

International Factors and U.S. Equity Excess Returns

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August 1994

Under revision

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An early version of this paper was "The Relationship between World Market, Exchange Rate and Inflation Risks and U.S. Equity Excess Returns," 1986. This research has been supported by an AACSB-R.J. Reynolds Doctoral Fellowship in Business Administration, gifts from Citicorp, NA, and grants from the Salomon Brothers Center at New York University, The University of Michigan and The Ohio State University. The author appreciates the helpful comments of Michael Adler, Christine Amsler, Warren Bailey, Steve Brown, K.C. Chan, Phil Dbyvig, Louis Ederington, Wayne Ferson, Kose John, Stan Kon, Bob Korajczyk, Bruce Lehman, Richard Levich, Rich Lyons, Mark Reinganum, Jay Shanken, Rene Stulz, Marti Subrahmanyam, and workshop participants at The London Business School, The University of Michigan, NYU, OSU, SMU, and Wisconsin. I thank Kalok Chan, Prafulla Nabar and Vijay Singal for research assistance. All errors of commission or omission are the author's.

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Abstract

We test for relationships between three sets of U.S. equity excess returns and a set of hypothesized factors. The disjoint equity sets are classified as U.S. domestic, U.S. global and foreign global stocks. All stocks are traded and listed in the U.S. Our choice of factors is motivated by previous empirical results in the domestic finance literature and by both theoretical and empirical work in international finance. Effectively, we extend the well-known Chan, Chen and Hsieh-Chen, Roll and Ross factor set to embody departures from international market integration, foreign equity market risk and foreign exchange rate risk. The test methodology utilized is an application of the cross-section regression (CSR) tests of Shanken (1985, 1992). Generally, we find that the three additional international factors are significant explanatory variables for the investigated cross-section of U.S. equity returns.

1. Introduction

This paper seeks to extend factor model tests in the U.S. domestic finance literature to address the globalization of this market. As a macro factor-based model, our work follows from the factor pricing-based models of Ross (1977) and Connor (1982).¹ The empirical application that we implement builds on the work of Chan, Chen and Hsieh (CCH, 1985) and Chen, Roll and Ross (CRR, 1986), and the domestic economy factor set that they hypothesize: U.S. market portfolio, unexpected inflation, industrial production, low-grade bond risk premium, U.S. Treasury term premium and changes in expected inflation.

For motivation in "globalizing" the CCH-CRR approach, we look to theoretical and empirical work in international finance. This literature has been primarily concerned with three additional factors: foreign market risk, exchange rate risk, and international market segmentation.²

¹ See also Ross (1976), Huberman (1982), Shanken (1982), Chamberlain and Rothschild (1983), Stambaugh (1983), Dbyvig (1983), Connor (1984), and Ingersoll (1984), among many.

² Exogenous exchange rate risk was hypothesized by Solnik (1974), and examined empirically by Roll and Solnik (1977), Jorion (1990), Bekaert and Hodrick (1991) and Korajczyk and Viallet (1991). Purchasing power risk has been hypothesized to affect nominal risk premiums in both domestic and international finance literatures. The international sources of this risk and the resultant pricing effects have been examined for real price effects by Grauer, Litzenberger and Stehle (1976), and for nominal

We carry out a joint significance test of the internationally augmented set of CCH-CRR factors. Linear expected returns relations are estimated for samples of New York Stock Exchange (NYSE), American Stock Exchange (AMEX) and National Association of Securities Dealers (NASD) Over-the-Counter (OTC) equity excess returns.

The importance of the hypothesized pricing factors is determined by their significance across the estimated expected return relations. Finding significant foreign market and foreign exchange rate risk price estimates implies the pricing of these factors in U.S. equity returns. Finding significant international investment restrictions requires departures from a single integrated expected returns relation.

We test the integration hypothesis across three sets of equities: U.S.-based global equities, W(orld), U.S. domestic equities traded only on U.S. exchanges, D(omestic), and foreign-based global equities, F(oreign), traded on U.S. markets, and the respective home market. For the market integration test, global U.S. and foreign equities are identified by two criteria. U.S. equities traded via the American depository receipt mechanism (ADR) or listed and traded actively on foreign markets are identified as U.S. global equities. Foreign equities traded via the international depository receipt mechanism (IDR), listed on U.S. exchanges or NASDAQ and traded actively are

money growth effects by Fama and Farber (1979), among others. Market segmentation issues and the choice of a benchmark pricing portfolio are linked. [See Mayers (1972), Rubinstein (1973), Grossman and Shiller (1982), Eun and Janakiramanan (1986), and Diwan, Errunza and Senbet (1993).] Welfare analysis of the market segmentation question is treated by Subrahmanyam (1974) and Eun, Janakiramanan and Senbet (1993). Corporate finance treatments are discussed in Adler and Dumas (1974), and Errunza and Senbet (1981), among others (see Amihud and Levich (1994). The implicit costs of market segmentation are treated by Black (1974), and Stulz (1981a). Appendix-B outlines an alternative factor-based model variant. Empirical tests for international market segmentation begin with Stehle (1977), followed by by Jacquillet and Solnik (1978), Errunza and Losq (1985), Jorion and Schwartz (1986), Cho, Eun and Senbet (1986), Wheatley (1988), Bodurtha, Cho and Senbet (1989), Korajczyk and Viallet (1989), Gultekin, Gultekin and Penati (1989), Bonser-Neal, Brauer, Neal and Wheatley (1990), Heston, Rouwenhoerst and Wessels (1992), Roll (1992), Bodurtha, Kim and Lee (1995). Appendix-C generalizes the domestic country cross-section asset pricing test specification to the two country case.

classified as foreign global equities. NYSE and AMEX equities that are not identified as U.S. or foreign global equities are classified as U.S. domestic equities.³

Rejection of a common expected returns relation across the three equity classes may be viewed as rejection of the market integration hypothesis (or another form of model misspecification). Therefore, the test for a common linear expected returns relationship and pricing tests of the hypothesized risk factors provide a joint significance test for our three hypothesized international factors.

Our testing methodology is based on Shanken's (1983,1985,1992) cross-section regression methodology. The tests of factor price equivalence follow Shanken and Weinstein (1990). Our test statistics are based on a multivariate normal return and factor distribution.

Our results indicate that departures from international market integration, foreign market risk and foreign exchange risk all help to explain the cross-section distribution of U.S. equity excess returns. Of general interest is the greater power of the factor-price equivalence tests relative to the power of general specification tests. Restricting traded-factor portfolios to satisfy the linear expected returns relations also increases the power of the empirical tests. Under traded factor portfolio pricing constraints, some evidence is found supporting the significance of all of the hypothesized factors, except changes in expected inflation. Without these restrictions under the general linear model hypothesis, only the foreign exchange factor and the unexpected inflation factor are priced significantly.

The body of this work is made up of four sections in addition to the introduction. Our hypotheses and empirical methodology are discussed in the second

³ Classification is based on AMEX, NYSE and NASD notices, Forbes and The Economist (various issues), and Depository Receipt information brochures from issuing banks. A more detailed discussion is provided in the data Appendix-A.

section. Data are examined and discussed in the third section. Section four contains the statement and discussion of our test results. In section five, we conclude.

2. Overview

In this section, we provide an overview of both our hypotheses and empirical testing procedures. Our tests are necessarily joint tests of the hypothesized linear returns relations, the identified factors and the multivariate normal return and factor set distribution.

2.1 Hypothesis

Our linear pricing relations can be motivated by either the Merton (1973) multiple state variable Capital Asset Pricing Model (CAPM), or the the Ross (1976, 1977) Arbitrage Pricing Theory (APT) as formalized by Connor (1982). Our Appendix B provides a derivation and discussion of such a model. To provide economic content to these models, we specify a set of K factors (or state variables) and stratify U.S. equities by their international trading attributes. The hypothesized dollar excess returns pricing relation for an equity j in group i is the following:

$$E(R'_{ijt}) = \gamma_{i0} + \sum_{l=1}^k \beta_{ijl} \gamma_{il} \quad , \quad \underline{E}_i = X_i \underline{\Gamma}_i \quad 1)$$

where, R'_{ijt} the dollar excess return on the j th of n assets in group i . The groups are U.S. global, W, U.S. domestic, D, and foreign global, F.

\underline{E}_i the $n \times 1$ vector of mean excess returns in the i th group, $i = W, U$ or F ,

$$\underline{E} = [\underline{E}'_W : \underline{E}'_U : \underline{E}'_F]' \quad , \quad 3n \times 1.$$

γ_{i0} the excess return on a portfolio in group i that is hedged against the hypothesized risk factors.

β_{ijl} the time-series multiple regression beta between asset ij and factor l .

$\underline{\beta}_{ij}$ $[\beta_{ij1}, \dots, \beta_{ijk}]'$ $k \times 1$, for all j of n equities in group $i = W, U$ or F .

$\underline{\beta}_i$ $[\underline{\beta}_{i1} \underline{\beta}_{i2} \dots \underline{\beta}_{in}]'$ $n \times k$, $i = W, U$ or F .

- γ_{il} is a measure of excess return associated with factor l for assets in group i . For the traded factors, these terms represent prices of risk. $i = W, U$ or F .
- X_i $[\underline{i}_n : \beta_i]$ $n \times (k+1)$, $i = W, U$ or F .
- X the block diagonal matrix with X_W , X_U and X_F on the diagonal.
- $\underline{\gamma}_i$ the cross-section factor price vector for group i , $[\gamma_{i1}, \dots, \gamma_{ik}]'$, $i = W, U$ or F , $k \times 1$.
- $\underline{\Gamma}_i$ the $(k+1) \times 1$ vector of the constant and factor prices, $[\gamma_{i0}, \underline{\gamma}_i']$, for group of equities $i = W, U$ or F .
- Γ $[\underline{\Gamma}'_W : \underline{\Gamma}'_U : \underline{\Gamma}'_F]'$, $3(k+1) \times 1$.

As stated, this specification admits three heterogeneous expected returns relations corresponding to the three identified equity groups. We test the market integration hypothesis by restricting the factor price estimates to be equal across equity groups. We interpret rejection of the equity groups' estimated factor price equivalence to be supportive of the international market segmentation view.

