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Accounting and market measures of risk evidence from Canada and Israel*

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Abstract

The relationship between accounting-based and market-based measures of systematic risk has been tested empirically in the United States. The primary purpose of this study is to investigate whether accounting variables are useful in predicting future market-determined systematic risk in Canada and Israel. Canada is a stable and developed capital market, whereas Israel was an emerging market during the research period. The results indicate that, in the turbulent Israeli economy, *ex post* accounting betas of a given period predicted the next period market betas slightly more accurately than the given period *ex post* market betas. Both predictors, however, were significant. These results resemble findings in the U.S. In the more stable Canadian economy, although it more closely resembles the U.S. economy, neither accounting nor market betas were useful in predicting the next period's market-systematic risk. A rationale for these findings is suggested, and implications for emerging markets are promoted.

1. Introduction

The association between accounting measures of risk and security risk has been a major research focus in accounting and finance since the seminal articles of Ball and Brown (1969) and Beaver, Kettler and Scholes (1970; henceforth BKS). To the best of our knowledge, the issue has been tested empirically prior to 1989 only on the U.S. market.

The purpose of this study is to provide empirical evidence of the relationship between accounting-based and market-based measures of systematic risk in Canada and Israel rather than in the U.S. This study is probably the first to examine the issue in both these countries. We investigate whether *ex post* accounting variables can be used to predict the next period's market-determined systematic risk (market beta). These predictions are compared with other forecasts, such as the market-systematic risk of the previous period. The findings are also compared with previous results.[1] In addition, this study examines the industry effect, which was not included in previous studies.

Canada and Israel have usually had stable and turbulent economies, respectively[2]. Israel is

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1. In the U.S., for instance, BKS (1970), Rosenberg and McKibben (1973), Rosenberg and Marathe (1979), and Rosenberg (1984, 1985) used both accounting and market data to predict systematic risk in the next period. Ferris et al. (1989) and Capstaff (1991) investigated the association between accounting information and investment risk perception in Japan and U.K., respectively.

2. The securities in Canada were traded in comparatively stable conditions, while securities in Israel were traded under high inflation rates, and frequent changes in monetary and fiscal policies, as well as in regulatory restrictions on the capital markets.

listed as a developed economy by the International Accounting and Reporting Issues (UN, 1986, p. 65) and as a developed stock market by the Emerging Stock Markets Factbook (IFC, 1990), with active trading since the early 1960s. But, Israel was an emerging stock market during the 1960s and 1970s with less than 100 publicly traded firms at the end of this period.[3]

The accounting procedures in Israel were quite similar to those in the U.S. during the research period. Canada has an accounting environment that is somewhat similar to that of the U.S., and it is identified as a developed market economy and developed stock market by the UN (1986) and IFC (1990), respectively. These conditions make both countries interesting cases for studying the relationship between accounting and market measures of risks. The question of whether the findings from the U.S. can be generalized to these two environments, was the basis of the motivation for the current study. In particular, it was presumed that the results might be useful for other emerging stock markets as they grow and expand into developed stock markets[4].

In Israel, the results show that *ex post* accounting betas of a given period predicted the next period market betas more accurately than the given period *ex post* market betas, but that both predictors were significant. These results resemble previous findings in the U.S. Neither accounting nor market betas were useful in predicting the next period's market-systematic risk in Canada.

The following section presents the theoretical relationship between market-determined systematic risk and accounting measures of risk. We were primarily concerned with the ability of accounting risk measures to predict the market-systematic risk. Research design and empirical results are discussed and reported in the third and fourth sections. The findings, which include some unexpected results, are then discussed in section five. Implications for studies and investors in emerging stock markets are addressed. Concluding remarks are presented in the summary section.

2. Market and accounting risk: specifications of the models

BKS (1970) and a few subsequent studies indicate that models using accounting data appeared to be able to forecast future levels of market risk measures better than models using past data on market-systematic risk alone. The linear relationship of security returns and the market return is described by the market model in the following form:[5]

$$\tilde{R}_{jt} = \alpha_j + \beta_j^M \tilde{R}_{mt} + \varepsilon_{jt}, \quad (1)$$

where:

$\tilde{R}_{jt}$ = return on security in period t;

$\tilde{R}_{mt}$ = return on the market portfolio in period t;

ε_{jt} = residual term for security j.

The familiar CAPM is presented as follows:

$$E(\tilde{R}_{jt}) = R_{ft} + B_j^M [E(\tilde{R}_{mt}) - R_{ft}], \quad (2)$$

3. More than 650 firms with about 1000 stocks and about 600 corporate and government bonds were publicly traded in Israel in 1996.

4. Several countries in southern Europe, such as Turkey, Greece, and a few other countries, are moving from emerging stock markets to developed markets as Israel did in the 1980s.

