-day treasury bill rate, and 90-day LIBOR. Based on the Akaike Information Criterion and the Schwarz Criterion, only one lag is used. Unexpected inflation is obtained as the residual. Table 2 shows the correlation matrix of the macroeconomic variables selected. Except for the correlation of the monthly growth in the index of industrial production and its annual change, the correlation of the spread between LIBOR and the 91-day treasury bill rate with the U. S. S&P 500 index and the interbank call loan rate, and the negative correlation of monthly change in nominal exchange rate with that of the real exchange rate, the correlation coefficients are rather low. This makes the correlation matrix closer to orthogonality and tends to increase the precision of parameter estimates. Thus, it appears that multicollinearity should not pose any serious problem in estimation and, except for the variables just mentioned, no one variable can be considered as a close substitute for another.

Factor analysis[4] using maximum likelihood estimation is used to determine which of the macroeconomic variables selected have the most co-variability with the movements in the returns of individual stocks and also to reduce the number of variables to a manageable level. This analysis considers an asset return generating process embodied by the system described in equations (1) to (3) where the factors are latent or unobserved factors that can only be extracted through factor analysis. The original test of the APT by Roll and Ross (1980) in the U. S. and that by Mangaran (1993) in the Philippines used this method. They then assigned economic or industry interpretations to the extracted factors. In this study, in view of the stated objectives, the factors extracted are further related to the candidate macroeconomic variables listed in the previous section.

Factor analysis itself involves two stages. The first stage involves estimating the beta or factor sensitivity matrix or factor loading matrix B and the disturbance covariance matrix Σ. Given K unobserved factors, where K is to be determined from the data, the covariance matrix of asset returns can be expressed as the sum of the variation due to the common factors and the residual variation, as follows:

$$(5)\quad \Omega = B\Omega_K B' + \Sigma ,$$

where $\Omega_K = E[ff']$ and Σ is a diagonal matrix. With unknown factors, B is identified only up to an orthogonal transformation and all transformations BG are equivalent for any (K x K) orthogonal (i.e., $GG' = I$, the identity matrix) transformation. Thus, set $\Omega_K = I$ such that B is now unique. With this, equation (5) is restated as:

$$(6)\quad \Omega = BB' + \Sigma.$$

To apply these concepts, sample estimates of the covariance matrix of stock returns Ω are computed. The data set used consists of data from 18 stocks with continuous trading history from 1994-2000. The correlation matrices of the stock returns are shown in Tables 3. The acronyms in the table are the Philippine Stock Exchange codes for the listed stocks which for convenience are listed in Table 4. All correlation coefficients are statistically significant mostly at the 95% and 99% confidence levels except for the correlation coefficient of the return on the B shares (unrestricted ownership) of the lone mining company to the returns on the B shares of the power company and the shares of a state-owned commercial bank. Thus, there seems to be a definite variance-covariance structure in the data that can be exploited in factor analysis.

Factor analysis identified four latent factors. To aid in identifying the factors, an orthogonal transformation of the factor loading or sensitivity measures (called factor rotation) using the Varimax method is performed.[5] The rotated factors are shown in Table 4. Factor 1 is heavy (bold entries) on the majority of the stocks except for those heavy on the other factors. This may be labeled by the catchall term commercial-industrial factor. Factor 2 is heavy on the stocks of the most dominant utility and manufacturing companies, which are among the longest-listed stocks in the bourse. This factor can be called the blue-chip factor. Factor 3 is heavy on the stocks of one of the oldest mining companies in the Philippines. Thus, this factor can be regarded as the mining factor. Factor 4 is heavy on the stocks of the power company. Thus, this factor is considered to have already been subsumed under factor 2.

To relate the extracted factors to the macro variables under study, factor scores or realizations of the latent factors are computed from the factor loadings and actual returns data. The factor scores thus recovered are then regressed against the realizations of the candidate macroeconomic variables. The macroeconomic variables that are highly correlated with the unobserved factors are then selected as relevant macroeconomic factors to be used in subsequent analysis. Thus, the statistically generated factors are given macroeconomic significance.

The regression results are shown in Table 5. Factor 1 regression is significant on the monthly change in nominal exchange rate. Factor 2 is significant on the spread between the 90-day LIBOR and the 91-day treasury bill rate, the monthly change in real money balances and a measure of expected inflation. However, no variable is significant on the factor 3 and factor 4 regressions. Thus, factor analysis results in four macroeconomic variables for subsequent analysis. Of these, the nominal exchange rate measure and the spread between foreign and domestic interest rates are new, representing foreign exchange-related risks. The other two variables have been used before in U.S. empirical studies. In addition, three other variables are also considered based on their inclusion in many past studies. The monthly change in the index of the value of industrial production is included in order to have a measure of business cycle risk. Also included is the difference between the 364-day treasury bill rate and the 91-day treasury bill rate as the closest measure one can have for the time horizon risk. The inclusion of the monthly change in the U.S. dollar price per barrel of crude oil is to test the popular notion that unanticipated movements in oil prices is also a major source of risk in local financial markets.

