



## MEASURING THE GENERALIZED ASSOCIATION BETWEEN FINANCIAL STATEMENTS AND SECURITY CHARACTERISTICS: A CANONICAL CORRELATION APPROACH

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### Abstract

A strong relationship between the firms' financial ratios and their security characteristics is observed when canonical correlation analysis is applied instead of trying to measure the volatile relationships between the individual variables. It is seen from a sample of 32 firms for 1974-84 that the key ratios in the relationship differ with time. Furthermore, it is observed that accrual based ratios relate more significantly than the cash flow based ratios to the security characteristics. Cash flow based ratios are incrementally significant, though. To establish a relationship between the financial ratios and the security characteristics a limited number of temporally varying key ratios is sufficient. Finally, it is observed that in assessing security characteristics the expected returns and beta are sufficient. Higher moments have no incremental significance.

### 1. Introduction and Overview

Many studies have considered the association between a firm's financial ratios and its security characteristics measured by market-based ratios. Typically these studies have focused on the association between a firm's accounting beta and its security market beta. See for example Ball and Brown (1969), Beaver, Kettler and Scholes (1970), Gonedes (1973), Beaver and Manegold (1975), Bildersee (1975), Bowman (1979), Hill and Stone (1980), Barlev and Livnat (1986), Ismail and Kim (1989). There are also some studies which have tried to establish which single financial ratio(s), or cluster (factor) of financial ratios best correlate with a security's return and risk. See Beaver, Kettler and Scholes (1970), Pettit and Westerfield (1972), O'Connor (1973), Rosenberg and McKibben (1973), Hochman (1983), Martikainen (1990a, 1990b), Kim and Lipka (1991). This approach implicitly assumes that the market's evaluation of a firm's performance and financial standing is based on an unvarying set of financial ratios.

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We will take a more generalized approach to the question of the association. Our first question is whether there exists a general correlation between financial ratios and security characteristics. To tackle this question we apply canonical correlation analysis on a cross section of (accrual based and cash based) financial ratios and security information of 32 publicly traded Finnish companies for 1974-84. Our results confirm that security return and risk are strongly associated to financial ratios, but that the set of best predicting financial ratios is not constant.

There has been much research on whether cash flow based financial ratios behave differently from accrual based financial ratios, and whether they contain more relevant information for security investment decisions than the accrual based figures. See Wilson (1986, 1987), Bowen, Burgstahler and Daley (1987), Blann and Balachandran (1988), Kinnunen (1988), Bernard and Stober (1989), Ismail and Kim (1989), Ou and Penman (1989), Sudarsanam and Fortune (1989), Livnat and Zarowin (1990), and Niskanen (1990). Our second research question is whether the cash flow based financial ratios or the accrual based financial ratios have a stronger relation with security characteristics. Our results do not corroborate a view that the cash flow information would have more relevance than the accrual based figures (rather vice versa).

The consequent question invoked by the above result is whether the cash flow based information is incrementally significant for a relationship between financial ratios and security characteristics. Cash flow based ratios are incrementally significant, but they do not impart decisive incremental information for security evaluation.

There is a strong tradition of research in financial statement analysis trying to reduce a (large) number of financial ratios into a smaller number of mutually exclusive categories covering the various aspects of the firm's activities. (These studies typically use factor analysis methods.) See Pinches, Mingo and Caruthers (1973), Pinches, Eubank, Mingo and Caruthers (1975), Laurent (1979), Johnson (1979), Aho (1980), Chen and Shimerda (1981), Pohlman and Hollinger (1981), Cowen and Hoffer (1982), Yli-Olli and Virtanen (1985), Ezzamel, Brodie and Mar-Molinero (1987), Salmi, Virtanen and Yli-Olli (1990), Kanto and Martikainen (1991), and Luoma and Ruuhela (1991).

It is commonly believed that investors use only a few key factors in their evaluation of a firm's performance and financial standing. Our third major research question is whether the generalized association between the financial ratios and the security characteristics still holds for a reduced set of accrual based financial ratios. Our empirical results conform to the view of a few key factors of being sufficient. The adjusted strength of the observed correlation between the reduced set and the security characteristics is over par with the

non-reduced set of financial ratios.