5. The return-generating process is described by the market model and the CAPM. Sharpe (1963) developed the market model. The CAPM was developed by Sharpe (1964) and Linter (1965), and has been extended by Black (1972) and numerous other studies.

where:

R_{ft} = return on a risk-free asset in period t, and the market-systematic risk (market beta) for security j is denoted by β_j^M

In the U.S., Ball and Brown (1969) found a significant association between the accounting-systematic risk (i.e., the systematic variability of accounting income numbers relative to a market index of accounting earnings) and the market-systematic risk. BKS (1970) also showed a significant correlation between a few accounting measures of risk and market-systematic risk. Thus, in addition to the accounting-systematic risk (also termed the "accounting beta"), BKS (1970) extended their analysis to other accounting variables.

The association between accounting numbers and an index of accounting numbers (e.g., a value-weighted industry index of earnings) is estimated from the following equation:

$$\tilde{A_{jt}} = \alpha_j^A + \beta_j^A \tilde{A_{mt}} + w_{jt}, \quad (3)$$

where:

$\tilde{A_{jt}}$ = the accounting number (i.e., accounting earnings or a financial ratio) for firm j for year t;

$\tilde{A_{mt}}$ = the index of accounting numbers for year t;

W_{jt} = the error term.

α_j^A and β_j^A are the parameters for firm j; and β_j^A is the accounting-systematic risk or the "accounting beta."

BKS (1970) and Beaver and Manegold (1975) also found that several models based on accounting variables predicted future levels of market-systematic risk better than models relying on market-systematic risk. Similar significant results have been reported in subsequent studies in the U.S. Bildersee (1975) and Eskew (1979) indicated that the inclusion of accounting variables enables better prediction of future betas. Hill and Stone (1980) and Comiskey et al. (1986) support their findings by both univariate and multivariate analyses.[6] However, Elgers (1980) found that accounting variables did not produce more accurate predictors of the future market-systematic risk when Bayesian adjustment was used to control measurement errors. Further analyses were provided by Gonedes (1973), Bowman (1979), Elgers (1980), Lee and Zumwalt (1981), Ismail and Kim (1989), and Karpik and Belkaoui (1989).

In this study, the ability of the accounting betas to predict ex ante market-systematic risk is compared with the ability of a given market-determined systematic risk to predict this future risk. Thus, on the basis of accounting betas of a given period (e.g., 14 years in Canada), a prediction of market-systematic risk for the next period is developed. The results are compared with the ability of the given market-determined systematic risk to predict the next period's market-systematic risk. The following form of cross-sectional regression equations are used:

$$\beta_{2j}^M = a + b\beta_{1j}^M + U_j, \quad (4)$$

$$\beta_{2j}^M = c + d\beta_{1j}^A + V_j, \quad (5)$$

where:

B_{2j}^M = market-systematic risk (beta) for the next period, for firm j;

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6. Comiskey *et al.* (1986) provided some evidence that a higher degree of association existed between market betas and forecast-error betas than between market betas and accounting betas. Ismail and Kim (1989) indicated that fund and cash-flow risk measures (i.e., betas) provided more significant explanatory power than accounting betas of earnings in explaining the market betas. Karpik and Belkaoui (1989) provided evidence on incremental explanatory power of value-added variables in explaining variability in market betas.

B^{M}_{1j} = *ex post* market-systematic risk (beta) for firm j;

B^{A}_{1j} = *ex post* accounting-systematic risk (accounting beta) for firm j.

The null hypothesis is that both accounting betas and market betas of a given period have the same predictive accuracy of market betas of the next period. This null hypothesis and related issues have been tested empirically and are discussed in the following sections.

3. Measurement procedures

To test the null hypothesis empirically, correlation and regression tests were performed. The market-systematic risk, the accounting betas, and other accounting variables are computed and analyzed before testing the null hypothesis. Both standard OLS regression and correlation analyses, as well as Bayesian smoothing suggested by Vasichek (1973) and used in more recent studies, were performed.[7] The results in Canada and Israel are analyzed and discussed in the following section.

3.1 Data samples and populations

The Israeli sample included 70 companies traded on the Tel-Aviv Stock Exchange (TASE) during the period 1965-1983.[8] This sample included the entire population of corporations with available market and accounting data. The Halevy Co. Financial Service File, consisting of data for 1965-1985, was the major data source. The TASE is the only organized bond and stock exchange in Israel.[9] During the 1960s and 1970s, the annual weight of the bond market varied from 59 percent to 84 percent of the total market: the weight dropped to less than 50 percent during the early 1980s.