On the basis of the aforementioned analysis, the following macroeconomic variables are included in the multifactor model:

Δe_t – change in the end of month nominal exchange rate

$\Delta \pi_t^e$ – monthly change in a measure of expected inflation

Δo_t – monthly change in the index of the value of industrial production

Δop_t – monthly change in the U.S. dollar price per barrel of crude oil

rs_t^d – spread between the 364-day treasury bill and the 91-day treasury bill

rs_t^f – spread between the 90-day LIBOR and the 91-day treasury bill

Δrm_t – monthly change in real money balances (M2)

Finally, excess monthly return on the market portfolio represented by the Phisix is included to incorporate residual macro factors not subsumed in the other macroeconomic variables. This can also be used as a measure of market timing risk or confidence risk in the absence of a measure of default risk premium. Thus, variables that are supposed to proxy for the five risk factors enumerated at the start of the section are included in addition to three other variables determined through factor analysis.

V. EFFECTS OF MACROECONOMIC FLUCTUATIONS

Macroeconomic variables as sources of systematic risks can potentially affect stock returns in two ways. First, individual stock returns can be affected by macroeconomic fluctuations, e.g., an increase in interest rates may lead to lower stock prices and hence reduced returns. Secondly, mere exposure of a stock to a systematic risk induced by potential macroeconomic fluctuations may require an increase (premium) or decrease (discount) in the stock's expected return. The premium or discount is the price of the risk factor, which is constant for all stocks, multiplied by the beta of the stock for that risk factor. The effects of macroeconomic fluctuations will be examined first. The pricing of the risk factors will be examined in the next section.

To evaluate the effects of macroeconomic fluctuations on stock returns, OLS regression is run on equation (1) which is restated below in terms of demeaned macroeconomic factors $\tilde{f} = f - \bar{f}$ (where f is the K x 1 vector of factors as in equation (1) and $\bar{f}$ is the vector of means) except for excess market return:

$$(7) \quad R^{exc} = a + B\tilde{f} + \varepsilon$$

Table 6 shows the results. The top entries in each row are the estimated coefficients and the bottom entries are the p-values. The bold entries signify that the coefficients are significant at least at the 90% confidence level. The last column shows the coefficients of determination R^2 which indicate the proportion of the stock return variation accounted for by macroeconomic fluctuations. The R^2 averages to 0.425. To put this into perspective, Goyal and Santa-Clara (2001) found that for the U. S. from 1926-1999, systematic risk, with market return as one of the factors, accounted for 15-20% of total stock return variation. Other results are summarized below:

a) Each macro variable is statistically significant for at least one stock. Except for the stocks of the mining company and the country's largest manufacturing company, at least one beta corresponding to a macroeconomic variable other than excess market return is statistically significant.

b) The coefficient of the excess market return is significant at least at the 90% (p-value of less than 0.10) confidence level in all but one stock. Out of these, the coefficient is significant at least at the 99% confidence level (p-value of less than 0.01) in all but one other stock.

c) The coefficient of the monthly change in the nominal exchange rate Δe_t which is significant for nine of the 18 stocks and the signs of the coefficients are mostly negative, implying that exchange rate depreciation has an adverse impact on stock returns. Note that not one of the B shares shows sensitivity to this factor.

d) The coefficient for the spread between foreign and domestic interest rates is significant in four stocks.

e) All the other coefficients are significant in only one or two stocks.

The second to the last row of the table shows the Wald test statistics for the hypothesis that the betas $\beta_{ik} = 0$ for all i. The figures underneath the chi-square statistics are the corresponding p-values. It can be seen that this hypothesis is rejected for all macro variables, except expected inflation and the monthly changes in crude oil prices and real money balances. The last row shows the Wald test statistics and the corresponding p-values for the hypothesis that $\beta_{ik} = \beta_{jk}$ for all $i \neq j$. This is also rejected for all variables except those just mentioned.

VI. PRICING OF MACROECONOMIC RISK FACTORS

The exact formulation of the multifactor model implies that the systematic risk factors should be priced uniformly by the market and the variation in individual stock returns due to these factors can be explained by difference in their exposure to these factors as measured by the betas. In this subsection, following Ferson and Harvey (1994), the factor prices in pricing equation (4) are estimated together with the betas in equation (1) using a SUR model. Again, let $\tilde{f} = f - \bar{f}$ be the demeaned factors, then the model implies:

$$(8)\quad R^{exc} = B(\tilde{f} + \lambda) + u$$

where B is the (N x K) matrix of betas and λ is the (K x 1) vector of factor prices. If the factors are not priced, then $\lambda_k = 0$ for all k.