In accordance to the assumptions of the (two-factor form of) Capital Asset Pricing Model two parameters of returns, mean and beta-risk are the sufficient statistics to define the properties of a security. This means that according to CAPM the alternative statistics (variance and the higher moments of the returns) are not relevant to the decision maker, i.e. they vary stochastically from period to period. Our fourth research question is whether the observed expected returns and betas are adequate, or whether the empirical relation between financial ratios and security characteristics is strengthened by the inclusion of the variance, and the higher moments of security returns. See Fama and MacBeth (1973, 1974), and Roll (1977). Our empirical results indicate that inclusion of the higher moments does not strengthen the empirical association, and thus corroborate the CAPM two-parameter view.

## 2. Research Questions

We pose the following research questions concerning the association between financial ratios and market-based ratios. Our first pair of questions relates to the potential association between a firm's financial characteristics as expressed in its financial ratios (accounting-based information) and its securities' characteristics (market-based information). If there is an association, this corroborates a view that financial ratio analysis can be a useful part of security analysis.

As discussed in the introduction, previous studies have sought for stable relationships between a particular financial ratio, or financial ratio factors. This is, however, a limiting precondition, and we pose the first question in more general terms, and use a more generic statistical methodology (canonical correlation analysis).

- 1a) Is there a statistically significant association between firms' accrual and cash based financial ratios and security characteristics?
- 1b) If such an association exists, is it stable in time?

There has been much discussion on the relative usefulness of alternative accounting information bases. In particular, much interest has focused on the question whether accrual based or cash based accounting produces more relevant information for security analysis. Two somewhat incompatible doctrines on cash based figures should be noted

here. In the theory of finance (capital investments more particularly) the focus of interest is on the value of the firm (and consequently the security behavior) which is considered to be the present value of the firms all future cash flows. On the other hand, the more pragmatic financial accounting has a different focus of interest. Foremost, it sees cash flow and funds-flow information as supplemental information to historical accrual based financial statements in annual disclosure. Because of this practical aspect, the observable cash flow information has this supplemental nature in financial ratio analysis, rather than being a self-contained alternative information set.

- 2a) If the general association is observed, do both accrual based and cash based ratios, when taken separately, have a significant association with the security characteristics.
- 2b) Which of the two, accrual based or cash based figures, have a stronger association.
- 2c) Does the less significant set have incremental explanatory power?

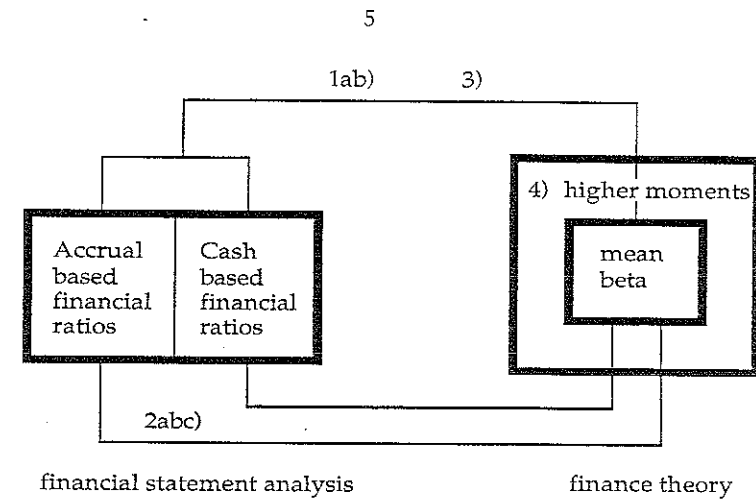
It is typical of human decision making process, that the decision maker seeks to reduce the influx of information into a few key elements or figures. This quest for keeping information in manageable proportions and concentrating on what is deemed essential gives rise to our next research question.

- 3) Are the results consistent with the view that investors use only a few key ratios? Can a strong association be observed for a reduced set of financial ratios?

Finally, we can examine if the standard CAPM or the Zero Beta model are sufficient descriptions of the market return. If the standard CAPM or the Zero Beta Model are best descriptions of the general equilibrium then the variance and the higher moments should have no influence on the market return.

- 4) Are mean and beta of security returns sufficient, or is the empirical association significantly strengthened by the inclusion of variance, skewness, and kurtosis of security returns?

The following figure illustrates the potential associations.