The TASE weighted stock index was used as the annual market rate of return. In addition, the combined weighted return of the bond and stock market was used as an alternative proxy measure of the market return. The real return on the CPI-linked government bonds was used as a proxy risk-free rate, Rf (see Levy, 1980, for specific explanations); this measure did not correlate with the

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7. The Bayesian procedure for adjusting the beta is:

$$\beta^{*} = \frac{\hat{\beta}_{1}/S^{2}_{1} + \hat{\beta}/S^{2}}{1/S^{2}_{1} + 1/S^{2}}$$

where:

β^{*} = the Bayesian adjusted beta

$\hat{\beta}_{1}$ = prior estimate of beta

$\hat{\beta}$ = sample estimate of beta

S^{2}_{1} = prior estimate of variance of beta

S^{2} = sample variance of beta

The procedure minimizes estimation loss. Empirical results of the Bayesian correlations are available upon request. The evidence does not alter the conclusions which are based on OLS estimations.

8. The annual rate of inflation was approximately 460 and 190 percent for the years 1984 and 1985, respectively. Due to the severe inflation, additional data for recent years were excluded, and the most recent observation is dated at the end of 1983. Also, the Israeli stock exchange has been identified by the IFC as a developed stock market since the mid-1980s, and implications of more recent periods for other emerging stock markets may not be relevant if recent data have been used.

9. For further information on the Israeli bond and stock market, corporate financial statements, accounting procedures, and economic conditions in Israel, see, e.g., Lev and Yahalomi (1972), Levy (1980, 1982), and Lakonishok and Sadan (1981).

market index.

Stock prices and accounting data of 221 Canadian firms traded on the Toronto Stock Exchange (TSE) between January 1963 and December 1983 were included in the second sample. The Financial Post Tape and the Laval Tape were used. The TSE 300 Index was used as a proxy measure of market return, and the return on 30-day Government T-bills as a proxy measure of Rf.[10]

Because of the severe inflation in Israel, the annual returns in both countries were also adjusted for inflation (see Levy, 1980, 1983). The estimations were calculated in nominal and in real terms. Data for all accounting variables were available for all years as well. The period was divided into sub-periods: 1963-1976 in Canada; 1965-1976 in Israel (data from previous years were not available); and, 1977-1983 for both countries. The database was divided by industries into five and six sub-samples in Israel and Canada, respectively. The breakdown by industries is summarized in Table 1.

3.2 Accounting variables

Although Chang et al. (1983) revealed a strong belief in the importance of financial statements for investment decisions in different countries, Choi et al. (1983) pointed out that financial ratios are often misused when applied to foreign companies. Thus, guidelines for comparing financial statements, as well as other accounting data, from different countries are required. Nair and Frank (1980) clustered the respective measurement and disclosure patterns in 38 countries. Canada and the U.S. were in the same disclosure and measurement groups according to the 1973 data base, but were clustered in two different disclosure groups based on survey data for 1975.

Nair (1982) identified groups of countries that have similar accounting practices. Canada and the U.S. were in the same disclosure grouping, but at different measurement groupings. Choi and Bavishi (1982) synthesized 32 accounting principles in different countries. The U.S. and Canada constituted 30 similar practices and differed only in two accounting principles. Choi and Mueller (1992) pointed out that the Canadian scene is highly similar to that of the U.S. in some ways, and they listed seven differences between accounting in Canada and in the U.S. The similar accounting principles and practices in the two countries were traced to the close economic links between both countries. Bloom (1984) compared accounting standards in the U.S. and Canada.[11]

In Israel, compliance with GAAP is mandatory for an unqualified audit opinion. All corporations (including private) are required to have audited financial statements. The accounting principles in Israel are similar to those in Canada and the U.S. In fact, Israel, Canada, and the U.S. use at least 25 similar principles from the 32 synthesized by Choi and Bavishi (1982).[12]

Accounting financial ratios and the covariability of these financial ratios with the market

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10. For a few details on the TSE, see Calvet and Lefoll (1988), Cheung (1990), and Lee (1991).

11. Biddle and Saudagarm (1989) have recently included a survey of studies that attempted to offer explanations for differences in accounting standards. Gray (1980) provided an explanation for differences in disclosure levels for U.K., France, and Germany. Gray (1989) proposed the global environmental and cultural framework as a basis for identifying international forces for changes and their impact on accounting systems and practices at the national level. For related issues in international accounting, see Schoenfeld (1981), Choi and Mueller (1992), and Bavishi (1989).

12. There were forty financial accounting standards in Israel in the mid-1980s; most were similar to the U.S. standards (FASB). Many other U.S. standards and pronouncements were practically adapted by the accounting profession in Israel. Israel has also been a member of the IASC, and its accounting education system in the universities has been very similar to the one in U.S. universities. Lev (1976), Givoly and Lakonishok (1982), Callen and Livnat (1984), and Barniv and Elitzur (1989) provide partial information on the scene of accounting practices and the accounting environment in Israel. In the present study, an attempt was made to adjust the Israeli GAAP to the U.S. GAAP, though only minor differences in GAAP exist. Restatements were made only for industrial firms. Cross-sectional differences before and after restatement were insignificant for ratios as well as accounting betas.

index of these ratios were used as proxy measures of accounting risk. The following accounting risk measures were considered in this study for both countries: (1) liquidity was measured by the current ratio; (2) profitability was measured by net income to total assets; (3) leverage was measured by the ratios of stockholders equity to total debt and by stockholders equity to total assets; and (4) current liabilities to revenues, a ratio which measured liquidity and efficiency.