As a test of model fit, a likelihood ratio test of the restricted model (8) is conducted. The unrestricted model is equation (7). The likelihood ratio test statistic is:

$$LR(p) = T \cdot Ln\left(\frac{|\Sigma_R|}{|\Sigma_U|}\right)$$

which is distributed as a χ^2 with p degrees of freedom. The values $|\Sigma_R|$ and $|\Sigma_U|$ are the determinants of the residual covariance matrices of the restricted and unrestricted equations, respectively, T is the number of usable observations, and p is the number of restrictions represented by the difference in the number of estimated parameters in the unrestricted and restricted models.

The regressions for both the restricted and unrestricted models are run. The multifactor model represented by equation (8) is not rejected by the data. The likelihood statistic with 84 usable observations is 4.54 and there are eleven restrictions yielding a p-value of 0.951 for the chi-square test. However, none of the macro factors are priced (except for excess market return which is priced by construction). Table 7 shows the results for individual stocks. The top figures are the coefficients and the bottom figures are the p-values. Most of the betas that are significant in the restricted regressions remain significant in the unrestricted regressions. The last column in Table 7 shows the R^2 for individual stocks which do not appear to be significantly different from the R^2 in Table 6. This provides additional, more intuitive evidence that the restricted and unrestricted models are not too different from each other.

Thus, the overall finding is that the macroeconomic factors affect the level and movement of stock returns. The regression results in the previous section are supportive of this finding. However, the mere exposure of individual stocks to the macro risk factors (in varying degrees as reflected by the betas) does not appear to merit additional rewards. One of the possible reasons for this is that macroeconomic risks may be diversifiable. If so, they are not sources of systematic risks but rather idiosyncratic risks to individual companies. An indication of this is that the betas of all macro factors, except that of excess market return, in Table 7 have both positive and negative signs across all stocks. This means that a zero-beta portfolio of stocks can theoretically be formed such that all risks emanating from the macroeconomic variables can be arbitraged away even without short-selling or purchase of derivative securities.[6] Note that this is not so with the market return factor. As earlier noted, all the betas associated with this factor are positive. In the absence of derivative securities and with limitations on short sale transactions, this risk factor cannot be diversified away.

One other possible explanation is that available macroeconomic data do not provide adequate measures of the underlying systematic risks that influence returns. This may be because they are not credible due to lack of accuracy or timeliness, or they are non-existent. A symptom of the first is the frequent revisions of some of the government published economic statistics. An example of the latter is the apparent lack of adequate measures of say, time horizon and confidence risks. One further indicator is that, in the previous section, none of the macroeconomic variables considered show up as significant in regressions with two of the factors extracted through factor analysis.

Two other possible explanations have already been hinted at in previous discussions. The first is that market inefficiencies may result in excess profits that can be gained by arbitrage, violating the major assumption of the exact formulation of the multifactor model. The second is the presence of large idiosyncratic risks that are not diversified away by investors. This does not necessarily invalidate the model but may lead to large pricing errors such that the null hypothesis of zero factor prices is unlikely to be rejected by the usual statistical tests.

VII. CONCLUDING REMARKS

This study set out to examine the various factors that may explain cross-sectional variation in individual stock returns in the context of a multifactor asset pricing model. Seven macroeconomic factors, not including excess market return, are identified as potential sources of risks to individual firms. Many of the factors are similar to those identified in U.S. studies. Two, representing foreign exchange and interest rate parity risks, do not normally show up in U.S. studies and are probably more important to economies that are more sensitive to foreign exchange flows such as the Philippines. Regression results indicate that fluctuations in all of these macroeconomic factors have significant influence on the time variability of individual stock returns. However, an exact formulation of a multifactor asset pricing model fails to individually price these risk factors. There are three possible explanations for the poor results. The first one is that available macroeconomic data do not provide adequate measures of the underlying systematic risks that influence returns. The second is that lack of market efficiency may result in excess profits that can be gained by arbitrage, violating the major assumption of the multifactor model. The third is the presence of large idiosyncratic risks that are not diversified away in investor portfolios. These do not necessarily invalidate the model but they can lead to large pricing errors such that tests have little power to reject the null hypothesis that factor prices are zero. Furthermore, lack of diversification also results in significant idiosyncratic risks in investor portfolios. Thus, systematic risks due to macroeconomic factors, while significant, may not by themselves be able to fully explain observed variation in stock returns.

The inconclusive results call for further research to explore some open questions. For example, there is a need to develop more accurate measures of underlying macro-economic risks based on available economic and perhaps even market trading statistics. The statistical properties of these measures should also be investigated. There is also a need to examine the effect of market inefficiencies on the empirical validity of multifactor models cast in the APT framework. Finally, there is a need to look at the nature of idiosyncratic risks in stock returns and their influence on asset prices.