The major difference between our specification and specifications that have been estimated for domestic markets is the potential differentiation of the zero-beta and factor risk price terms across specific groups of assets. One way to motivate such differentiation is to recognize that international investment is restricted. Therefore, the implicit costs of these restrictions will differentiate the expected returns pricing relation, just as restricted borrowing and lending or margin restrictions do in the domestic context.⁴

Alternatively, we hypothesize that restrictions force different representative investors (those least restricted) to be the marginal pricing agents for the stocks in a particular equity group. The risk tolerance, feasible choice sets and transaction costs of these marginal investors together determine the prices of risk for the associated equity

⁴ Internationally, this argument is developed by Black (1974) and Stulz (1981, 1985). Domestically, Black (1972) and Litzenberger and Ramaswamy (1979).

groups. Importantly, and as is common in the international asset model testing literature, we do not allow the pricing factors to differ across groups.⁵

Our specification permits testing of a range of alternative hypotheses. Of particular interest are parameterizations that further impose the restrictions that traded factor portfolios are also priced according to the hypothesized expected returns relations. Of the k hypothesized factors, we assign the p traded factors to a subset P , and the k' non-traded factors to the disjoint set K' . We define $\delta_{l,t}$ as the observation on factor l in period t . The excess expected returns on a traded factor portfolio is the following:

$$E(\delta_{il}) = \gamma_{i0} + \gamma_{il} \quad l \in P(\text{traded}) \quad 2)$$

Under these definitions, the traded factor constrained pricing relation becomes

$$E(R'_{ijt}) - \sum_{l \in P} \beta_{ijl} E(\delta_{l,t}) = \gamma_{i0} \left(1 - \sum_{l \in P'} \beta_{ijl} \right) + \sum_{l \in P'} \beta_{ijl} \gamma_{il} \quad 3)$$

Additionally, some of these traded portfolios may be "spread" portfolios, portfolios formed by a long position in one risky asset and short another. An example of a return on such a spread portfolio is the return on the low-grade bond portfolio in excess of the U.S. Treasury bond portfolio return. Assigning this spread portfolio subset of traded factor portfolios to set S , and the p' non-spread traded portfolios to set P' , we have

$$E(\delta_{il}) = \gamma_{il} \quad l \in S(\text{spread}) \quad 4)$$

The average spread portfolio provides an estimate of the price of the spread portfolio's risk.

⁵ An exception to this approach is Bodurtha, Cho and Senbet (1989). In this work, an interbattery factor analysis procedure extracts portfolios maximally correlated with a set of macro-factors and a CSR pricing test is performed. In our case, with eight pre-specified factors and cross-sections as small as 15 portfolios, broadening factor heterogeneity across groups raises degrees of freedom and related power questions. Appendix-C provides a broader test specification that permits different factor sets for each equity group.

2.2 Test Methodology

Based on Shanken's (1985, 1992) work, we employ the unconditional cross-section regression (CSR) test methodology. All of our tests are based on an assumption of multivariate normal returns and factor innovations:

$$R'_{ijt} = \alpha_{ij} + \sum_{l=1}^k \beta_{ijl} \delta_{lt} + \varepsilon_{ijt} \quad i = W, U \text{ or } F, j = 1, \dots, n \quad 5)$$

$$\underline{\varepsilon}_t = \{\varepsilon_{W1t}, \varepsilon_{W2t}, \dots, \varepsilon_{Wnt}, \varepsilon_{U1t}, \dots, \varepsilon_{Fnt}\}' \sim N(0, \Sigma), \quad \Sigma = \begin{bmatrix} \Sigma_{WW} & \Sigma_{WU} & \Sigma_{WF} \\ \Sigma_{UW} & \Sigma_{UU} & \Sigma_{UF} \\ \Sigma_{FW} & \Sigma_{FU} & \Sigma_{FF} \end{bmatrix}$$

$$\underline{D}_t = \{\delta_{1t}, \dots, \delta_{kt}\}' \sim N(\underline{\mu}, \Delta)$$

The unconditional nature of our tests is set by our assumption that the time-series regression coefficients, covariance matrices and means of the factor growth rates are constant. An interesting extension of our test would be to relax some of these restrictions, or, in other words, broaden our null information set to incorporate other information and dynamics. Our analysis can be viewed as a set of multivariate tests for the significance of average equation errors, the regression coefficients, or functions of these random variables. The tests are generated in a variant of the Fama-MacBeth (1978) two-pass cross-section regression technique.

We concentrate on two tests developed by Shanken: general linearity or goodness-of-fit tests and cross-section regression parameter significance tests. The general linearity test is based on the multivariate time-series distributions of average errors from the pricing equations. Significance tests for the cross-section regression coefficients are based on the sample covariance matrix of these estimates. In both cases, our joint null hypotheses imply that the observation vectors of interest are normally distributed, mean zero, and are associated with a Wishart distributed weighting matrix. The quadratic forms defined by pre- and post-multiplication of these weighting matrices by the "averaged" vectors will be distributed T^2 , or equivalently F, and provide our test statistics:

$$Q = T\underline{z}'V(c)^{-1}\underline{z} \sim T^2(N, M) = \frac{M-N+1}{MN} F(N, M-N+1) \quad 6)$$

\underline{z} is the N vector hypothesized to be zero mean

$V(c)$ is the weighting matrix, which is adjusted by the constant c to center the statistic.

For tests based on the first-pass multiple time-series regression coefficients, the weighting matrix is the coefficient variance matrix, $V_{\alpha\beta} = \sum_{t=1}^T \left(\Sigma^{-1} \otimes [1_k : D_t] [1_k D_t]' \right)^{-1}$, and the

adjustment constant is one. For the other two-pass regression tests, the goodness-of-fit test weighting matrix is the shifted sample error variance-covariance matrix, $\Sigma(1 + \underline{\gamma}' \Delta^{-1} \underline{\gamma})$. Tests for significance of the estimated coefficients under the factor

pricing constraints are based on the following covariance matrix:⁶

$$TV(\hat{\Gamma}) = \begin{bmatrix} \hat{X}_{K'} \hat{S}^{-1} \hat{X}_{K'} & : \hat{V}(\gamma_0, \gamma) & : 0_{k'+1, s} \\ \hat{V}(\gamma_0, \gamma) & : \hat{v}_0 I_{P'} & : 0_{P', s} \\ 0_{s, k'+1} & : 0_{s, P'} & : 0_{ss} \end{bmatrix} \left(1 + \hat{\underline{\gamma}}' \hat{\Delta}^{-1} \hat{\underline{\gamma}} \right) + \begin{bmatrix} 0 & 0'_k \\ 0_k & \hat{\Delta} \end{bmatrix} \quad 7)$$

$X_{K'}$ the unit vector of matrix X augmented by only the non-traded factor betas.

$V(\gamma_0, \gamma)$ $\underline{v}(\gamma_0, \gamma)$ is the covariance of the γ_0 component of the traded factor prices with the non-traded factor prices, the first column of the $X'\Sigma^{-1}X$ matrix. The $V(\gamma_0, \gamma)$ matrix is formed by horizontally concatenating P' of these vectors.

v_0 the variance of γ_0 .

For the unconstrained factor pricing tests, $X'\Sigma^{-1}X$ replaces the first matrix term in brackets in equation 7). Determinations of goodness-of-fit and multiple regression beta significance are made by calculating the Q quadratic form under appropriate restrictions.

⁶ See Shanken (1992), Theorem 1-iii, with specific treatment of spread portfolios here. To economize on notation, we have dropped the group specific subscript i. The defined weighting matrices are appropriate across all groups if the integration hypothesis is maintained. If not, they are appropriate only for tests within the subgroups, and the separate X matrices the block diagonal X matrix. As discussed in an appendix available from the author, group specific factor prices do not permit the centering of the test statistics across groups.

Different $r \times q$ design matrices, C , are used to define restrictions on the parameter estimates, and we will generally have the following test statistic:

$$Q_C = \underline{z}' C' (CV(\cdot)^{-1} C')^{-1} C \underline{z} \sim T^2(r, T - k) \quad 8)$$

Specifically, consider the time-series regression intercept augmented beta vector, $\underline{\alpha\beta}_{ij} = \left[\underline{\alpha}_{ij}; \underline{\beta}'_{ij} \right]'$, and stack these vectors into a combined $n \times (k+1)$ vector, $\alpha\beta$. We can test the multivariate significance of any set of these estimates by the Q_C statistic based on the covariance matrix of the estimates, $V_{\alpha\beta}$, and an appropriate design matrix.

To test the joint significance of the N intercepts, the design matrix is an N -block diagonal matrix with $k+1 \times k+1$ submatrices defined with a one in the first row and first column and zeros elsewhere. For an SLM-CAPM test with only one market factor, the Gibbons, Ross, Shanken (1989) test follows. To test other multivariate betas' significance, the dimensions of the design matrix and submatrix are the same, and the submatrices have a single non-zero diagonal element corresponding with one plus the number of the factor under test equal to one.

For testing the significance of particular cross-section regression coefficients, we form $N \times 1$ design matrices with a one in the element corresponding to the factor under test, one for the intercept, use the resulting F-probability estimates to aggregate significance across time periods. We also report asymptotic t-statistics derived from the estimated variance-covariance matrix.

Following Shanken and Weinstein (1990), the tests of factor price equivalence are based on a modification of the $V(\hat{\beta})$ matrix. For our three asset group

case, the design matrix will be

$$C_{\Gamma_W = \Gamma_U = \Gamma_F} = \begin{bmatrix} I_h & 0_h & -I_h \\ 0_h & I_h & -I_h \end{bmatrix} \quad 9)$$

Due to the differencing in this design matrix, terms other than the block in the upper left corner of the equation 7) $V(\hat{\Gamma})$ matrix cancel out. The submatrix row and column

dimensions, h , are $k'+1$ for the factor price constrained tests, and $k+1$ for the unconstrained tests. The adjustment factor still multiplies the remaining component of the weighting matrix, and the γ terms in the adjustment are calculated under the null of a single set of factor prices.

In the end, we will execute three variants of tests: multivariate regression coefficient significance, cross-section equation average error significance, and cross-section regression coefficient significance. We now introduce the data used in the study.