We selected these five ratios because they were common for most industries and are similar when applied to Canada and Israel. Having commonality of accounting characteristics in both countries and in the U.S., these ratios should permit comparisons and valid conclusions. Major differences in the financial statements of the various industries led us to eliminate several other financial ratios in both countries. A negative association was expected between these ratios and risk (except the fifth ratio). However, our study focused on the accounting betas of these ratios, and we expected a positive relation between the market betas and the accounting betas.

While the five financial ratios were used in Canada and Israel, other financial ratios and growth measures were also used in Israel. Most of these ratios were not available for all industries; but were useful for industrial (i.e., manufacturing and retail) and land and development industries; the accounting betas of these additional ratios were also used in this study (see Appendix for details). Ratios that have been used by BKS (1970) in the U.S. have also been used in both countries and were compared with the U.S., Japan, and UK results.

4. Empirical results

Estimates of the market-systematic risks were obtained for both countries. These market betas were computed for each firm in nominal terms and then in real terms. Both the CAPM and the market model, as well as the Bayesian adjustment, were used for the Israeli data. Table 2 presents the real and nominal security-return estimates of the market-determined betas. The market betas were computed at the single firm level. The industry averages and the weighted average are shown for both countries.

Table 2 shows that the average market-determined betas were close to 1, but were somehow below 1 for most industries in Israel, with the exception of the banks and financial service industry. In Canada, the average market betas were below 1 for industrial firms, banks, and financial service firms, and higher than 1 for other industries. Low variances of the betas were observed in both countries. Insignificant Durbin-Watson statistics indicate the absence of substantial serial correlations for both countries. Previous studies indicated that the average cross-sectional market-determined betas were close to 1 in the U.S. (see Table 6). Table 3 presents the average accounting betas across accounting variables for both countries. The estimations, were below, but close to, 1 for most variables in Israel; but most accounting betas were significantly higher than 1 in Canada. The Canadian data were unstable over time for the research period. In Israel both accounting and market betas were stationary over time. Implications and interpretations of the findings are discussed in the following section.

The cross-sectional correlation between market betas and accounting measures of risk are shown in Table 4. Previous results in the U.S. and the UK are compared with results in Canada and Israel. Panel A shows the correlations of market betas, with alternative accounting ratios. The results were somewhat significant for asset growth and leverage only in Israel. Panel B shows that the accounting measures of risk (i.e., accounting betas of the five ratios) were significantly correlated with market betas in Israel (except for ratio 3). The cross-sectional correlation of accounting measurers of risk, including accounting betas with market betas, were insignificant in Canada. The correlations in Israel resemble the finding in the U.S., whereas those in Canada were even lower than the insignificant correlation between market beta and accounting variables in the

UK.

The ability of the accounting betas to predict next period's market betas is presented in Table 5, the inter-period cross-sectional correlations (i.e., the explanatory power) for equations 4 and 5 are presented. Accounting betas were measured for the first sub-period and are used to predict the market betas in the second sub-period (1977-1983). The results were compared with forecasts based on the first sub-period *ex post* market beta estimates.

The results in panel A of Table 5 indicate that the predictions of market betas based on accounting risk measures (accounting betas in the table) were slightly superior to the market beta forecasts in Israel.[13] Accounting betas did not produce more accurate estimates of the market beta in Canada (Panel B), and the associations of the accounting betas and market beta estimates with the next period's market beta were insignificant or significant in the unexpected direction, indicating an absence of prediction power. Coefficients for cross-sectional regression analyses (dj in equation 5) were usually significant in Israel, but generally insignificant in Canada.[14] In conclusion, the null hypothesis was rejected for most accounting betas in Israel, but not in Canada, because ex post accounting and market estimates were generally not correlated or were negatively correlated with future market betas.

The results of previous studies in the U.S. are presented in Table 6. The estimated average market betas and the average accounting betas for various financial ratios were close to 1. In the U.S., the results for univariate correlation coefficients indicated that both the market and accounting betas for given periods are significant predictors of the next period's betas. BKS (1970), Bildersee (1975), and Eskew (1979) also indicated that the inclusion of accounting betas and other accounting risk measures in models used to predict future market betas results in better predictions than models using market betas only.