NOTES

[1] These refer to variables that describe the investment opportunity set such as macroeconomic variables.

[2] For a comprehensive treatment of factor analysis, including the interpretation of factors, please see any text on multivariate data analysis such as Hair, Anderson, Tatham, and Black (1998) and Johnson and Wichern (1992). Essentially, the factors are linear combinations of the original variables which in this case are returns. Thus, the factors can be interpreted as portfolios of stocks with given returns.

[3] The advantage of the two-pass procedure is that it can accommodate a great number of assets but is subject to the errors-in-variables problem (see for example, Campbell et al., 1997). Simultaneous estimation of all parameters addresses this problem but the number of assets that can be included is limited. In many studies, both problems are addressed by grouping the assets into portfolios.

[4] Using Statistical Package for the Social Sciences (SPSS).

[5] Please see the references cited in Note No. 2 and References for more details on factor rotation and interpretation.

[6] The question of whether risks associated with all macroeconomic risk factors can all be arbitraged away with the proper choice of nonnegative portfolio weights is a more complicated matter. A basic result in linear algebra is that the homogeneous system of equations $Bx = 0$ where B is $n \times k$ with rank $k < n$ has a nontrivial solution. A sufficient condition for the systems $Bx = 0$, where $x \geq 0$, to have a solution is for the nonhomogeneous system $Bx = b$, $x \geq 0$, to have a bounded feasible solution (see Gass, 1969, Chapter 9, Problem 19). This can be shown using the duality theory of linear programming. For the system to be bounded, it is necessary that for the ith entry such that $x_i > 0$ not all the entries in the ith column of B have the same sign.

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Table 1: Macroeconomic Variables Used in Selected Papers

Reference	Macroeconomic Variables Used
Chen, Roll and Ross, 1986	° growth rate of an index of industrial production ° change in a measure of expected inflation ° change in unexpected inflation ° default risk premium computed as the spread between the return on high-grade corporate bonds and long-term government bonds ° shape of the term structure of interest rates measured by the spread between the returns on long-term government bonds and that on a one-month treasury bill. ° change in consumption ° change in oil prices
Burmeister and McElroy, 1988	° default risk premium computed as the spread between the returns on corporate bonds and government bonds ° time premium represented by the spread between the return on long-term government bonds and that on one-month U. S. treasury bills ° unexpected inflation ° change in expected sales ° market return represented by the Standard and Poor composite index
Cutler, Poterba and Summers, 1989	° unexpected changes in log dividends to a market portfolio proxy ° log industrial production ° log real money supply (M1) ° long-term corporate bond interest rate ° three-month U. S. treasury bill rate ° consumer price index ° stock volatility
Ferson and Harvey, 1994	° a global equity market index ° log first difference of the trade-weighted U.S. dollar exchange rate of the currencies of ten industrialized countries ° a measure of unexpected inflation ° change in a measure of expected inflation ° change in the spread between the 90-day Eurodollar deposit rate and the 90-day U.S. treasury bill rate ° real short-term interest rate ° monthly change in the U.S. dollar price per barrel of oil ° industrial production growth rate

Table 2: Correlation Matrix of Macroeconomic Variables

	ib_t	π_t^u	sp_t	Δrm_t	Δo_t	rs_t^f	Δe_t	Δrer_t	Δr_t^d	rs_t^d	Δop_t	$\Delta \pi_t^e$	$\Delta o12_t$
ib_t	1.000	-0.069	-0.193	0.042	-0.006	-0.419	0.023	-0.109	0.358	0.022	0.029	0.094	0.036
π_t^u	-0.069	1.000	0.005	-0.378	0.027	0.041	0.001	0.156	-0.043	-0.005	0.102	0.133	-0.031
sp_t	-0.193	0.005	1.000	0.144	0.006	0.437	0.083	-0.119	-0.062	-0.195	0.066	0.016	0.053
Δrm_t	0.042	-0.378	0.144	1.000	-0.104	0.129	0.026	-0.063	0.032	0.011	-0.214	-0.066	0.108
Δo_t	-0.006	0.027	0.006	-0.104	1.000	0.072	-0.151	0.008	-0.019	-0.012	-0.032	-0.081	0.708
rs_t^f	-0.419	0.041	0.437	0.129	0.072	1.000	-0.025	0.038	-0.122	-0.251	0.019	-0.030	0.100
Δe_t	0.023	0.001	0.083	0.026	-0.151	-0.025	1.000	-0.606	0.146	0.039	0.057	-0.014	-0.091
Δrer_t	-0.109	0.156	-0.119	-0.063	0.008	0.038	-0.606	1.000	-0.276	-0.041	-0.063	0.089	-0.036
Δr_t^d	0.358	-0.043	-0.062	0.032	-0.019	-0.122	0.146	-0.276	1.000	-0.115	0.124	0.147	-0.010
rs_t^d	0.022	-0.005	-0.195	0.011	-0.012	-0.251	0.039	-0.041	-0.115	1.000	0.036	-0.147	-0.062
Δop_t	-0.032	-0.121	0.042	0.068	-0.058	0.117	0.021	-0.227	0.164	-0.071	1.000	0.014	-0.028
$\Delta \pi_t^e$	0.094	0.133	0.016	-0.066	-0.081	-0.030	-0.014	0.089	0.147	-0.147	-0.027	1.000	0.021
$\Delta o12_t$	0.036	-0.031	0.053	0.108	0.708	0.100	-0.091	-0.036	-0.010	-0.062	-0.079	0.021	1.000