3. Data and Classification

Our data set is time-series of equity returns, U.S. Treasury bill returns, U.S. market value-weighted portfolio returns, foreign market value-weighted portfolio returns, U.S. inflation rates, U.S. industrial production growth rates, low-grade U.S. corporate bond portfolio returns, U.S. Treasury bond returns and Eurocurrency deposit and currency exchange rates. The time series run from November 1972 through December 1987.

3.1 Period of the Study

The 1973-1987 sample period was chosen to insure homogeneity in international market structure. The period also coincides with the availability of returns data on NASD equities. Our estimation period for the cross-section tests runs from January 1973 through December 1987. Finally, the observation interval is monthly. This interval was chosen because the international data on market returns, the low-grade corporate bond returns and the macro time series are only available to us on a monthly basis.

3.2 Data Sources

Individual equity returns were obtained from the CRSP NYSE-AMEX and NASDAQ Daily returns files. Monthly returns were calculated from daily returns. If an equity did not have a price within the last ten days of the month, then the equity was dropped from the sample. Individual equities are classified as U.S. domestic, U.S. global

or foreign global. Foreign global equities are foreign-domiciled corporations that are traded on the NYSE, AMEX or NASDAQ. U.S. global equities are those listed on the NYSE or AMEX and held outside of the U.S. These global equity sets are either listed on a non-home country exchange and/or are available in a foreign market through the depository receipt mechanism. The global equity sets are listed in Table A-1. The remaining NYSE and AMEX equities are considered to be U.S. domestic assets. 15 value-weighted portfolios were created from each of these sample sets. The 45 resulting time-series of returns on these portfolios in excess of the the U.S. Treasury bill return provide the dependent variables in our tests.⁷

The independent variables are the following: excess returns on a U.S. market index portfolio, excess returns on a foreign market index portfolio, excess returns on a U.S. Treasury bond portfolio, returns on a portfolio of one month Eurocurrency deposits in excess of one month Eurodollar returns, returns on a low-grade U.S. corporate bond portfolio in excess of the U.S. Treasury bond portfolio returns, U.S. industrial production growth, unexpected U.S. inflation and changes in expected U.S. inflation.

The proxy that we use for the U.S. market index return is the monthly return on the CRSP NYSE-AMEX value-weighted index. The proxy used for the foreign market index return is a value-weighted index of national equity index total returns. The returns are drawn from the Morgan-Stanley Capital International Perspective, and the value weights come from this database and Ibbotson Associates. The countries entering the foreign market index and the index-weighting procedure are discussed in Appendix-A. The known beginning of month return on one month U.S. Treasury bills is subtracted from the realized portfolio returns to generate the portfolio excess returns. The one

⁷ The equities in each set are ranked by market value at the beginning of each five year period, and broken out into 15 groups. If equity group sizes are not evenly divisible by 15, then the remainder is used to randomly chose which groups are augmented by one additional value-ranked equity. Equities are then equally weighted to form the three sets of 15 portfolios that we price. There are 119 U.S. global firms, so that each portfolio includes 7 or 8 firms. The foreign global firms total 75, with 5 equities in each portfolio. 1076 U.S. domestic equities are in the sample, and 71 or 72 firms are in each portfolio.

month Treasury bill returns come from the CRSP bond files, and the low-grade bond and Treasury bond portfolio returns are from the Ibbotson and Associates bond database.

Changes in expected inflation and unexpected inflation are measured by the Fama and Gibbons (1984) method. The expected industrial production growth variable is the growth in industrial production led by one month relative to the coincident level of industrial production. The source of the inflation and industrial production time series is the International Monetary Fund's International Financial Statistics database.

Our foreign exchange rate variable is the return on an equity market value-weighted portfolio of one month Eurocurrency deposits in excess of the Eurodollar deposit rate. The weights used are the same as those used in calculating the foreign market portfolio index return. Under purchasing power parity and the Fisher interest rate hypothesis, the returns on this portfolio are deviations from uncovered interest rate parity, and may be viewed as unexpected exchange rate changes. The exchange rates and Eurocurrency rates necessary for these calculations come from Harris Bank weekly publications. The data set is described further in Appendix-A.

From 1973-1987, our sample period contains 180 months. We conduct our pricing tests both over this 180 month period and over three sixty month subperiods. The subperiods are 1973-77, 1978-82 and 1983-87. Given the return correlations across equities, this stationarity assumption limits the cross-section of equities that may be modeled. Therefore, three sets of 15 value-ranked portfolios were created in each time period.

Finally, we examine the time-series structure of the independent variables. Table 1 presents the averages, standard errors and correlation structure of the independent variables. These results are presented for the full sample period and are also broken out by five year subperiods. Of interest is the high degree of correlation between world, U.S. and foreign market excess returns, and the low-grade bond portfolio return. Foreign exchange returns and U.S. Treasury bond excess returns also exhibit positive correlation

with the other investment excess returns and with each other. The exchange rate return correlation with the foreign market return is significant.

The unexpected inflation and expected inflation change variables are negatively correlated from 1978 to 1987, and positively correlated from 1973 to 1977. As a result, the expected inflation change variable is negatively correlated with the equity returns. Unexpected inflation is positively correlated with these returns from 1973 to 1982. Unexpected inflation remains significantly positively correlated with the term premium in the 1983 to 1987 period.⁸

Industrial production growth is negatively correlated with both the term premium (over all periods) and with the foreign exchange variable (in the 1973-77 and 1983-87 periods). The correlation between industrial production and equity returns is insignificant and mixed in sign, and the correlation between industrial production and the inflation-related variables is also insignificant and mixed in sign.

None of the series have significant sample means in all sub-periods. Only the world market, foreign market, foreign exchange and industrial production growth have significant sample means. Otherwise, all other sample means are insignificant. (The unexpected inflation sample mean is, of course, zero.) We now present our test results.

4. Test Results

As an introduction to our multiple factor model tests, we review the multivariate time-series significance of the multiple regression coefficients. Next, the CSR test results are presented.⁹

⁸ Since many previous empirical studies of factor pricing have used relatively long sample periods, we present both sets of results for comparison.

⁹ A trade-off exists between the efficiency and small sample properties of these estimators. Some CAPM tests use full variance-covariance matrices for weighting. Gibbons (1982), Stambaugh (1982) and Shanken (1985) However, the macro-factor literature has generally used weighted least squares when a heteroskedasticity adjustment is made. Chan, Chen and Hsieh (1985) and Shanken and Weinstein (1990). Also see MacKinlay (1987).

4.1 Multivariate Time-Series Betas

In Table 2, F-probabilities are listed. These probabilities are associated with maintaining the null that the coefficients for the listed right-hand-side variables are jointly zero across the 15 portfolios in each group. The five-year subperiod results are also aggregated. The aggregate statistics are computed by calculating the standard normal Z variables that are consistent with the subperiod estimated-F distribution p-values. These Z variables are summed and the probabilities associated with a zero null are reported.¹⁰

The market portfolio-related betas are strongly significant. Interestingly, the foreign market betas are more significant for the U.S. domestic stock group than they are for the U.S. global group. The other factor betas are only significant for certain equity groups. For U.S. domestic equities, the low-grade bond premium, term premium and foreign exchange betas are all significant. The foreign equity group term premium betas are marginally significant and the foreign exchange betas are significant. For the U.S. global equities, marginally significant betas are found for the low-grade bond premium. These time series results indicate that the two hypothesized international factors are significant in a time-series sense.

4.2 Traded Factor Constrained CSR Tests

Table 3 contains linearity and factor price equivalence test results. The general linearity hypothesis is found to be maintained. For the market integration tests of factor price equivalence, we find mixed results. We reject integration for the 1973-77 period, the 1978-82 period and the three period aggregate. Examination of group pair coefficient equivalence indicates that the heterogeneous group is U.S. global stocks. This result suggests that the differences among group factor price estimates are manifest in the intercept terms. A conjecture on these results is that the degree of international

¹⁰ Sums of T^2 variables do not generate a random variable with a usual sampling distribution. The normal approximation to this aggregate statistic was suggested by Shanken (1985).

integration increases with time. However, the significant probability estimates against the hypothesis of integrated U.S. equity markets (World=Domestic) in the 1983-87 period casts doubt on this interpretation.

Since we have, generally, found negative evidence on the integration hypothesis, we present cross-section regression coefficient test results for all groups together and for each group separately. The lengthy Table 4 reports these results. In reviewing these results, we concentrate on the sub-period aggregate results.

In the equity subgroups, the foreign market is, uniformly, the most significant factor. The U.S. market factor is also significant for U.S. domestic stocks and for foreign stocks. The size and signs of the U.S. and foreign market factor price estimates are similar for all equity groups. We find negative risk premium estimates in the 1973-77 period and positive estimates in the 1978-82 and 1983-87 periods.

The term premium factor is significantly priced in the 1973-77 period. It carries a negative risk premium for all groups. The other factors are significantly priced in some sub-periods and for some groups. If we test across all equity groups together, the W,D,F entries, then foreign exchange emerges as a significant factor (as it does for the foreign equities). Analogously, industrial production factor price estimates are predominantly negative and significant. The unexpected inflation factor price estimates are predominantly negative and marginally significant.

The intercept term estimates are also significant. As the market factor price estimates were, the intercept estimates are similar across equity groups in sign and size. The estimates are positive in the 1973-77 period, negative in the 1978-82 period and mixed in sign in the 1983-87 period. Based on these estimates, it appears the factor price equality rejection arises from both the relative precision of the similar intercept and market-related coefficients, and heterogeneous pricing of the other factors. For U.S. equities, a broader multi-factor specification improves upon the U.S. market-based

CAPM by admitting other factors, especially the foreign market, term premium and foreign exchange.

4.2.2 Unconstrained CSR Tests

For the unconstrained CSR test case, we analyze the equity groups separately and together. The integrated market implication of factor price equality is rejected in the 1973-77 period. Unlike the case in the previous section, this rejection is not supported across equity group pairs. Significant factor price coefficient estimates are found only for the intercept, the unexpected inflation factor, the foreign market factor and the foreign exchange factor. However, only grouped data yield significant estimates. It is apparent that the sub-group tests have limited power, and a question arises if this phenomenon is not due to the limited (six) degrees of freedom for the test (15 portfolio cross-sections and nine coefficient estimates).

Nevertheless, it appears that the low power of these tests does not come from the limited cross-section in each equity group. Instead, the level of significance is not very high. For these unrestricted factor price tests, we find some evidence against the integration hypothesis, and some evidence for significant pricing of the zero-beta, foreign market, foreign exchange and unexpected inflation factors.