A comparison of the results, in Tables 3, 4, and 5 with the previous results for the U.S. (presented in Table 6), indicates that the results of the turbulent Israeli economy resemble the findings in the U.S., but the results in Canada were not similar to the findings in Israel and the U.S. The results in Canada are consistent with results of two studies in Japan and the UK, where accounting risk measures were not found to explain significant variations in market-determined betas.

5. Discussion

Securities were traded under unstable conditions in Israel.[15] However, using the Rao-Miller nonparametric tests, we found that predictions of market-determined betas based on ex post accounting betas and other accounting risk variables were often superior to predictions based on ex post market-determined betas. Accounting betas were not superior to market betas as estimates of ex ante market betas in Canada, and both forecasts were insignificant. These findings are less expected, because the Canadian environment has been stable with relative low inflation.[16]

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13. The associations of the market beta with accounting-financial ratios were also significant, but generally the significance level was lower than that of the accounting betas. Note that accounting beta predictions were significantly more correlated with market betas for development and land, insurance, and investment firms.

14. Most cross-sectional coefficients d (equation 5) and many of the coefficients b (equation 4) were significant across ratios at $p < 0.05$ in Israel. The mean R^2 (weighted across industries and the five ratios) was 0.226 for equation (5) compared with a mean R^2 0.09 for equation (4). Most coefficients (b and d) were insignificant in Canada.

15. The average annual rate of inflation was about 15 percent during the first sub-period and about 92 percent during the second sub-period. The severe inflation was accompanied by frequent changes in monetary and fiscal policies.

16. The average annual inflation rates of 4.5 percent and 9.3 percent for the first and the second sub-periods, respectively.

5.1 Empirical applicability of the CAPM

Levy (1980) was concerned with the empirical applicability of the CAPM in the Israeli market and noted that his data produced very strong results.[17] Thus, market betas obtained for the Israeli market were consistent with the theoretical CAPM. Levy indicated that the thin and small Israeli market (about 100 stocks of different companies listed on the TASE during the late 1970s) might suit the CAPM better than large markets (such as the U.S. security exchanges).[18] In Israel there are also government bonds that are linked to the CPI, which provides a riskless asset in real terms. Thus, it seems that the empirical tests of the CAPM were valid in Israel.

Levy also pointed out the central role of the investment horizon in Israel; meaningful relationships between return and market measures of risks were found for annual data, but not for shorter horizons. Lev (1989) and Easton et al. (1992) recently provided evidence of impressive correlations between security returns and accounting earnings for sufficiently wide-event windows (i.e., five or ten years).

Generally, studies in Canada did not confirm the applicability of the CAPM to the Canadian security (see, Morin, 1980; Jobson and Korkie, 1985; Calvet and Lefoll, 1988). The applicability to the Canadian market of equilibrium models such as the CAPM was rejected for the 1960s and early 1970s, but slightly significant results were produced for the late 1970s and the 1980s.[19] In our study, the average market-determined betas were close to 1 in both countries. This supports previous findings on the usefulness of the market measures of risks in Israel (and in Canada during the late 1970s and 1980s); however, significant instability over time between the two sub-periods were found in Canada.

5.2 Rationale and interpretation

The rationale behind these results is not clear-cut, because the Canadian economy more closely resembles the U.S. environment than the Israeli economy. In Canada, the empirical results indicate that security returns and market betas were unstable over time, and the historical betas might contain more measurement errors.

About half of the Canadian corporations (especially industrial and mining firms) were U.S.-owned firms. Foreign ownership of the Canadian economy has been a much debated issue (see Globerman, 1979; Rugman, 1980, 1987). Thus, foreign ownership constraints and noise in the Canadian data generated insignificant predictive power for both market betas and accounting beta.[20]

The relationship of the accounting profession and government in Canada is less of an adversarial one than in the U.S., and a regulatory body such as the SEC did not exist in Canada (Johnston et al., 1980). This makes it virtually impossible to interpret Canadian results and to control multinational parent-subsidiary relationships in the accounting data.

In Canada, tax treatment of dividends and capital gains differed from that in the U.S. (Booth

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17. Levy (1980, p. 563) noted: "Indeed to the best of my knowledge, this is the first time that empirical findings are fully consistent with the CAPM. Possibly the thinness of the Israeli market and the existence of a risk-less interest rate in real terms account for these results."

18. The error induced by the fact that investors in the Israeli market hold less than 10 stocks rather than 100 is probably much smaller than the error caused by investors in the U.S. holding less than 10 stocks rather than thousands of securities (see Levy, 1980).

19. Brown et al. (1991) and L'Her and Suret (1991) indicate the appropriateness of using the CAPM for TSE data during the 1980s. Both studies examine analyst price and earnings forecasts.