Table 3: Correlation Matrix of Monthly Stock Returns

	ABS	AC	ALI	BPC	FLI	ICT	JFC	JGS	LC	LCB	MBT	MER	MERB	MPC	PNB	SMC	SMCB	TEL
ABS	1.000	0.483	0.550	0.446	0.538	0.542	0.501	0.535	0.149	0.214	0.338	0.406	0.421	0.457	0.348	0.228	0.240	0.221
AC	0.483	1.000	0.818	0.664	0.528	0.545	0.701	0.554	0.250	0.251	0.483	0.477	0.673	0.655	0.491	0.258	0.347	0.304
ALI	0.550	0.818	1.000	0.606	0.691	0.651	0.715	0.678	0.303	0.297	0.500	0.460	0.669	0.680	0.500	0.263	0.405	0.342
BPC	0.446	0.664	0.606	1.000	0.533	0.608	0.528	0.572	0.270	0.191	0.391	0.372	0.515	0.565	0.435	0.267	0.251	0.326
FLI	0.538	0.528	0.691	0.533	1.000	0.715	0.537	0.657	0.236	0.294	0.451	0.256	0.413	0.644	0.399	0.141	0.276	0.300
ICT	0.542	0.545	0.651	0.608	0.715	1.000	0.506	0.676	0.257	0.263	0.579	0.242	0.498	0.522	0.493	0.243	0.391	0.346
JFC	0.501	0.701	0.715	0.528	0.537	0.506	1.000	0.551	0.121	0.147	0.333	0.368	0.548	0.606	0.415	0.191	0.216	0.224
JGS	0.535	0.554	0.678	0.572	0.657	0.676	0.551	1.000	0.230	0.190	0.532	0.336	0.485	0.686	0.418	0.224	0.268	0.317
LC	0.149	0.250	0.303	0.270	0.236	0.257	0.121	0.230	1.000	0.837	0.327	0.168	0.192	0.341	0.135	0.178	0.247	0.136
LCB	0.214	0.251	0.297	0.191	0.294	0.263	0.147	0.190	0.837	1.000	0.332	0.075	0.120	0.353	0.173	0.207	0.226	0.062
MBT	0.338	0.483	0.500	0.391	0.451	0.579	0.333	0.532	0.327	0.332	1.000	0.232	0.440	0.360	0.600	0.159	0.407	0.257
MER	0.406	0.477	0.460	0.372	0.256	0.242	0.368	0.336	0.168	0.075	0.232	1.000	0.814	0.342	0.296	0.461	0.511	0.461
MERB	0.421	0.673	0.669	0.515	0.413	0.498	0.548	0.485	0.192	0.120	0.440	0.814	1.000	0.478	0.488	0.476	0.601	0.528
MPC	0.457	0.655	0.680	0.565	0.644	0.522	0.606	0.686	0.341	0.353	0.360	0.342	0.478	1.000	0.447	0.066	0.171	0.216
PNB	0.348	0.491	0.500	0.435	0.399	0.493	0.415	0.418	0.135	0.173	0.600	0.296	0.488	0.447	1.000	0.167	0.273	0.276
SMC	0.228	0.258	0.263	0.267	0.141	0.243	0.191	0.224	0.178	0.207	0.159	0.461	0.476	0.066	0.167	1.000	0.698	0.359
SMCB	0.240	0.347	0.405	0.251	0.276	0.391	0.216	0.268	0.247	0.226	0.407	0.511	0.601	0.171	0.273	0.698	1.000	0.522
TEL	0.221	0.304	0.342	0.326	0.300	0.346	0.224	0.317	0.136	0.062	0.257	0.461	0.528	0.216	0.276	0.359	0.522	1.000