### 3. Data and Methodology Description

Our full set of the accrual based financial ratios is the same as used in Foster (1978, p. 60), which has been used in many studies. The ratios are listed in Appendix 1A (variables  $x_1$ - $x_{12}$ ). The definitions for calculating these basic ratios are given in Yli-Olli (1983, pp. 62-65). For a discussion see Yli-Olli and Virtanen (1985, pp. 11-13). The full set of the cash based financial ratios follow Gombola and Ketz (1983), and are given in Appendix 1A (variables  $x_{13}$ - $x_{20}$ ).

The ratios were obtained for cross sections of all the 32 available publicly traded Finnish companies for 1974-84. See Salmi, Virtanen and Yli-Olli (1990, Appendix G) for the list of the firms which we included in the analysis.

The security characteristics used, i.e. the return and beta, and the variance, skewness and kurtosis of return series, were calculated from the weekly stock returns for the same group of 32 companies. The annual values are thus based on 52 observations each.

To obtain the values of the variables (both financial ratios and security characteristics) for our study period (1974-84) and subperiods (1974-78, 1979-84) we applied simple arithmetic averages of the annual data.

The individual asset returns were collected from a data base originally introduced by Berglund, Wahlroos and Grandell (1983). The price indices used for calculating the

returns were the closing values for each Wednesday. The prices were corrected for splits, new issues etc. assuming that dividends were reinvested with zero transaction cost. The returns for each week were calculated as first differences of the natural logarithms of these price indices. The general index in use (when calculating the betas) was the value-weighted market index collected from the same data base.

For studying the association between the two sets of variables, i.e. financial ratios and security characteristics, we applied canonical correlation analysis. See for example Green (1978, pp. 260-289) for the statistical foundations of the canonical correlation analysis, and Fornell and Larcker (1980), and Pohlman and Hollinger (1981) for its applications in accounting research.

Canonical correlation analysis is a more general case of the usual multiple regression analysis. In the case of multiple regression the aim is to find a linear combination of the independent (or predictor) variables such that the composite has the maximum correlation with the dependent (or criterion) variable. In canonical correlation the interest centers on the linear association between one battery of variables, the predictor variables  $x_1, x_2, \dots, x_p$ , and another battery of variables, the criterion variables  $y_1, y_2, \dots, y_q$ .

The objective in canonical correlation analysis is to find a linear composite of the  $x_i$ -variables,  $i = 1, 2, \dots, p$ , and a (different) linear composite of the  $y_j$ -variables,  $j = 1, 2, \dots, q$ , such that when this pair of derived variables (linear composites) is correlated, the resulting (usual) bivariate correlation is the highest attainable.

Having done this, it is (generally) possible to find a second pair of linear composites, chosen to be uncorrelated with the first pair, such that the correlation between this second pair of derived variables is, conditionally for the first pair, maximal. In general, with  $p$  predictors and  $q$  criteria we can obtain  $r = \min(p, q)$  different pairs of linear composites. The correlations between successive pairs will, in general decline in size.

#### 4. Empirical Results and Interpretation

First the association between all the financial ratios (the twelve averaged accrual based ratios and the eight averaged cash based ratios) and the CAPM security characteristics (the average return and beta) was studied for the entire 1974-84 period. The relevant empirical results of the canonical correlation analysis are in condensed form in Appendix 1A. The (first) canonical correlation between the financial ratios and security

characteristics is 0.925, and the association is significant (0.0267) at the 5 per cent risk level. Thus the answer to our first question (1a) is that there is a significant association between financial ratios and security characteristics.

Our next question (1b) concerned the stability of the association. The results in Appendixes 1B-1 and 1B-2 for the sub-periods of 1974-1978 and 1979-84, respectively, give reasonable support to a general stability. But although numerically high, the association is not strictly significant (0.0734) at the 5 per cent risk level for the 1974-78 period.

By comparing the standardized canonical coefficients for the individual variables a very interesting observation can be made. Although there is a general association between the financial ratios and security characteristics, the individually significant variables are not stable. In layman's terms this means that although it can be stated that financial ratio analysis is important for security analysis, a mechanistic analysis involving an invariable set of predetermined variables cannot be presaged. This volatility of the key ratios is also in line with the frequented view in literature which points out the fact that the last factors resulting from factoring financial ratios fluctuate widely from one study to another.