20. Foreign direct investments (FDI) in Canada were usually in the form of equity capital involving direct control over the assets. It has effects on employment, taxation, trade, and other economic issues, as well as raising political and cultural issues (see, Safarian, 1966; Rugman, 1980, 1987).

and Johnston, 1984). Darrat (1990) recently found that the present Canadian stock is somewhat efficient and the returns are constant over time; however, fiscal policy exerts a significant lagged effect on Canadian stock prices, suggesting inconsistency with stock market efficiency. In addition, there were frequent changes in tax rates for dividend, capital gain, and interest income. It appears that the multinational, fiscal policy, and taxation effects were amazing, and significant noise is included in the data and the analyses.

In summary, the results in Canada reflect instability over time of both accounting and market measures of risk, macro factors such as interest rates and tax rates, and differences in industries as well as institutional-related issues. The different results can also be traced to differences in cultural, political, and institutional environments in each country.

FDI in Israel were less significant than in Canada, and there were fewer similarities in the regulatory systems in Israel and U.S. The turbulent Israeli economy differed from the U.S. and the Canadian economies; however, the results resembled the findings in the U.S. The stability of market-determined betas and accounting betas over time, and the applicability of the CAPM, are probably the major reasons for this result.

The results might be applicable for future studies in other countries that have moved, or are currently moving, from emerging stock markets to developed markets as Israel did in the 1980s. For example, Greece and Turkey did not have meaningful active stock markets during the 1970s; both countries were listed as emerging markets by the Emerging Stock Markets Factbook (IFC, 1990), and they were listed by the International Accounting and Reporting Issues (UN, 1986, p. 65) as developed economies. Other turbulent economies, in countries such as Argentina, Columbia, Chile, Jordan, Thailand, and Malaysia, were listed as developing countries and emerging stock markets by the UN (1986) and the IFC (1990), respectively.

There were less than 200 listed companies in many emerging markets at the end of 1989 (IFC, 1990). For example, 119, 50, 178, and 82 firms were publicly traded in Greece, Turkey, Argentina, and Colombia, respectively. The market capitalizations were $3506 billion, $291 billion, and $8.3 billion, in the U.S., Canada and Israel, respectively. However, market capitalizations were smaller in emerging markets. For instance, market capitalizations were only $6.4 billion, $6.7 billion, $4.2 billion, and $1.1 billion, in Greece, Turkey, Argentina, and Colombia, respectively. In Israel, market capitalization expanded to $4.8 billion in 1980 and to $12 billion in 1987, and resembled the size and growth of emerging markets in the late 1980s and early 1990s. Therefore, the TASE during the 1970s and 1980s may be used as a model for emerging markets in the 1990s.

Similar to the TASE during the 1970s and early 1980s, the thin and small emerging markets may suit the CAPM better than large developed markets such as the U.S. and Canada. The potential validity of the CAPM in these emerging markets may render better predictions of market betas by using *ex post* accounting betas. The development of accounting standards and the progress of disclosure practices in the emerging markets may provide more reliable accounting betas. Thus, it may be interesting to examine whether accounting-systematic risk measures predict the future market-determined risk more accurately than *ex post* sub-period market betas in these emerging markets. Future research should scrutinize the emerging markets and may find the resemblance of results to the Israeli market. In practice, foreign investors may be more amenable to invest in emerging markets if *ex post* accounting risk measures can predict the future market-determined risk.

6. Summary and concluding remarks

This study has focused on using *ex post* accounting and market betas to predict future market betas in a stable economy and a turbulent economy. Canada and Israel have similar accounting

procedures with those of the U.S. and sufficient time series data. The findings are compared with previous studies in the U.S. Although, Israel suffered from turbulent economy, and had an emerging stock market until the mid-1980s, *ex post* accounting and market betas could unexpectedly predict the next period's market betas. Moreover, several accounting-systematic risk measures (accounting betas) predict the future market-determined risk (beta) more accurately than *ex post* sub-period market betas.

The results from the more stable Canadian economy were generally insignificant or significant in an unexpected direction. Multinational constraints, tax considerations, and return-generating processes, as well as accounting data which were not stable over time, could be promoted as possible reasons for the findings in Canada. The return-generating process was adjusted for inflation in both countries, but nominal analyses produced similar results.

Empirical analyses in both countries were limited by the following: (1) only annual returns and accounting data were used, because recent studies in the U.S. have shown impressive correlation between returns and earnings for wide-vent windows; (2) recent data were excluded because of severe inflation in Israel during 1984 and 1985 and the changing of the definition of the Israeli stock market to a developed stock exchange since the mid-1980s; and, (3) the results were examined at the single-firm level and no attempt was made to provide evidence over portfolio levels.

In conclusion, the empirical results indicate that accounting variables, especially the accounting betas, were associated with market-systematic risk in Israel. Moreover, both *ex post* market betas and accounting betas of a given period could be used to predict the market systematic risk of the next period. A few accounting betas predicted the next period market betas with slightly more accuracy than did the given period *ex post* market betas. For the research period, it is not apparent that *ex post* accounting and market betas could be used to predict the next period's market-systematic risk in Canada. Future studies may extend the analysis to comparisons with these and other emerging markets, such as Greece, Turkey, and countries in the Middle East, South America, and the Far East during the 1980s and the 1990s.