Table 4: Rotated Factor Sensitivity Matrix

Stock	Code	Factor 1	Factor 2	Factor 3	Factor 4
ABS-CBN Broadcasting	ABS	**0.5889**	0.1815	0.1003	0.1030
Ayala Corp.	AC	**0.7192**	0.2042	0.1188	0.4069
Ayala Land, Inc.	ALI	**0.8059**	0.2373	0.1456	0.2754
Benpres Holding Corp.	BPC	**0.6770**	0.1913	0.0619	0.1612
Filinvest Land Inc.	FLI	**0.7932**	0.1268	0.1468	-0.0741
ICTS	ICT	**0.7933**	0.3075	0.0989	-0.2014
Jollibee Foods Corp.	JFC	**0.7035**	0.0792	0.0239	0.3335
JG Summit Holdings, Inc.	JGS	**0.7870**	0.1716	0.0403	0.0200
Lepanto Corp.	LC	0.1709	0.1348	**0.8137**	0.0491
Lepanto Corp. – B	LCB	0.1760	0.0732	**0.9810**	-0.0175
Metropolitan Banking Corp.	MBT	**0.5407**	0.3166	0.2164	-0.0930
Meralco	MER	0.2316	**0.6073**	-0.0002	**0.5788**
Meralco – B	MERB	0.4762	**0.6448**	-0.0023	**0.5021**
Metro Pacific Corp.	MPC	**0.7418**	-0.0143	0.2328	0.2748
Philippine National Bank	PNB	**0.5343**	0.2397	0.0642	0.0980
San Miguel Corp.	SMC	0.0689	**0.6951**	0.1471	0.0491
San Miguel Corp. – B	SMCB	0.1877	**0.8169**	0.1362	-0.0019
PLDT	TEL	0.2522	**0.5617**	-0.0223	0.0834

Table 5: Regression of Factors Against Macroeconomic Variables

	Factor1		Factor2		Factor3		Factor4	
	Coefficients	p-value	Coefficients	p-value	Coefficients	p-value	Coefficients	p-value
ib_t	-0.01357	0.6879	-0.04796	0.1778	-0.03157	0.4396	-0.03107	0.3751
π_t^u	0.02971	0.0592	0.00628	0.6998	-0.00396	0.8331	-0.00430	0.7892
sp_t	0.00010	0.3280	0.00004	0.6636	-0.00005	0.6837	-0.00011	0.2698
Δrm_t	0.19635	0.0882	0.27191	**0.0253**	-0.05184	0.7065	0.06870	0.5607
Δo_t	0.00116	0.7601	0.00162	0.6841	0.00536	0.2449	0.00066	0.8659
rs_t^f	-0.03957	0.3937	-0.13102	**0.0084**	-0.00379	0.9459	-0.00932	0.8458
Δe_t	-0.34716	**0.0004**	-0.05542	0.5713	-0.05368	0.6341	-0.07877	0.4159
Δrer_t	-0.03199	0.6268	-0.06238	0.3665	0.00796	0.9202	-0.10851	0.1140
Δr_t^d	-0.07125	0.4838	-0.08280	0.5155	0.04791	0.6962	0.08401	0.4252
rs_t^d	0.00515	0.9662	-0.02806	0.7921	-0.17708	0.2293	-0.03786	0.7631
Δop_t	0.02711	0.6751	0.08056	0.2366	-0.03104	0.6910	-0.06882	0.3055
$\Delta \pi_t^e$	0.04288	0.3253	0.08439	**0.0670**	-0.03043	0.5624	0.01687	0.7077
$\Delta o12_t$	-0.00464	0.1706	0.00003	0.9936	-0.00410	0.3154	-0.00244	0.4847