Note that observing a strong association between financial ratios and security characteristics is not tantamount to claiming that abnormal returns can be earned by applying an analysis of financial ratios. This is not a CAR (cumulative abnormal returns) study.

Our second set of questions (2abc) concerned the significance of accrual based versus cash based financial ratios in relation to security characteristics. From Appendixes 2AB-A (the last A stands for accrual based) and 2AB-C (C for cash based) it is seen that both financial ratio sets are significantly associated with security characteristics, but that the strength of the association is clearly lower for the cash based ratios. Note that this does not, per se, indicate that cash flow information is less relevant for security analysis than accrual based financial ratios. But what it does indicate is that cash based financial ratios when calculated as suggested in standard literature are not up to the standard of accrual based financial ratios. One clear conclusion is that the traditional definitions of cash flow based financial ratios need a serious reevaluation. On the other hand comparing the results of Appendix 1A and 2AB-A indicates that the cash based figures have incremental informational value for security analysis (Question 2c).

Our third question (3) concerned whether a limited set of key financial ratios is sufficient for security analysis. Appendix 3-A gives the results for a reduced set of accrual based ratios: quick ratio, debt to equity, return on equity, total assets turnover, and defensive

interval measure. The selection of these five ratios was based on the classifications in Foster (1978), Lev (1974), Yli-Olli and Virtanen (1985), Salmi, Virtanen and Yli-Olli (1990), and our deliberations. The reduced set of financial ratios represents the following categories: Liquidity, Solvency, Profitability, Turnover, and Dynamic Liquidity (see Yli-Olli and Virtanen (1985) for the inclusion of the defensive interval measure to represent dynamic liquidity). The association to security characteristics remains strong and highly significant for the reduced set of accrual based financial ratios.

Likewise, the cash based financial ratios from Gombola and Ketz (1983) were reduced into cash/sales and cash flow/equity, since these two can best be expected to be independent by definition. This reduction does not retain a significant association between cash based financial ratios and security characteristics. This need not be indicative of a poor usefulness of cash based information. Rather it may be indicative of a fact that the cash based financial ratios have been inadequately defined in earlier literature. Looking more fully into this aspect remains a subject for further research.

Our last question (4) was concerned whether including unsystematic risk, and the higher moments (skewness and kurtosis) of the returns of individual securities makes the empirical association stronger between the financial ratios and security characteristics. This is an interesting question because the theory of the standard Capital Asset Pricing Model or the Zero Beta model assumes normality of the returns (and thus no need for the higher moments), and also assumes that all relevant riskiness is reflected in the beta (systematic risk). Because of the answers to the previous questions, we look into this association using the reduced set of accrual based financial ratios. The results in Appendixes 4 and 4-H (H for higher moments) indicate that the higher moments have no increasing influence on the strength of the canonical correlation coefficients. The non-significance of the higher moments has interesting implications on the empirical relevance of the Capital Asset Pricing Model. The results indicate that the standard CAPM or the Zero Beta model are sufficient descriptions of the market returns.

## 5. Summary

Our results corroborate the view that for an investor a select set of accrual based financial ratios contains essential information for security assessment, and that there is very much redundancy in the financial ratios. This is in line with the observation that beyond five key ratios, the results of studies categorizing financial ratios have given no consistent patterns but have varied from study to study. Our results also corroborate that a simple mechanistic analysis is not sufficient for investment decisions, since the weights of the key ratios vary significantly.

Our results cast doubt on the method ordinarily used for defining cash based financial ratios in the restricted manner exemplified by Gombola and Ketz (1983). It remains a subject of further research to see if defining cash based financial ratios in a way that would make them true alternative counterparts of accrual based figures would add useful incremental information for security analysis.

Our results also show that measuring security characteristics with return and beta is sufficient in the sense that the unsystematic risk (variance) and the higher moments (skewness and kurtosis) of the returns of individual securities have no information value for observing relationships between financial statement variables and security characteristics. The empirical results are thus in agreement with the Capital Asset Pricing Model.