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Table 1. Firms by Country and Industry

Industry	Canada (%)	Israel (%)
	(%)	(%)
Industrial (manufacturing and retail)	86 (38.9)	23 (32.9)
Oil and Gas	53 (24.0)	-
Development and Land	10 (4.5)	9 (12.9)
Banks and F. Services	30 (13.6)	22 (31.4)
Insurance[1]	-	4 (5.7)
Investment	-	12 (17.1)
Gold Mining	12 (5.4)	-
Other Mining	30 (13.6)	-
Total	221	70

Note: [1]Holding companies are included in Banks and Financial Services in Canada.

Table 2. Estimates of Market-Systematic Risks (Market betas)

Industry	Canada[1] Industry Average		Israel[1] Industry Average[2]	
	Nominal	Real[3]	Nominal	Real[3]
Industrial	0.833	0.843	1.62	0.92
Oil and Gas	1.385	1.454	-	-
Development and Land	1.032	1.039	0.71	0.49
Bank and F. services	0.835	0.882	0.68	1.32
Insurance	-	-	0.40	0.89
Investment	-	-	0.72	0.95
Gold Mining	1.630	1.588	-	-
Other Mining	1.261	1.228	-	-
Weighted Average	1.076	1.072	0.98	0.99

Notes:

[1]Bayesian Adjustment estimates are available upon request and do not alter the conclusions.

[2]The market index is the combined weighted bond and stock TASE index.

[3]Adjusted for inflation.

Table 3. Estimates of Accounting Betas (Industry Averages)

Financial Ratio	Industrial	Oil & Gas	Development and Land	Banks & F. Services	Insurance	Investment	Gold	Mining Others	Weighted Average
Canada									
1	1.084	1.04	1.093	.856	-	-	3.145	1.404	1.028[1]
2	1.547	.987	1.018	.527	-	-	4.165	1.726	1.192[1]
3	.602	1.267	.721	3.719	-	-	.889	1.375	1.915[1]
4	1.487	.658	1.031	9.123	-	-	2.597	.861	1.041[1]
5	2.266	1.242	.752	.189	-	-	1.421	.535	1.152[1]
Israel[2]									
1	1.43	-	-2.84	.16	.98	.77	-	-	.7091
2	.98	-	.90	1.06	.80	.83	-	-	.914
3	1.29	-	1.14			1.01	-	-	1.183
4	.88	-	1.07	.23		.70	-	-	.8671
5	1.07	-	1.00				-	-	
6	1.03	-	.82	.80	.97		-	-	.914
7	.75	-	.53			.83	-	-	.727
8	1.00	-	1.05	.32	.84		-	-	.751
9	.81	-	1.01						.867
10	1.09	-	.10			1.01	-	-	.784
11	.90	-	.90			.95			.911
12	1.00	-	1.04			.95	-	-	.911
15	.96	-	.09	.34			-	-	.562

Notes:

[1]Extreme outliers are excluded from the weighted averages.
[2]For banks and insurance, several results are not available or are irrelevant to the industry.

Table 4. Contemporaneous Intra-period Correlation between Market-Determined Measures of Risk and Accounting Risk Measures

Accounting Measure	Ratio	U.S., BKS[1] 47-56	U.S., BKS[1] 57-67	U.K. Capstaff[2]	Canada 63-83	Israel 65-83
Financial Measures:						
Payout Ratio	(9)	-.49	-.29	-.23	-0.012	NA[3]
Asset Growth	(15)	.27	.01	-.05	.014	.273
Leverage	(12)	.23	.22	.09	.048	.264
Liquidity	(1)	-.13	.05	.08	-.085	-.204
Size (Assets)		-.06	-.16	.21	.044	-.187
Earning variability		.66	.45	.28	.019	.691
Earning covariability		.44	.23	-.09		
Accounting Beta of:		NA	NA	NA		
Current Ratio	(1)				.084	.478
Net Income/Total Assets	(2)				.066	.396
Owners Equity/Debt	(3)				.120	.066
Owners Equity/Total Assets	(4)				.011	.521
Current Liabilities/Revenues	(5)				.159	.627

[1]BKS - Beaver, Kettler and Scholes (1970).
[2]Capstaff (1991). Ferris et al. (1989) did not report these correlations for Japan.
[3]NA = Not available or not sufficient information.