Table 6: Regression of Stock Returns Against Macroeconomic Risk Factors

Stock	Intercept	Δe_t	$\Delta \pi_t^e$	Δo_t	Δop_t	Δrm_t	rs_t^d	rs_t^f	Market Return	R^2
ABS	0.0158	-0.0088	-0.0072	0.0002	0.0125	-0.0011	-0.0192	0.0029	0.6264	0.3686
	0.1308	0.2999	0.1227	0.4723	**0.0707**	0.9221	0.1362	0.4429	**0.0000**	
AC	0.0269	-0.0176	-0.0025	-0.0004	-0.0054	0.0008	0.0183	0.0027	1.8340	0.6776
	0.0656	0.1398	0.7041	0.3158	0.5716	0.9630	0.3108	0.6011	**0.0000**	
ALI	0.0127	-0.0174	-0.0036	-0.0002	-0.0016	-0.0051	0.0191	-0.0011	1.5680	0.7003
	0.2822	**0.0700**	0.4929	0.5913	0.8390	0.6996	0.1897	0.7864	**0.0000**	
BPC	-0.0060	-0.0206	-0.0041	-0.0005	0.0019	-0.0094	-0.0198	0.0030	1.0603	0.6046
	0.5736	**0.0173**	0.3880	0.1392	0.7860	0.4245	0.1321	0.4285	**0.0000**	
FLI	0.0855	-0.1403	-0.0024	-0.0007	-0.0021	-0.0611	0.1364	-0.0224	2.3020	0.3746
	0.0815	**0.0005**	0.9136	0.6203	0.9492	0.2623	**0.0247**	0.2036	**0.0000**	
ICT	0.0070	-0.0461	0.0042	0.0002	0.0115	-0.0019	0.0135	-0.0094	1.4112	0.5080
	0.7119	**0.0028**	0.6153	0.7445	0.3544	0.9270	0.5630	0.1671	**0.0000**	
JFC	0.0119	0.0002	-0.0086	-0.0001	0.0000	-0.0013	0.0089	-0.0002	1.1194	0.5378
	0.2921	0.9788	**0.0888**	0.7624	0.9984	0.9143	0.5242	0.9696	**0.0000**	
JGS	0.0064	-0.0300	0.0021	-0.0001	0.0019	-0.0138	0.0093	0.0000	1.4373	0.5005
	0.7165	**0.0357**	0.7844	0.8579	0.8717	0.4759	0.6660	0.9961	**0.0000**	
LC	0.0124	-0.0104	-0.0068	0.0006	-0.0037	-0.0175	-0.0139	0.0028	0.4118	0.0947
	0.4950	0.4825	0.4037	0.2423	0.7578	0.3833	0.5347	0.6690	**0.0363**	
LCB	0.0186	-0.0188	-0.0105	0.0005	-0.0158	-0.0219	-0.0377	0.0036	0.3616	0.1027
	0.3966	0.2922	0.2837	0.4315	0.2755	0.3686	0.1646	0.6495	0.1282	
MBT	0.0107	-0.0310	0.0141	-0.0001	0.0069	-0.0110	0.0049	-0.0097	0.5476	0.3529
	0.4474	**0.0068**	**0.0250**	0.8645	0.4572	0.4816	0.7756	**0.0555**	**0.0003**	
MER	-0.0091	0.0029	-0.0010	-0.0001	0.0029	0.0040	-0.0079	-0.0045	0.5096	0.4036
	0.2142	0.6303	0.7625	0.6535	0.5530	0.6268	0.3847	**0.0859**	**0.0000**	
MERB	-0.0041	-0.0018	0.0023	0.0001	0.0017	0.0079	-0.0042	-0.0051	0.8661	0.6380
	0.5949	0.7793	0.5089	0.7093	0.7434	0.3522	0.6607	**0.0633**	**0.0000**	
MPC	0.0260	-0.0787	-0.0139	-0.0002	-0.0167	-0.0637	0.0501	0.0038	2.1420	0.6240
	0.2363	**0.0000**	0.1563	0.7833	0.2496	**0.0092**	**0.0656**	0.6334	**0.0000**	
PNB	0.0159	-0.0312	0.0133	-0.0017	0.0313	-0.0406	-0.0217	0.0001	1.3746	0.4842
	0.4472	**0.0681**	0.1570	**0.0065**	**0.0238**	**0.0810**	0.4022	0.9942	**0.0000**	
SMC	0.0002	0.0022	-0.0012	-0.0001	0.0034	0.0148	-0.0130	-0.0048	0.2644	0.1755
	0.9845	0.7678	0.7675	0.6817	0.5676	0.1429	0.2455	0.1370	**0.0072**	
SMCB	0.0033	-0.0040	0.0039	0.0002	0.0070	0.0147	0.0147	-0.0074	0.4870	0.2407
	0.7806	0.6752	0.4565	0.6240	0.3721	0.2624	0.3135	**0.0796**	**0.0001**	
TEL	-0.0011	0.0191	0.0051	0.0007	0.0108	0.0032	-0.0033	-0.0020	0.5945	0.3719
	0.9024	**0.0093**	0.2035	**0.0121**	**0.0697**	0.7473	0.7655	0.5412	**0.0000**	
H_0: β_{ik}	16.1147	76.2371	17.5083	33.5767	23.3530	20.2582	38.9733	27.7261	567.6830	
= 0	0.5845	**0.0000**	0.4885	**0.0142**	0.1774	0.3185	**0.0029**	**0.0663**	**0.0000**	
H_0: β_{ik}	16.0463	75.8415	17.0991	33.3438	17.6663	20.1593	36.5642	24.8367	117.2061	
= β_{jk}	0.5206	**0.0000**	0.4477	**0.0102**	0.4102	0.2662	**0.0039**	**0.0984**	**0.0000**	