5. Conclusion

U.S. equity average excess returns are hypothesized to be characterized by market integration and by their relationship to a set of risk factors: U.S. market, foreign market, U.S. unexpected inflation, U.S. industrial production, foreign exchange rates, low-grade U.S. corporate bond premium, U.S. Treasury bond term premium and changes in U.S. expected inflation. The foreign market and exchange rate variables are constructed as value-weighted indices from eight developed countries. All other variables are constructed to approximate the factors studied by Chan, Chen and Hsieh (1985) and Chen, Roll and Ross (1986).

We conduct both time-series and cross-section tests for the significance of these factors, and identify a cross-section test for market integration between three sets of equities. The equity sets differ with regard to their international trading and holding characteristics: U.S. domestic equities, U.S. global equities and foreign global equities. The cross-section regression tests follow the work of Shanken (1985, 1992), and Shanken and Weinstein (1990).

Multivariate significance tests of the time-series beta estimates reveal that the U.S. and foreign market factors are predominant. The term premium and foreign exchange beta estimates are also significant for U.S. domestic and foreign global stock groups. The low-grade bond portfolio beta estimates are significant for U.S. domestic equities, and are marginally significant for U.S. global stocks.

Based on time-series beta estimates, we proceed with cross-section tests. Two sets of estimates are generated, and these sets are differentiated by the imposition of factor-portfolio pricing constraints. These restrictions require that traded factor portfolios also satisfy the hypothesized pricing relation.

For the case imposing the factor pricing constraints, significant evidence was found against a single linear pricing relation for all equity groups. Hence, the market integration hypothesis is rejected. These results are in line with the findings of Errunza and Losq (1985) for LDC's, Jorion and Schwartz (1986) for Canadian equities, Gultekin, Gultekin and Penati (1989) for U.S. and Japanese equities and Bonser-Neal, Brauer, Neal and Wheatley (1990) for closed-end country funds. However, in the case of the less restricted model, in which the factor portfolio pricing constraints relaxed, the evidence against the integration hypothesis is not as strong. In this case, integration was rejected only in the 1973-77 period. In our context, we find that the general specification or linearity tests have much less power than the factor price equivalence tests.

Our unconstrained estimation results provide some marginal support to the pricing of the zero-beta, foreign market, foreign exchange and unexpected inflation

factors. Our factor portfolio pricing-constrained estimates give strong support to the pricing of foreign market risk. In particular equity sub-groups, the U.S. market factor, term premium factor, and foreign exchange factor were found to have explanatory power. Marginal significance was found for industrial production and unexpected inflation factors.

The signs and sizes of the zero-beta, U.S. market factor, foreign market, term premium and foreign exchange coefficient estimates exhibit reasonable patterns. The U.S. and foreign market coefficient estimates are similar: negative in the 1973-77 period, and positive thereafter. The zero-beta coefficients follow an opposite sign pattern from the market risk terms in the 1973-82 period, and are mixed in sign across groups in the 1983-87 period. Except for the 1983-87 period, all three equity groups tend to be priced similarly on the zero-beta and market risk dimensions.

During the 1973-77, term premium risk was highly significant and priced negatively. For the 1973-77 and 1983-87 periods, the foreign exchange risk coefficient estimated is positive in sign, with varying significance levels across stock groups. This pattern of results, coupled with other particular significant factor coefficient estimates, leads us to believe that our rejection of the homogeneous pricing relation is due to precision in estimating the similar zero-beta and market factor coefficients and heterogeneous pricing of the other factors.

In terms of economic significance, we find that market factors and foreign exchange predominantly demanded positive risk premia. However, for the 1973-77 period, both the market and term premium factor price estimates are negative. Taken at face value, these estimates imply that lower expected returns were required on stocks with positive equity market betas and government bond market betas. As an alternative explanation, the estimates may be an artifact of the generally declining markets in the 1973-77 period.

A different question arises with regard to the positive risk premium estimate on foreign exchange risk. If U.S. international investment is partially restricted, should assets that hedge against the declines in the value of dollar deposits improve diversification and demand a low or even negative risk premium? Our findings suggest not. Stocks that had positive currency betas had, on average, higher excess returns. This finding has implications regarding two questions in international finance. First, firms that were subject to greater relative amounts of exchange rate risk, all other factors held equal, earned higher average returns during our sample period. Second, this evidence sheds some additional light on the use of forward rates as predictors of future spot rates. Independent of the other risk prices, the positive currency risk premium estimate implies that the forward price for the value-weighted portfolio of country currencies that we analyzed should be a downward-biased estimate of the future spot price of the currency portfolio.

In concluding, we recognize that, except for our treatment of differential asset pricing in five year subperiods, the dynamic nature of international markets has not been incorporated in our unconditional tests. Recent work in international finance suggests the importance of analyzing the link between unconditional and conditional asset pricing model tests.¹¹ Alternatively, broadening the set of assets, countries and factors examined will be of interest. In this area, further work on the sampling properties of the estimators needs to be done.

¹¹ Mark (1985, 1988), Giovannini (1989), Harvey (1992, 1993), Ferson and Harvey (1992), Bansal, Hsieh and Viswanathan (1992), Chan, Karolyi and Stulz (1991), Brown and Otsuki (1994).

Appendix-A: Data Sample Construction

Our tests require three sets of 15 value-ranked portfolio returns, U.S. equity market index returns, foreign equity market index returns, measures of unexpected U.S. inflation and changes in U.S. expected inflation, exchange rate risk, as well as low-grade corporate bond and U.S. Treasury bond portfolio excess returns. The three sets of 15 portfolio returns are the dependent variables in our tests, and the other variables are the independent variables. We will discuss the construction of the independent variables, and then discuss the characteristics and construction of the dependent variables. The estimation period of our study is January 1973 - December 1987.

Independent Variables

U.S. Market Return Index

We use the CRSP NYSE-AMEX value-weighted index as our proxy for the market index. Monthly observations were used in our tests.

World and Foreign Market Return Index

We have constructed a value-weighted returns index from the monthly total returns country indices of the Morgan-Stanley Capital International Perspectives database. The countries that we consider are Canada, France, Germany, Holland, Italy, Japan, Switzerland and the United Kingdom. These countries were chosen for two reasons. First, when combined with the U.S. market, the capitalization of these countries equity markets represents between 80 and 90 percent of world equity market capitalization. Second, we require that quoted Eurocurrency rates be available for the countries in this index. These rates are used to calculate our exchange rate risk variable. This second condition necessitated our direct construction of the foreign market return index.

The foreign market return index is a value-weighted index. Prior to 1986, we only have annual data on foreign equity market capitalization. Therefore, monthly capitalizations were linearly interpolated from the annual data until 1986. These capitalizations provided monthly value-weights for the individual country's total returns. These weights were used to aggregate country portfolio returns into the foreign market return index. This index return contains both dividend and capital gains return components. The world index is created by combining the CRSP-NYSE value-weighted index with the foreign market indices by the relative market values.

The weights used in constructing the foreign and world market portfolios are the following:

Year	US	UK	FR	GE	IT	NE	SW	CA	JA	Total (bil.)
1973	72.9%	8.9%	2.0%	3.0%	0.8%	0.9%	1.1%	4.1%	5.9%	\$1,358
1978	66.6%	6.1%	1.8%	4.2%	0.5%	1.4%	1.6%	3.8%	13.6%	\$1,316
1983	63.7%	7.8%	1.4%	2.5%	0.7%	0.8%	1.6%	4.3%	16.7%	\$2,291
1987	39.3%	9.2%	2.0%	3.0%	1.6%	1.1%	1.3%	2.7%	39.4%	\$5,728

Country abbreviations are the following Canada (CA), France (FR), Germany (GE), Netherlands (NE), Italy (IT), Japan (JA), Switzerland (SW), United Kingdom (UK) and the United States (US).

Low-Grade Corporate Bond Risk Premium

This variable, UPR, is calculated as the difference in return between a low-grade bond portfolio, below Baa rating (<Baa), and a long-term U.S. Treasury bond portfolio, TB.

$$\delta_{UPR t} = R_{<Baa t} - R_{TB t} \quad A-1)$$

The source of this data is the Ibbotson and Associates bond database.

U.S. Treasury Bond Premium

This variable is the excess return on a long-term U.S. government bond portfolio. This portfolio time series is from the Ibbotson and Associates bond database.

Foreign Exchange Rate Risk

We have chosen to model unexpected exchange rate movements as deviations from uncovered interest rate parity. Therefore, the expected exchange rate change is taken to be equal to the nominal interest rate differential between the U.S. and the foreign country. This differential is scaled down to a monthly basis. Algebraically, the variable is the following:

$$\delta_{E t} = \frac{S_t - S_{t-1}}{S_{t-1}} - \frac{R_{E\$ t-1} - R_{Efx t-1}}{360} * 30 \quad A-2)$$

S_t is the dollar value of the foreign currency at month end t

$R_{E\$ t}$ is the 30 day Eurodollar rate at month end A-4)

$R_{Efx t}$ is the 30 day Eurocurrency rate on the foreign currency at month end t

The source of this data is Harris Bank weekly publications. The observations are taken on the Friday preceding month end, unless the Friday is the first or second day of the next month. We were unable to find another source of these rates going back to 1973 across the countries of interest with month end observations.

The country-specific deviations from uncovered interest rate parity are aggregated into an exchange rate-risk index by the same value weights that are used to create the foreign equity market return index. This approach was chosen for consistency.

Industrial Production Growth

Industrial production growth is calculated in a manner similar to the one used by Chan, Chen and Hsieh (1985) and Chen, Roll and Ross (CRR, 1986). Specifically, IP_t denotes the rate of industrial production in month t . The monthly industrial production growth rate is

$$\delta_{IPt} = \frac{IP_t}{IP_{t-1}} - 1 \quad A-3$$

Following CRR, this variable is led by one month in our statistical work.