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APPENDIX 1A: Canonical Correlation Analysis: Return and Beta vs All Financial Ratios, 1974-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.925436	0.871041	0.025786
2	0.878130	0.816609	0.041109

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.03286104	2.2582	40	20	0.0267
2	0.22888755	1.9504	19	11	0.1285

Standardized Canonical Coefficients for the 'VAR' Variables

	V <sub>1</sub>	V <sub>2</sub>	
x <sub>21</sub>	0.5977	-0.8720	securitys beta
x <sub>22</sub>	1.0188	0.2824	return on the security

Standardized Canonical Coefficients for the 'WITH' Variables

	W <sub>1</sub>	W <sub>2</sub>	
x1	-0.9443	0.8202	CR current ratio
x2	0.4790	-1.0013	QR quick ratio
x3	-1.0155	1.5236	DI defensive interval measure
x4	0.8400	-1.6204	DE debt to equity
x5	-0.5891	1.6035	LTDE long-term debt to equity
x6	-0.1632	-0.6722	TIE times interest earned
x7	2.2311	-0.1471	ES earnings to sales
x8	-0.4720	0.2433	ROA return on assets
x9	-0.4828	-0.2239	ROE return on equity
x10	0.4481	0.8136	TAT total assets turnover
x11	-0.0310	0.8978	IT inventory turnover
x12	-0.5302	0.2356	ART accounts receivable turnover
x13	1.4749	-0.9754	cash/current debt
x14	0.2265	-1.0724	cash/sales
x15	0.2827	0.4225	cash/total assets
x16	-1.7063	0.9973	cash/total debt
x17	0.3433	1.1319	cash flow/equity
x18	-1.6146	-0.1486	cash flow/sales
x19	-0.6270	-2.4556	cash flow/total assets
x20	1.4239	1.9431	cash flow/total debt

APPENDIX 1B-1: Canonical Correlation Analysis: Return and Beta vs All Financial Ratios, 1974-78.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.941106	0.902720	0.020533
2	0.773969	0.632559	0.072017

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.04583921	1.8353	40	20	0.0734
2	0.40097224	0.8649	19	11	0.6240

Standardized Canonical Coefficients for the 'VAR' Variables

	V <sub>1</sub>	V <sub>2</sub>	
x <sub>21</sub>	-0.0581	1.1231	securitys beta
x <sub>22</sub>	0.9721	0.5656	return on the security

Standardized Canonical Coefficients for the 'WITH' Variables

	W1	W2	
x <sub>1</sub>	0.2209	-0.8296	CR current ratio
x <sub>2</sub>	-0.7815	0.2700	QR quick ratio
x <sub>3</sub>	1.0473	-0.1408	DI defensive interval measure
x <sub>4</sub>	-1.1840	-0.7851	DE debt to equity
x <sub>5</sub>	1.4052	1.1925	LTDE long-term debt to equity
x <sub>6</sub>	0.2982	0.7263	TIE times interest earned
x <sub>7</sub>	1.7236	2.0263	ES earnings to sales
x <sub>8</sub>	-0.8278	-0.7678	ROA return on assets
x <sub>9</sub>	-1.1230	-1.3004	ROE return on equity
x <sub>10</sub>	1.2473	0.9037	TAT total assets turnover
x <sub>11</sub>	0.1735	-1.3025	IT inventory turnover
x <sub>12</sub>	0.1489	0.1655	ART accounts receivable turnover
x <sub>13</sub>	-0.3420	-0.0647	cash/current debt
x <sub>14</sub>	-0.5204	0.5392	cash/sales
x <sub>15</sub>	-0.2844	-0.1642	cash/total assets
x <sub>16</sub>	0.9298	-0.1418	cash/total debt
x <sub>17</sub>	1.2959	0.1214	cash flow/equity
x <sub>18</sub>	-0.9510	0.9857	cash flow/sales
x <sub>19</sub>	-0.9573	0.6165	cash flow/total assets
x <sub>20</sub>	1.1367	-1.1996	cash flow/total debt

APPENDIX 1B-2: Canonical Correlation Analysis: Return and Beta vs All Financial Ratios, 1979-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.939898	0.899639	0.020941
2	0.846767	0.759023	0.050826

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.03299409	2.2527	40	20	0.0271
2	0.28298632	1.4669	19	11	0.2607

Standardized Canonical Coefficients for the 'VAR' Variables

	V <sub>1</sub>	V <sub>2</sub>	
x <sub>21</sub>	0.9868	-0.1731	securitys beta
x <sub>22</sub>	0.1122	0.9956	return on the security