Table 7: Pricing of Macroeconomic Risk Factors

Stock	Δe_t	$\Delta \pi_t^e$	Δo_t	Δop_t	Δrm_t	rs_t^d	rs_t^f	Market Return	R^2
ABS	-0.00907	-0.00712	0.00022	0.012564	-0.00071	-0.01897	0.002978	0.624898	0.36852
	0.2695	0.1222	0.4730	**0.0661**	0.9484	0.1349	0.4125	**0.0000**	
AC	-0.01698	-0.00267	-0.00043	-0.00568	-0.00024	0.01767	0.00250	1.83742	0.67752
	0.1292	0.6756	0.3166	0.5497	0.9872	0.3134	0.6147	**0.0000**	
ALI	-0.01743	-0.00362	-0.00018	-0.00159	-0.00507	0.01914	-0.00115	1.56809	0.70031
	0.0496	0.4801	0.5913	0.8357	0.6581	0.1733	0.7707	**0.0000**	
BPC	-0.01825	-0.00491	-0.00046	0.00094	-0.01354	-0.02236	0.00204	1.07458	0.60260
	0.0246	0.2913	0.1428	0.8917	0.2004	**0.0800**	0.5726	**0.0000**	
FLI	-0.14529	-0.00071	-0.00071	-0.00006	-0.05254	0.14168	-0.02034	2.27233	0.37395
	0.0001	0.9738	0.6174	0.9985	0.2882	**0.0165**	0.2243	**0.0000**	
ICT	-0.04269	0.00309	0.00018	0.01017	-0.00776	0.00987	-0.01077	1.43153	0.50643
	0.0031	0.7078	0.7389	0.4082	0.6806	0.6631	**0.0933**	**0.0000**	
JFC	-0.00217	-0.00776	-0.00010	0.00099	0.00280	0.01144	0.00084	1.10498	0.53568
	0.7997	0.1148	0.7558	0.8930	0.8019	0.3969	0.8250	**0.0000**	
JGS	-0.02767	0.00137	-0.00009	0.00095	-0.01777	0.00691	-0.00097	1.45088	0.49969
	0.0341	0.8563	0.8624	0.9334	0.2889	0.7393	0.8671	**0.0000**	
LC	-0.01409	-0.00551	0.00061	-0.00219	-0.01117	-0.00996	0.00432	0.38963	0.09092
	0.3010	0.4840	0.2468	0.8521	0.5249	0.6446	0.4770	**0.0447**	
LCB	-0.02582	-0.00814	0.00049	-0.01295	-0.00985	-0.03020	0.00647	0.31985	0.09349
	0.1230	0.3963	0.4420	0.3652	0.6514	0.2517	0.3848	0.1749	
MBT	-0.03225	0.01449	-0.00007	0.00739	-0.00883	0.00627	-0.00914	0.54016	0.35242
	0.0035	**0.0193**	0.8615	0.4212	0.5477	0.7131	**0.0613**	**0.0004**	
MER	0.00175	-0.00061	-0.00010	0.00333	0.00590	-0.00669	-0.00406	0.50292	0.40216
	0.7545	0.8486	0.6490	0.4856	0.4179	0.4470	0.1024	**0.0000**	
MERB	-0.00207	0.00237	0.00008	0.00179	0.00847	-0.00383	-0.00499	0.86420	0.63793
	0.7218	0.4778	0.7106	0.7201	0.2608	0.6757	**0.0534**	**0.0000**	
MPC	-0.07953	-0.01366	-0.00018	-0.01640	-0.06235	0.05091	0.00409	2.13733	0.623981
	0.0000	0.1577	0.7821	0.2538	**0.0062**	**0.0560**	0.5907	**0.0000**	
PNB	-0.03253	0.01371	-0.00166	0.03186	-0.03832	-0.02027	0.00061	1.36656	0.484033
	0.0508	0.1395	**0.0065**	**0.0207**	**0.0862**	0.4284	0.9335	**0.0000**	
SMC	0.00117	-0.00086	-0.00011	0.00383	0.01648	-0.01195	-0.00443	0.25840	0.174459
	0.8664	0.8285	0.6783	0.5171	**0.0718**	0.2734	0.1528	**0.0080**	
SMCB	-0.00310	0.00362	0.00017	0.00659	0.01311	0.01373	-0.00782	0.49257	0.240264
	0.7299	0.4824	0.6216	0.3909	0.2629	**0.3315**	**0.0504**	**0.0001**	
TEL	0.01747	0.00564	0.00066	0.01141	0.00596	-0.00161	-0.00131	0.58493	0.369911
	0.0123	0.1530	**0.0125**	**0.0521**	0.5172	0.8820	0.6718	**0.0000**	
Factor	-1.03867	0.712504	1.16428	0.763773	1.167762	0.452769	3.591454		
Prices	0.2544	0.6449	0.9411	0.3698	0.2824	0.2357	0.1487		