Inflation Variables

We use the Fama-Gibbons (1984) estimation procedure to forecast real rates. The differences between the current one-month T-Bill rates and expected real rates provide our expected inflation estimates. The difference between this estimate and realized inflation is unexpected inflation. The estimated equation is

$$r_{t-1}^t - r_{t-2}^{t-1} = (R_{t-1} - \pi_t) - (R_{t-2} - \pi_{t-1}) = u_t - \theta u_{t-1} \quad A-4$$

Sample Period	1973-77	1978-82	1983-87
θ	0.947	0.614	0.434
T-ratio	(14.2)	(5.6)	(3.49)

Dependent Variables

Construction of the dependent variables required formation of portfolios including U.S. and foreign equities traded domestically and globally. The sources for this information are two. First, NYSE, AMEX and NASD foreign security lists were used to identify foreign firms. U.S. global firms were identified from The Economist lists of actively traded global stocks. Second, we have identified those stocks that are traded and held globally in the form of depository receipts. Table A-1 lists the U.S. and foreign global stocks that we have identified, and are actively traded throughout our 1973-87 sample period. We turn to briefly review the depository receipt-linked element of our selection criterion.

Depository Receipt Classification

The availability of depository receipts for equities on the AMEX, NYSE and NASD from 1973-1987 was determined from the issuing bank publications, and reviews from *The Economist*. American depository receipt-associated equities were identified from Bankers Trust, Morgan Guaranty Trust, Citibank, Chemical Bank, Irving Trust, and Manufacturer's Hanover brochures. The names of International Depository Receipt related equities were obtained from a Morgan Guaranty Trust publication. Depository receipt-linked equities are generally larger multinational firms.

Depository Receipt Description

Depository receipts are "warehouse" receipts created by banks to satisfy investor demand. Seven U.S. banks; Bankers Trust, Morgan Guaranty Trust, Citibank, Chase Manhattan, Chemical Bank, Irving Trust, and Manufacturer's Hanover; offered the depository receipt service. A receipt is created when an investor has a security in a foreign country and wishes to possess a marketable financial instrument for that security in another country. The investor may transport the actual security internationally, or he may deposit the security in a custodian bank designated by the bank issuer of depository receipts. A day later, the investor is able to obtain a receipt in another country testifying to his ownership of the underlying security. The cost of this service on a security with a price greater than ten dollars was approximately five dollars per one hundred shares.

Besides documenting ownership of the underlying asset, a depository receipt entitles the investor to certain services from the issuer. Generally, these services are meant to bring the transaction attributes of the underlying security into line with those available on securities normally traded in the country where the receipt is issued. For example, if an American purchases a foreign security any rights offering may not be participated in unless it is registered with the Securities and Exchange Commission. Registration does not usually occur. Since a large proportion of foreign securities are traded in bearer form, an American investor must actually present evidence of ownership at times of dividend payment and voting to be paid a dividend and exercise his vote. The investor must also apply directly to obtain evidence of the payment of foreign taxes to offset domestic taxes. Therefore, the cost of exercising ownership rights for foreign securities are significant. This cost will be especially high for smaller investors.

The issuers of American Depository Receipts (ADR) have attempted to lower these costs. Since ADR's are registered, a bank issuer can provide services to investors similar to those offered on domestic American issues. Rights are sold in a block and the proceeds are distributed to certificate holders, so that American investors obtain some value for them. Dividends are requested by and paid directly to the bank issuer and passed on to investors. The bank handles proxy dissemination for voting and issues necessary evidence of foreign tax payment. A more in depth review of depository receipts can be found in Egly (1958).

For investors outside of the U.S., Morgan Guaranty Trust issues International Depository Receipts (IDR) for U.S. and foreign equity shares. These financial instruments, similar to ADRs, have the same service attributes as securities traded in the market of issue. For example, U.S.- based equities have IDR's issued in Europe in bearer form. Other than the limited problem of expropriation risk, depository receipts are almost indistinguishable from other domestic issues traded on the same market.

The presence of such a trading mechanism suggests that equities covered by depository receipts in foreign markets should be more widely held internationally than other equities. Though depository receipts are predominantly a retail product, retail interest in the underlying equities should also be indicative of institutional interest. Therefore, assets covered by depository receipts are possible candidates for inclusion in the set of global assets.

References

- Adler, M., The Cost of Capital and Valuation of a Two-Country Firm, *Journal of Finance*, March 1974, 29, 119-132.
- American Stock Exchange (AMEX), Issues fo Foreign Corporations (Other than Canadian) Dealt in on the American Stock Exchange, and Issues of Canadian Corporations Dealt in on the American Stock Exchange, New York, 1989.
- Amihud, Y. and R. Levich, *Exchange Rates and Corporate Performance*, New York, Irwin, 1994.
- Bansal, R., D. Hsieh, and S. Viswanathan, *A New Approach to International Arbitrage Pricing*, 1992, working paper.
- Bekaert, G., and R. Hodrick, Characterizing Predictable Components in Excess Returns on Equity and Foreign Exchange Markets, *Journal of Finance*, June 1992, 467-450.
- Black, F., Capital Market Equilibrium with Restricted Borrowing, *Journal of Business*, 45, 444-454.
- Black, F., International Capital Market Equilibrium with Investment Barriers, *Journal of Financial Economics*, December 1974, 1, 337-352.
- Bodurtha, Jr., J.N., D.C.Y. Cho and L. Senbet, Economic Forces in the Stock Market, *Global Finance Journal*, Fall 1989, 1(1), 21-46.
- Bodurtha, Jr., J., D.S. Kim and C.M.C. Lee, Closed-End Country Funds and U.S. Market Sentiment, *Review of Financial Studies*, 1995, forthcoming.
- J.C. Bradford Co, ADR list, mimeographed.
- Brown, S. and T. Otsuki, Exchange Rate Volatility and Equity Returns, in Amihud, Y. and R. Levich (Ed.), *Exchange Rates and Corporate Performance*, New York: Irwin, 1994.
- Chamberlain, G. and M. Rothschild, Arbitrage, Factor Structure, and Mean- Variance Analysis in Large Asset Markets, *Econometrica*, 51, September 1983, 1281-1304.
- Chan, K.C., N. Chen and D. Hsieh, An Exploratory Investigation of the Firm Size Effect. *Journal of Financial Economics*, 1985, 14, 451-472.
- Chan, K.C., A. Karolyi and R. Stulz, Global Financial Markets and the Risk Premium on U.S. Equity, *Journal of Financial Economics*, October 1992, 137-167.
- Chemical Bank, Chemical Bank ADR Companies, mimeographed.
- Chen, N., R. Roll and S. Ross, Economic Forces and the Stock Market, *Journal of Business*, 1986, 383-403.
- Cho, D., C. Eun, and L. Senbet, International Arbitrage Pricing Theory: An Empirical Investigation. *Journal of Finance*, June 1986, 41(3), 313-330.
- Citibank, N.A, Citibank ADRs, New York, Citibank, N.A., various brochures.

- Connor, G. A Unified Beta Pricing Theory, *Journal of Economic Theory*, 34, December 1984, 13-31.
- Dybvig, P. An Explicit Bound on Deviations from APT Pricing in a Finite Economy, *Journal of Financial Economics*, 12, December 1983, 483-96.
- Diwan, I., C. Eun and L. Senbet, *Country Funds for Emerging Economies*, 1993, working paper, University of Maryland.
- The Economist, American Depository Receipt Action Calendar, various issues.
- The Economist, The Corporate List, various issues.
- Egly, D. W. The American Depository Receipt as an Instrument of International Finance, unpublished M.B.A Thesis, New York University Graduate School of Business Administration, 1958.
- Errunza, V. and E. Losq, International Asset Pricing under Mild Segmentation: Theory and Test, *Journal of Finance* 40(1), March 1985, 105-124.
- Errunza, V. and L. Senbet, The Effects of International Operations on the Market Value of the Firm: Theory and Evidence, *Journal of Finance*, May 1981, 36, 401-17.
- Eun, C. and S. Jannakiramanan, A Model of International Asset Pricing with a Constraint on Foreign Equity Ownership, *Journal of Finance*, 1986, 897-914.
- _____ and L. Senbet, The Design and Pricing of Country Funds under Market Segmentation, 1993, working paper, University of Maryland.
- Fama, E. F., and Farber, A., Money, Bonds and Foreign Exchange, *American Economic Review*, December 1979, 69, 639-649.
- Fama, E.F. and M.R. Gibbons, A Comparison of Inflation Forecasts, *Journal of Monetary Economics*, May 1984, 13, 327-348.
- Ferson, W.E., Are Latent Variables in Time-Varying Expected Returns Compensation for Consumption Risk, *Journal of Finance*, June 1990, 397-429.
- _____ and C. Harvey, The Risk and Predictability of International Equity Returns, *The Review of Financial Studies* 6(3), 1993, 527-566.
- Forbes, 100 U.S. Traded Foreign Stocks, July 24, 1989, p 326-329.
- Gibbons, M.R., Multivariate Tests of Financial Models, *Journal of Financial Economics*, 10, 1982, 3-27.
- Gibbons, M.R., S.A. Ross and J. Shanken, A Test of the Efficiency of a Given Portfolio, *Econometrica*, September 1989, 57(5), 1121-1152.
- Giovannini, A., Time Variation of Risk and Return in the Foreign Exchange and Stock Markets, *Journal of Finance*, 44, 1989, 307-325.
- Grauer, F. L., Litzenberger, R. H., and Stehle, R., Sharing Rules, and Equilibrium in an International Capital Market under Uncertainty, *Journal of Financial Economics*, June 1976, 3, 233-256.