Table 5. Interperiod Cross-Sectional Correlations of Various *Ex Post* Beta Measures (for first sub-period) with Real Market Betas[1] (2, for second sub-period)

Measure (Ratio)	Indus-trial	Development and Land	Banks and F. Services	Insur-ance	Invest-ment	Weighted Average
Panel A: Israel						
β''	.230	.279	.326	.365	.336	.292
β'						
(1)	.283	.997+	.316[2]	.911[3+]	.374	.437+
(2)	.100[3]	.964[3+]	.100[2]	.624+	.515+	.380[2]
(3)	.063	*	*		*	.063[2]
(4)	.283	.200[3+]	.671+	.721[3+]	.707+	.492+
(5)	.458+	.927[3+]				.590+
(6)	.054*	.800[3+]			.781+	.405+
(7)	.054[*3]			.100	.520+	.202
(8)		.023[*3]		.223		.085
(9)		.574+				.574+
(10)			.490+			.490+
(11)	.070	.742[3+]			.974+	.454+
(12)	.656+	.994[3+]			.678+	.731+
(13)			.141		.141	.141+
(14)			.361		.768+	.505+
(15)	.283	.812+			.490+	.478+

Financial Ratio	Indus-trial	Oil & Gas	Development and Land	Banks & F. Services	Mining: Gold	Mining: Others	Weighted Average
Panel B: Canada							
β''	.070	.090	.505	.100	.934	.120	.152
β'							
(1)	.007	.048	-.030	-.288	.905	-.514+	-.047
(2)	.067	.196	-.392+	.038	-.337+	-.004	.042
(3)	-.070	-.184	-.363+	-.484+	-.424+	-.256+	-.211+
(4)	-.156	-.228	-.096	-.014	-.885+	.228	-.135
(5)	-.240+	-.141	-.360+	-.288	-.944+	-.030	.051

Notes:

[1]Results for nominal market betas are available upon request, but they do not alter the conclusions.
[2]Adjusted for industry specifications.
[3] Market based on the market model.
* Insignificant and close to zero; results are not available (in blanks).
+ Significant differences between and predictions for .

Table 6. Selected Results in the U.S.

Study[1]	# of firms in the Sample	Average Estimate of Market Betas	Average Estimate of Accounting Betas Ratio	Estimate	Correlations[2] Market Beta	Accounting Beta
BB (1969)	261	NA	EPS[5,7]	NA	NA	.59[5]
		NA	OP[5]	NA	NA	.53[5]
BKS (1970)	307	.989[3]	E/P[6]	.949	.594	.310
BM (1975)	254	.98	2	.97	.45	.49[5]
			8	.97		.52[5]
			8[5]	.98	.54[5]	
Bildersee (1975)	98	.906	E/P[6]	1.344	NA	.132[4]
Eskew (1979)	210	1.123[3]	E/P[6]	1.020[3]	NA	NA
			7	1.129[3]		NA
HS(1980)	564	1.055	2	1.027[3]	.531	.076
			8	.917[3]		.243
CMP (1986)	122	NA	EPS[7]	NA		.442[5]
						.085[5]
IK (1989)	272	1.118	8	1.00	NA	.240[4]
			CF[7]	1.00		.316[4]
KB (1989)	103	.683	8	1.071	NA	.222[4]
			CF[7]	1.052		.516[4]
			VA[7]	1.075		.545[4]

Notes:

[1]The following abbreviations are used: Ball and Brown - BB (1969), Beaver, Kettler and Scholes - BKS (1970), Beaver and Manegold - BM (1975), Hill and Stone - HS (1980), Comiskey, Mulford and Porter - CMP (1986), Ismail and Kim-IK (1989), and Karpik and Belkaoui-KB (1989).

[2]Cross-sectional correlations of various beta measures with market betas.

[3]Average for two sub-periods (intra-periods).

[4]Intra-period analysis for the entire period (results for sub-periods are not available).

[5]Adjusted figure or ratio.

[6]E/P = Earning price ratio.

[7]EPS = Earning per share ratio; OP = Operating income; CF = Cash flow to owners equity; VA = Net value added to equity; NA = Results are not available.

APPENDIX

A List of Accounting Variables:

The accounting betas of the following financial ratios were used in both countries:

Classification	Ratio#	Details
Liquidity	1	Current Ratio
Profitability	2	Net Income to Total Assets
Leverage	3	Owners' Equity to Debt
	4	Owners' Equity to Total Assets
Mixed	5	Current Liabilities to Revenues

In addition, the accounting betas for the following ratios were used in Israel only:

Profitability	6	Net Income to Revenues
	7	Net Income (before tax) to Owners' Equity
	8	Net Income to Owners' Equity
	9	Dividends to Net Income (Payout)
	10	Net Income to Current Liabilities
Leverage	11	Revenues to Total Assets
	12	Debt to Owners' Equity (Reciprocal of 3)
	13	Investments to Total Assets
Liquidity & Leverage	14	Investments to Current Liabilities
Growth	15	Total Assets Growth

Note: See Table 4 for additional variables used by BKS (1970).