Standardized Canonical Coefficients for the 'WITH' Variables

	W1	W2	
x <sub>1</sub>	-1.7278	0.3721	CR current ratio
x <sub>2</sub>	1.6441	-0.8693	QR quick ratio
x <sub>3</sub>	-2.0943	1.6103	DI defensive interval measure
x <sub>4</sub>	3.8069	-1.4121	DE debt to equity
x <sub>5</sub>	-3.6131	1.3095	LTDE long-term debt to equity
x <sub>6</sub>	0.2911	1.8654	TIE times interest earned
x <sub>7</sub>	2.2436	-1.5714	ES earnings to sales
x <sub>8</sub>	-0.8038	-0.0426	ROA return on assets
x <sub>9</sub>	-0.4235	0.7843	ROE return on equity
x <sub>10</sub>	-0.2720	0.4113	TAT total assets turnover
x <sub>11</sub>	-0.6569	-0.4627	IT inventory turnover
x <sub>12</sub>	-0.6977	-0.0756	ART accounts receivable turnover
x <sub>13</sub>	3.3570	-0.4769	cash/current debt
x <sub>14</sub>	0.2746	0.0467	cash/sales
x <sub>15</sub>	0.8462	-2.7652	cash/total assets
x <sub>16</sub>	-3.5025	3.1197	cash/total debt
x <sub>17</sub>	-0.8130	-0.5471	cash flow/equity
x <sub>18</sub>	-0.9144	0.7846	cash flow/sales
x <sub>19</sub>	1.3749	5.3810	cash flow/total assets
x <sub>20</sub>	-0.5648	-5.7705	cash flow/total debt

**APPENDIX 2AB-A:** Canonical Correlation Analysis: Return and Beta vs Accrual Based Financial Ratios, 1974-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.866683	0.808304	0.044697
2	0.741299	0.661968	0.080908

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.11210552	2.9800	24	36	0.0015
2	0.45047593	2.1071	11	19	0.0741

**APPENDIX 2AB-C:** Canonical Correlation Analysis: Return and Beta vs Cash Based Financial Ratios, 1974-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.686371	0.559448	0.094992
2	0.581293	0.526569	0.118916

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.35018084	1.8971	16	44	0.0475
2	0.66209876	1.6769	7	23	0.1645

**APPENDIX 3-A:** Canonical Correlation Analysis: Return and Beta vs Reduced set of Accrual Based Financial Ratios, 1974-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.802959	0.765538	0.063806
2	0.598566	0.568252	0.115256

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.22797542	5.4719	10	50	0.0001
2	0.64171921	3.6290	4	26	0.0177

**APPENDIX 3-C:** Canonical Correlation Analysis: Return and Beta vs Reduced set of Cash Based Financial Ratios, 1974-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.412231	0.320204	0.149084
2	0.253024	.	0.168107

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.77692414	1.8832	4	56	0.1261
2	0.93597906	1.9836	1	29	0.1696

**APPENDIX 4:** Canonical Correlation Analysis: Return, Beta and Variance vs Reduced set of Accrual Based Financial Ratios, 1974-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.809226	0.766023	0.061991
2	0.610870	0.564879	0.112583
3	0.137028	-.081771	0.176233

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.21229309	3.3467	15	66.65483	0.0003
2	0.61506817	1.7193	8	50	0.1170
3	0.98122345	0.1658	3	26	0.9184

**APPENDIX 4-H:** Canonical Correlation Analysis: Return, Beta, Variance, Skewness and Kurtosis vs Reduced set of Accrual Based Financial Ratios, 1974-84.

Canonical Variables	Canonical Correlation	Adjusted Canonical Correlation	Approx Standard Error
1	0.815855	0.758423	0.060057
2	0.659407	0.596424	0.101510
3	0.2221933	-.237733	0.170759
4	0.164251	.	0.174760
5	0.108474	.	0.177492

Test of H0: The canonical correlations in the current row and all that follow are zero:

Canonical Correlations	Likelihood Ratio	Approx F	Num DF	Den DF	Pr > F
1	0.17277326	2.0115	25	83.2283	0.0097
2	0.51669635	1.0692	16	70.90379	0.3999
3	0.91421079	0.2443	9	58.5603	0.9861
4	0.96157247	0.2473	4	50	0.9099
5	0.98823330	0.3096	1	26	0.5827