- Graybill, F. An Introduction to Linear Statistical Models, New York, McGraw- Hill, 1961.
- Grossman, S. J. and R.J. Shiller, Consumption Correlatedness and Risk Measurement in Economies with Non-traded Assets, and Heterogeneous Information, Journal of Financial Economics, July 1982, 10, 195-210.
- Gultekin, M.N., N.B. Gultekin and A. Penati, Capital Controls and International Capital Market Segmentation, Journal of Finance, September 1989, 44(4), 849-869.
- Harvey, C., The World Price of Covariance Risk, Journal of Finance, 1991, 111-157.
 _____, Predictable Risk and Return in Emerging Markets, working paper, Duke University, 1993.
- Heston, S., K.G. Rouwenhorst and R. Wessels, The Structure of International Stock Returns, 1992, working paper.
- Huberman, G. A Simple Approach to Arbitrage Pricing Theory, Journal of Economic Theory, 28, October 1982, 183-91.
- Ibbotson, R. C., R. C. Carr and A. W. Robinson, International Equity and Bond Returns, Financial Analysts Journal, July-August 1982, 61-83.
- Ingersoll, Jr., J., Some Results in the Theory of Arbitrage Pricing, Journal of Finance, 39, September 1984, 1021-39.
- International Monetary Fund, International Financial Statistics, Washington, D.C., 1971-1985. Volumes 24-39.
- Irving Trust Co., American Depository Receipts, mimeographed.
- Jacquillet, B. and B. Solnik, Multinational are Poor Tools for Diversification, Journal of Portfolio Management, Winter 1978, 8-12.
- Jorion, P., The Pricing of Exchange Risk in the Stock Market, Journal of Financial and Quantitative Analysis, 26, 1991, 363-376.
 _____ and E. Schwartz, Integration vs. Segmentation in the Canadian Stock Market, Journal of Finance, July 1986, 41(3), 603-13.
- Korajczyk, R.A., and C.J. Viallet, An Empirical Investigation of International Asset Pricing, Review of Financial Studies, 1989, 2(4), 553-587.
 _____, Equity Risk Premia and the Pricing of Foreign Exchange Risk, Journal of International Economics, ,1991, forthcoming.
- Litzenberger, R. H., and K. Ramaswamy, The Effect of Personal Taxes and Dividends on Capital Asset Prices, Journal of Financial Economics, September 1979, 7(2), 163-196.
- MacKinlay, C., On Multivariate Tests of the CAPM, Journal of Financial Economics, 18, 1987, 341-371.
- Mark, N., On Time-Varying Risk Premia in the Foreign Exchange Market: An Econometric Analysis, Journal of Monetary Economics, 1985, 3-18.

- _____, Time-Varying Betas and Risk Premia in the Pricing of Forward Foreign Exchange Contracts, *Journal of Financial Economics*, 1988, p 335-354.
- Mayers, D. Non-Marketable Assets and Capital Market Equilibrium Under Uncertainty. In Jensen, Michael C. (Ed.), *Studies in the Theory of Capital Markets*, New York: Praeger Publishers, 1972.
- Merton, R.C., An Intertemporal Capital Asset Pricing Model, *Econometrica*, 1973, 41, 867-887.
- Morgan Guaranty Trust Co, Depository Receipts- a Service for International Investors, New York, Morgan Guaranty Trust Co., 1973.
- Morgan Guaranty Trust Co., American Depository Receipts Facilities Established since October 1977 (continued) as of October 1979, mimeographed.
- National Association of Securities Dealers (NASD), ADR's in NASDAQ System, and Foreign Common Shares in NASDAQ System, Washington, D.C., 1989.
- New York Stock Exchange (NYSE), Foreign Equities Traded on the NYSE, New York, various circulars.
- Roll, R., Industrial Structure and the Comparative Behavior of International Stock Market Indices, *Journal of Finance*, 47, 1992, 3-42.
- _____ and B. Solnik, A Pure Foreign Exchange Asset Pricing Model, *Journal of International Economics*, 1977, 7, 161-179.
- Ross, S. The Arbitrage Theory of Capital Asset Pricing, *Econometrica*, 13, December 1976, 341-360.
- Ross, S. Return, Risk and Arbitrage, in I. Friend and J. Bicksler (eds.), *Risk and Return in Finance*, Cambridge, MA, Ballinger, 1977, 189-219.
- Rubinstein, M., Corporate Financial Policy in Segmented Securities Markets, *Journal of Financial and Quantitative Analysis*, December 1973, 8(5), 749- 761.
- Shanken, J. The Arbitrage Pricing Theory: Is it Testable?, *Journal of Finance*, 37, December 1982, 1129-40.
- _____, An Asymptotic Analysis of the Traditional Risk-Return Model, 1983 University of California, Berkeley, working.
- _____, Multivariate Tests of the Zero-Beta CAPM, *Journal of Financial Economics*, 1985, 14, 327-48.
- _____, On the Estimation of Beta-Pricing Models, *The Review of Financial Studies*, 1992, 5(1), 1-34.
- _____, and M. Weinstein, *Macroeconomic Variables and Asset Pricing: Estimation and Tests*, University of Rochester, manuscript, 1990.
- Solnik, Bruno H., An Equilibrium Model of the International Capital Market, *Journal of Economic Theory*, August 1974, 4(2), 500-524.

- Stambaugh, R.F., Missing Assets, Measuring the Market, and Testing the Capital Asset Pricing Model, Ph.D. Dissertation, University of Chicago, 1981.
- Stambaugh, R.F., On the Exclusion of Asset from Tests of the Two-Parameter Model, *Journal of Financial Economics*, 10, 1982, 237-268.
- Stambaugh, R.F., Arbitrage Pricing with Information, *Journal of Financial Economics*, 12, 1983, 357-69.
- Stehle, R., An Empirical Test of the Alternate Hypotheses of National and International Pricing of Risky Assets, *Journal of Finance*, May 1977, 32, 493-502.
- Stulz, R., On the Effects of Barriers to International Investment, *Journal of Finance*, September 1981, 36(4), 923-934.
- _____, A Model of International Asset Pricing, *Journal of Financial Economics*, December 1981, 9, 383-406.
- _____, Currency Preferences, Purchasing Power Risks, and the Determination of Exchange Rates in an Optimizing Model, *Journal of Money, Credit, and Banking*, August 1984, 16(3), 302-316.
- _____, Pricing Capital Assets in an International Setting: An Introduction, in D. Lessard, ed.: *International Financial Management*, New York, John Wiley and Sons, 1985.
- Subrahmanyam, M. G., On Optimality of International Capital Market Integration, *Journal of Financial Economics*, March 1975, 2(1), 3-28.
- Wheatley, S., Some Tests of International Equity Integration, *Journal of Financial Economics*, 21, 177-192.

Table 1: Factor Sample Statistics- Correlation Matrices, Means and Standard Deviations

Years	World Market	U.S. Market	Foreign Market	Low-Grade Bond Premium	Term Premium	Foreign Exchange	Industrial Production	Expected Inflation Change	Unexpected Inflation
1973-87									
World Market	1.000	0.915**	0.828**	0.558**	0.340**	0.260**	0.006	-0.171*	0.125
U.S. Market		1.000	0.543**	0.541**	0.323**	0.023	-0.001	-0.130	0.094
Foreign Market			1.000	0.412**	0.262**	0.522**	0.020	-0.177*	0.123
Low-Grade Bond				1.000	0.567**	0.148*	-0.144	-0.159*	0.076
Term Premium					1.000	0.199**	-0.224**	-0.083	0.201**
Foreign Exchange						1.000	-0.119	-0.065	0.040
Industrial Production							1.000	0.046	-0.053
Exp. Inflation Change								1.000	-0.070
Unexpected Inflation									1.000
Mean	0.005	0.003	0.008*	0.001	0.001	0.007**	0.002**	-0.000	0.000
Std. Dev.	0.0447	0.0505	0.0509	0.0282	0.0354	0.0282	0.0095	0.0064	0.0028
1973-77									
World Market	1.000	0.957**	0.838**	0.684**	0.309*	0.226	-0.083	-0.174	0.314*
U.S. Market		1.000	0.645**	0.690**	0.325*	0.114	-0.073	-0.143	0.306*
Foreign Market			1.000	0.510**	0.205	0.397**	-0.080	-0.193	0.241
Low-Grade Bond				1.000	0.316*	0.052	-0.099	-0.158	0.125
Term Premium					1.000	-0.001	-0.214	0.047	-0.002
Foreign Exchange						1.000	-0.263*	0.001	-0.170
Industrial Production							1.000	0.047	0.034
Exp. Inflation Change								1.000	0.118
Unexpected Inflation									1.000
Mean	-0.003	-0.004	-0.001	0.001	-0.000	0.017**	0.002	0.000	0.000
Std. Dev.	0.0475	0.0519	0.0520	0.0307	0.0208	0.0232	0.0109	0.0086	0.0031
1978-82									
World Market	1.000	0.923**	0.768**	0.590**	0.447**	0.424**	0.150	-0.184	0.177
U.S. Market		1.000	0.463**	0.534**	0.417**	0.124	0.107	-0.171	0.136
Foreign Market			1.000	0.468**	0.332**	0.776**	0.180	-0.142	0.184
Low-Grade Bond				1.000	0.779**	0.299*	-0.202	-0.240	0.143
Term Premium					1.000	0.281*	-0.313*	-0.228	0.283*
Foreign Exchange						1.000	0.009	-0.212	0.201
Industrial Production							1.000	0.087	-0.120
Exp. Inflation Change								1.000	-0.290*
Unexpected Inflation									1.000
Mean	0.004	0.004	0.003	-0.002	-0.003	-0.004	0.000	-0.000	0.000
Std. Dev.	0.0421	0.0488	0.0481	0.0313	0.0445	0.0293	0.0101	0.0058	0.0030
1983-87									
World Market	1.000	0.867**	0.860**	0.330**	0.273*	0.234	-0.144	-0.185	-0.196
U.S. Market		1.000	0.502**	0.368**	0.251	-0.091	-0.072	-0.073	-0.235
Foreign Market			1.000	0.180	0.224	0.512**	-0.174	-0.242	-0.085
Low-Grade Bond				1.000	0.507**	0.035	-0.261*	-0.027	-0.106
Term Premium					1.000	0.201	-0.238	-0.049	0.277*
Foreign Exchange						1.000	-0.276*	-0.019	0.158
Industrial Production							1.000	-0.061	-0.069
Exp. Inflation Change								1.000	-0.180
Unexpected Inflation									1.000
Mean	0.014*	0.008	0.021**	0.006*	0.005	0.007	0.005**	0.000	0.000
Std. Dev.	0.0434	0.0510	0.0507	0.0214	0.0369	0.0285	0.0064	0.0041	0.0025

** and * indicate significance as the 1% and 5% levels, respectively.

Table 2
 Joint Tests Of Time Series Beta Significance
 For 15 Portfolios In Each Asset Set

Portfolios	Year	Constant	U.S. Market	Foreign Market	Low-Grade Bond Premium	Term Premium	Foreign Exchange	Industrial Production	Expected Inflation Change	Unexpected Inflation
U.S. Global	1973-87	0.198	0.000**	0.048*	0.096	0.000**	0.122	0.544	0.194	0.261
	1973-77	0.353	0.000**	0.204	0.464	0.332	0.394	0.704	0.379	0.653
	1978-82	0.653	0.000**	0.471	0.019*	0.621	0.400	0.948	0.810	0.422
	1983-87	0.549	0.000**	0.003**	0.353	0.192	0.131	0.340	0.225	0.709
	AGG.	0.532	0.000**	0.018*	0.071	0.282	0.171	0.844	0.457	0.667
U.S. Domestic	1973-87	0.294	0.000**	0.060	0.041*	0.012*	0.171	0.001**	0.454	0.348
	1973-77	0.363	0.000**	0.144	0.229	0.141	0.090	0.219	0.574	0.647
	1978-82	0.448	0.000**	0.008**	0.055	0.059	0.063	0.260	0.763	0.066
	1983-87	0.616	0.000**	0.010*	0.018*	0.001**	0.033*	0.767	0.300	0.205
	AGG.	0.457	0.000**	0.000**	0.005**	0.000**	0.003**	0.346	0.586	0.129
Foreign Global	1973-87	0.921	0.000**	0.000**	0.507	0.007**	0.023*	0.111	0.610	0.009**
	1973-77	0.210	0.011*	0.000**	0.917	0.049*	0.025*	0.190	0.433	0.557
	1978-82	0.361	0.008**	0.000**	0.115	0.351	0.001**	0.411	0.342	0.383
	1983-87	0.858	0.011*	0.000**	0.484	0.304	0.761	0.905	0.513	0.581
	AGG.	0.479	0.000**	0.000**	0.533	0.069	0.005**	0.549	0.377	0.512

Statistics reported are the F-probabilities associated with the null that the 15 coefficients are all zero. The AGG. statistic is calculated by determining the standard normal variates that yield probabilities against the null in each subperiod that correspond to the reported F probabilities. For each portfolio set and independent variable type, these statistics are summed and the probability that the respective sum is zero is reported. ** and * indicate significance at the 1% and 5% levels, respectively.

Table 3
Multivariate Tests For Linearity
And Factor Price Equality Across Equity Groups
Under Traded Factor Portfolio Pricing Constraints

Years	Linearity Test	Factor Price Equality Tests Across Equity Groups			
	Across World, Domestic and Foreign Groups	World= Domestic= Foreign	World= Foreign	World= Domestic	Domestic= Foreign
1973-87	0.366	0.551	0.377	0.561	0.788
1973-77	0.421	0.031*	0.012*	0.265	0.063
1978-82	0.776	0.003**	0.004**	0.122	0.641
1983-87	0.803	0.554	0.246	0.000**	0.466
Agg.	0.783	0.005**	0.001**	0.000**	0.235

Statistics are F-probabilities for maintaining the nulls listed in the column headings. GLS and WLS indicate which error variance-covariance matrix was used in estimation. Equity groups are WORLD, globally traded U.S. equities, DOMESTIC, domestically traded U.S. equities, and FOREIGN, foreign equities traded in the U.S. AGG. probability statistics are associated with the average of Z-statistics matching the F-probabilities across the respective five year subperiods. ** and * indicate significance at the 1% and 5% levels respectively.

Table 4: Multifactor Models Under Traded Factor Portfolio Pricing Constraints

Years	Equity Groups	Constant	U.S. Market	Foreign Market	Low-Grade			Industrial Production	Expected	Unexpected	Linearity
					Bond Premium	Term Premium	Foreign Exchange		Inflation Change	Inflation	
1973-87	W,D,F	-0.001 (0.47)	0.004 (0.89)	0.009* (2.04)	0.001 (0.68)	0.002 (0.53)	0.008* (2.63)	0.001 (0.40)	0.001 (0.90)	-0.000 (0.00)	0.366
1973-77	W	0.015** (2.62)	-0.018* (2.10)	-0.016 (1.77)	0.001 (0.13)	-0.015** (2.41)	0.002 (0.32)	0.003 (0.69)	0.002 (0.71)	-0.000 (0.07)	0.471
	D	0.012** (2.97)	-0.015 (1.95)	-0.012 (1.57)	0.001 (0.13)	-0.012** (2.50)	0.005 (1.11)	-0.002 (0.57)	0.002 (0.56)	0.001 (0.66)	0.688
	F	0.007** (2.52)	-0.011 (1.47)	-0.008 (1.07)	0.001 (0.13)	-0.007 (1.90)	0.010* (2.38)	-0.004 (0.95)	-0.007* (2.15)	-0.002 (1.23)	0.971
	W,D,F	0.006** (6.26)	-0.010 (1.45)	-0.007 (1.01)	0.001 (0.13)	-0.007* (2.27)	0.011** (3.42)	0.001 (0.48)	-0.001 (1.04)	-0.002** (3.34)	0.421
1978-82	W	-0.000 (0.07)	0.005 (0.65)	0.004 (0.50)	-0.002 (0.44)	-0.002 (0.34)	-0.003 (0.65)	0.002 (0.52)	-0.000 (0.02)	-0.001 (0.67)	0.382
	D	-0.012 (1.14)	0.017 (1.34)	0.016 (1.26)	-0.002 (0.44)	0.010 (0.79)	0.009 (0.76)	-0.000 (0.11)	0.001 (0.32)	-0.001 (0.62)	0.603
	F	-0.012 (2.46)**	0.016 (2.04)*	0.015 (1.91)	-0.002 (0.44)	0.009 (1.21)	0.008 (1.32)	-0.000 (0.16)	0.002 (1.09)	-0.001 (0.71)	0.845
	W,D,F	0.003 (1.51)	0.002 (0.24)	0.000 (0.07)	-0.002 (0.44)	-0.005 (0.90)	-0.007 (1.54)	-0.007* (4.81)	0.001 (0.64)	-0.000 (0.53)	0.756
1983-87	W	0.005 (1.29)	0.002 (0.29)	0.015 (1.99)	0.006* (2.01)	-0.000 (0.05)	0.002 (0.30)	-0.002 (1.23)	-0.001 (0.63)	0.000 (0.19)	0.979
	D	-0.004 (0.89)	0.012 (1.47)	0.025** (3.08)	0.006 (2.01)*	0.010 (1.39)	0.012 (1.88)	-0.001 (0.39)	-0.000 (0.06)	-0.001** (2.43)	0.882
	F	-0.005 (0.62)	0.012 (1.24)	0.026 (2.59)	0.006* (2.01)	0.010 (1.11)	0.012 (1.43)	0.001 (0.26)	0.001 (0.53)	-0.001 (1.09)	0.731
	W,D,F	0.007** (6.26)	0.001 (0.16)	0.014* (2.16)	0.006* (2.01)	-0.001 (0.31)	0.001 (0.14)	-0.002* (2.05)	-0.001 (0.88)	-0.000 (0.66)	0.803
Agg.	W	0.194	0.295	0.059	0.508	0.570	0.794	0.382	0.889	0.934	0.831
	D	0.019*	0.021*	0.003**	0.508	0.029*	0.099	0.883	0.927	0.129	0.868
	F	0.008**	0.022*	0.006**	0.508	0.049*	0.012*	0.818	0.111	0.212	0.979
	W,D,F	0.265	0.721	0.348	0.508	0.188	0.045*	0.001**	0.335	0.062	0.782

T-statistics are reported under coefficient estimates in parenthesis. Linearity tests are F-probabilities. ** and * indicate significance at the 1% and 5% levels, respectively. GLS and WLS indicate which error variance-covariance matrix was used in estimation. Equity groups are W, globally traded U.S. equities, D, domestically traded U.S. equities, and F, foreign equities traded in the U.S. Agg. probability statistics are associated with the average of Z-statistics matching the F-probabilities under the null across the respective five year subperiods.

Table 5: Multifactor Models Under Traded Factor Portfolio Pricing Constraints

Years	Equity Groups	Constant	Low-Grade					Expected		Unexpected Inflation	Linearity	Factor Price Equality
			U.S. Market	Foreign Market	Bond Premium	Term Premium	Foreign Exchange	Industrial Production	Inflation Change			
1973-87	W	-0.002 (0.30)	0.007 (0.81)	-0.009 (0.43)	0.005 (0.43)	-0.001 (0.09)	0.001 (0.09)	0.002 (0.32)	0.002 (0.83)	0.000 (0.31)	0.487	
	D	0.008 (0.60)	-0.006 (0.43)	-0.011 (0.66)	0.013 (1.08)	-0.001 (0.07)	-0.003 (0.29)	0.002 (0.69)	0.001 (0.45)	-0.001 (0.72)	0.741	
	F	0.002 (0.16)	0.004 (0.35)	0.011 (0.95)	0.006 (0.52)	0.011 (0.90)	0.009 (1.15)	-0.001 (0.44)	-0.001 (0.19)	0.000 (0.25)	0.940	
	W,D,F	0.003 (0.99)	0.001 (0.24)	0.008 (1.47)	0.004 (0.99)	0.003 (0.55)	0.013** (2.90)	0.002 (1.27)	0.001 (0.79)	0.000 (0.11)	0.836	0.381
1973-77	W	0.003 (0.31)	-0.004 (0.40)	-0.016 (0.92)	0.007 (0.55)	-0.009 (1.01)	-0.013 (1.00)	-0.002 (0.33)	0.001 (0.16)	0.002 (0.86)	0.997	
	D	0.001 (0.04)	-0.001 (0.05)	0.016 (0.69)	0.011 (0.67)	-0.006 (0.66)	-0.001 (0.10)	-0.004 (0.99)	-0.005 (1.01)	-0.000 (0.08)	0.923	
	F	0.003 (0.25)	0.004 (0.26)	-0.003 (0.21)	-0.007 (0.42)	0.001 (0.10)	0.006 (0.64)	-0.002 (0.43)	-0.005 (0.68)	-0.001 (0.73)	0.979	
	W,D,F	0.003 (1.32)	-0.004 (0.58)	-0.006 (0.74)	0.007 (1.31)	-0.002 (0.58)	-0.001 (0.38)	-0.003 (1.64)	-0.001 (0.87)	-0.002 (2.80)**	0.924	0.027*
1978-82	W	-0.002 (0.21)	0.007 (0.77)	-0.005 (0.39)	-0.001 (0.17)	-0.012 (0.87)	-0.010 (1.07)	-0.001 (0.20)	0.001 (0.40)	-0.000 (0.09)	0.380	
	D	-0.015 (0.79)	0.021 (1.15)	0.030 (0.78)	0.027 (0.94)	0.017 (0.61)	0.024 (0.70)	0.002 (0.29)	0.002 (0.43)	-0.003 (1.12)	0.931	
	F	-0.021 (0.94)	0.013 (0.81)	0.024 (1.10)	-0.006 (0.49)	-0.017 (0.76)	0.012 (0.98)	0.002 (0.50)	0.004 (1.45)	-0.001 (0.58)	0.782	
	W,D,F	0.010** (4.19)	-0.002 (0.35)	-0.004 (0.59)	-0.007 (1.40)	-0.012 (1.78)	-0.002 (0.43)	0.000 (0.15)	-0.000 (0.12)	-0.001 (2.11)*	0.921	0.916
1983-87	W	0.023 (1.02)	-0.015 (0.62)	0.002 (0.11)	0.001 (0.17)	0.002 (0.23)	-0.001 (0.05)	-0.003 (0.79)	-0.000 (0.14)	0.001 (0.54)	0.918	
	D	0.007 (0.42)	0.000 (0.02)	0.006 (0.28)	0.003 (0.36)	0.000 (0.05)	0.015 (1.10)	-0.002 (0.71)	0.002 (1.15)	-0.000 (0.23)	0.910	
	F	0.035 (0.93)	-0.033 (0.74)	-0.012 (0.33)	0.009 (0.74)	0.008 (0.46)	-0.018 (0.60)	-0.000 (0.06)	-0.002 (0.57)	0.002 (0.63)	0.886	
	W,D,F	0.010** (4.31)	0.001 (0.20)	0.017* (2.26)	0.000 (0.12)	-0.000 (0.06)	0.022** (3.75)	-0.001 (1.18)	-0.000 (0.00)	-0.000 (0.52)	0.971	0.556
AGG.	W	0.698	0.559	0.791	0.924	0.535	0.611	0.756	0.947	0.744	0.986	0.949
	D	0.795	0.917	0.506	0.341	0.835	0.551	0.499	0.295	0.661	0.993	0.599
	F	0.350	0.474	0.638	0.670	0.840	0.300	0.913	0.174	0.456	0.990	0.605
	W,D,F	0.000**	0.845	0.130	0.381	0.604	0.063	0.348	0.987	0.012*	0.997	0.406

T-statistics are reported under coefficient estimates in parenthesis. Linearity tests are F-probabilities. ** and * indicate significance at the 1% and 5% levels, respectively. GLS and WLS indicate which error variance-covariance matrix was used in estimation. Equity groups are W, globally traded U.S. equities, D, domestically traded U.S. equities, and F, foreign equities traded in the U.S. Agg. probability statistics are associated with the average of Z-statistics matching the F-probabilities under the null across the respective five year subperiods.

Table A-1: U.S. Globally Traded and Held Equities

00814010	Aetna Life & Cas Co	45920010	International Business Machs
02224910	Aluminum Co Amer	45950610	International Flavors & Frag
02312710	Amax Inc	46014610	International Paper Co
02470310	American Brands Inc	48258410	K Mart Corp
02532110	American Cyanamid Co	49436810	Kimberly Clark Corp
03017710	American Tel & Teleg Co	53245710	Lilly Eli & Co
03190510	Amoco Corp	53802110	Litton Inds Inc
04454010	Ashland Oil Inc	57327510	Martin Marietta Corp
04882510	Atlantic Richfield Co	58013510	Mc Donalds Corp
05430310	Avon Prods Inc	58016910	Mc Donnell Douglas Corp
07170710	Bausch & Lomb Inc	58933110	Merck & Co Inc
08750910	Bethlehem Stl Corp	59018810	Merrill Lynch & Co Inc
09702310	Boeing Co	60405910	Minnesota Mng & Mfg Co
09738310	Boise Cascade Corp	60705910	Mobil Corp
09959910	Borden Inc	61166210	Monsanto Co
11009710	Bristol Myers Co	61688010	Morgan J P & Co Inc
11704310	Brunswick Corp	62007610	Motorola Inc
12614910	C P C Intl Inc	62886210	N C R Corp
14912310	Caterpillar Inc Del	67459910	Occidental Pete Corp
15852510	Champion Intl Corp	68066520	Olin Corp
16161010	Chase Manhattan Corp	70990310	Pennzoil Co
16675110	Chevron Corporation	71344810	Pepsico Inc
17119610	Chrysler Corp	71708110	Pfizer Inc
17303410	Citicorp	71726510	Phelps Dodge Corp
18139610	Clark Equip Co	71815410	Philip Morris Cos Inc
19121610	Coca Cola Co	71850710	Phillips Pete Co
19416210	Colgate Palmolive Co	72151010	Pillsbury Co
20911110	Consolidated Edison Co N Y Inc	73109510	Polaroid Corp
20961510	Consolidated Nat Gas Co	74271810	Procter & Gamble Co
21236310	Control Data Corp Del	74444810	Public Svc Co Colo
21932710	Corning Glass Wks	74740210	Quaker Oats Co
23102110	Cummins Engine Inc	74960110	Rjr Nabisco Inc
24419910	Deere & Co	75127710	Ralston Purina Co
25384910	Digital Equip Corp	75511110	Raytheon Co
25468710	Disney Walt Co	76176310	Reynolds Metals Co
26054310	Dow Chem Co	77434710	Rockwell Intl Corp
26353410	Du Pont E I De Nemours & Co	80311110	Sara Lee Corp
26980310	Eagle Picher Inds Inc	80685710	Schlumberger Ltd
27746110	Eastman Kodak Co	80987710	Scott Paper Co
30229010	Exxon Corp	81238710	Sears Roebuck & Co
31409910	Federated Dept Stores Inc	82930210	Singer Co
34386110	Fluor Corp	85224510	Squibb Corp
34537010	Ford Mtr Co Del	86676210	Sun Inc
36473010	Gannett Inc	87538210	Tandy Corp
36960410	General Elec Co	88037010	Tenneco Inc
37033410	General Mls Inc	88169410	Texaco Inc
37044210	General Mtrs Corp	88250810	Texas Instrs Inc
37329810	Georgia Pac Corp	90290510	U S X Corp
37576610	Gillette Co	90558110	Union Carbide Corp
38255010	Goodyear Tire & Rubr Co	90781810	Union Pac Corp
40206410	Gulf & Westn Inc	91301710	United Technologies Corp
40621610	Halliburton Co	91530210	Upjohn Co
42307410	Heinz H J Co	93114210	Wal Mart Stores Inc
42705610	Hercules Inc	93443610	Warner Communications Inc
42823610	Hewlett Packard Co	93448810	Warner Lambert Co
43761410	Homestake Mng Co	96040210	Westinghouse Elec Corp
43850610	Honeywell Inc	96216610	Weyerhaeuser Co
44216110	Houston Inds Inc	98088110	Woolworth F W Co
45067910	I T T Corp	98412110	Xerox Corp
45686610	Ingersoll Rand Co		

Table A-1 (cont.): Foreign Global Equities Listed and Traded in the U.S.

01371610	Alcan Alum Ltd	47103430	Japan Air Lines Ltd
02706950	American Israeli Paper Mls Ltd	48251610	K L M Royal Dutch Airs
03486130	Anglo Amern Corp South Africa	49735020	Kirin Brewery Ltd
03487050	Anglo Amern Gold Invt Ltd	49874650	Kloof Gold Mng Ltd
04924930	Atlas Cons Mng & Dev Corp	57687920	Matsushita Elec Indl Ltd
06033910	Banister Contl Ltd	60434020	Minorco
06323930	Bank Leumi Le Israel Tel Aviv	60682720	Mitsui & Co Ltd
07679740	Beecham Group Plc	62905020	N E C Corp
08185120	Benguet Corp	65474430	Nissan Motors
09656320	Blyvooruitzicht Gold Mng Ltd	66641610	Northgate Expl Ltd
10216910	Bow Valley Inds Ltd	67052210	Numac Oil & Gas Ltd
10218750	Bowater Inds Plc	68340420	O Okiep Copper Ltd
10550240	Brascan Ltd	71833750	Philips N V
11088940	British Pete Plc	71833750	Philips N V
11216940	Broken Hill Proprietary Ltd	72911087	Plessey Plc
11987120	Buffelsfontein Gold Mng Ltd	73964710	Prairie Oil Rtys Ltd
12216920	Burmah Oil Plc	74081820	President Brand Gold Mng Ltd
13442210	Campbell Res Inc New	74085220	President Steyn Gold Mng Ltd
13635710	Canadian Marconi Co	75280510	Ranger Oil Ltd
13642010	Canadian Occidental Pete Ltd	75304160	Rank Organisation Plc
13644030	Canadian Pac Ltd	76688910	Rio Algom Ltd
13800630	Canon Inc	78967020	St Helena Gold Mines Ltd
20043510	Cominco Ltd	79715110	San Carlos Mlg Inc
22268740	Courtaulds Plc	80685710	Schlumberger Ltd
24025330	De Beers Cons Mines Ltd	81126710	Scurry Rainbow Oil Ltd
25756110	Domtar Inc	81185010	Seagram Ltd
26156120	Dresdner Bank A G	83569930	Sony Corp
29482130	Ericsson L M Tel Co	87940340	Telefonos De Mexico S A
29788210	Etz Lavud Ltd	88909020	Tokio Marine & Fire Ins Ltd
33812320	Fisons Plc	89150810	Total Pete North Amer Ltd
35615420	Free St Geduld Mines Ltd	89233130	Toyota Mtr Corp
35958630	Fuji Photo Film Ltd	90476760	Unilever Plc
37458610	Giant Yellowknife Mines Ltd	90478450	Unilever N V
37732720	Glaxo Hldgs Plc	91850620	Vaal Reefs Expl & Mng Ltd
38059740	Gold Fields South Africa Ltd	92224r10	Varity Corp
44935080	Idb Bankholding Ltd	94945920	Welkom Gold Mng Ltd
45303820	Imperial Oil Ltd	95807720	Western Deep Levels Ltd
45325840	Inco Ltd	95833220	Western Holdings Ltd
47103430	Japan Air Lines Ltd		