A Comparison of Relations Between Security Market Prices, Returns and Accounting Measures in Japan and the United States

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Introduction

Extensive research and discussion has occurred over the last two decades relating to the relevance of accounting differences in the valuation of securities in international capital markets (Choi and Levich [1990]). Yet little empirical evidence exists which evaluates how the accounting measures in Japan are associated with stock prices or returns, especially over periods other than short-event windows of a few days, weeks or months.

The stock prices of companies listed on Japan's securities markets rose at a rapid pace in the 1980s and yielded price-earnings {P/E} and price-to-book value {P/B} ratios which many observers suggested was high by international standards (Aron [1987,1989], French and Poterba [1991], Chan, Hamao and Lakonishok [1991] and Schieneman [1988]). The last few years have reflected an opposite trend. At the time of writing the Japanese stock market had lost about fifty percent of its market value since the 1989 high. The accounting measures of the Japanese firms listed on the stock market have not shown the same volatility.

We see use of P/E relatives in discussions of cost of capital (for example, McCauley and Zimmer [1991] and Poterba [1991]) and broad international comparisons (for example, Bildersee, Cheh and Lee [1990], and Dontoh, Livnat and Todd [1991]). For such evaluations to be made usefully we should expect fundamental associations between the accounting and stock market measures to be equivalent across the countries, subject to accounting differences. That is, if equivalent basic associations do not exist then it is not clear what it means to make such international comparisons.

This paper evaluates such associations in Japan and compares them to a sample of firms in the United States using a methodology recently developed in Easton and Harris [1992] {EH} and Easton, Harris and Ohlson [1992] {EHO} and considered for Germany in Harris and Lang [1992].

Darrough and Harris [1991] and Sakakibara, Yamaji, Sakurai, Shiroshita and Fukuda [1988] provide evidence that Japanese reported accounting earnings and management forecasts do have information content around earnings announcement dates. Yet, it might be argued that despite there being information content in earnings the relative returns-earnings associations are different across the U.S. and Japan because of both economic factors and accounting differences. For example, expected rates of return might affect the relative

coefficients of earnings in returns-earnings association studies and be independent of any accounting differences. However, while such economic differences may affect the coefficient estimates in cross-sectional tests, they should not necessarily affect the degree of association as reflected in the R^2. On the other hand, the garbling of the accounting information may cause differences in both the coefficient estimates and the strength of the association. This would seem to be consistent with the results reported in Chan, Hamao and Lakonishok [1991]. The EHO methodology minimizes the influences of accounting measurement differences so the methods we use should control for much of the garbling effect. Also, Brown, Soybel and Stickney [1991], find that adjusting Japanese and U.S. financial statement data for differences in accounting principles has only a small impact on average P/Es or rates of return, and Harris and Lang [1992] find equivalent return-earnings associations in Germany and the U.S. These results suggest that we might reasonably expect equivalent associations in Japan without any accounting adjustments.

While we do not control for all accounting differences we do factor in a specific difference by considering both the parent-only and consolidated measures in Japan. Both popular perception in Japan and empirical evidence in Darrough and Harris [1991] suggest that the parent-only earnings appear to be the primary earnings information variable. Until 1991, consolidated data could be, and generally was, reported after the parent data had been presented. The parent data are considered in Aron [1971, 1989], Chan, Hamao and Lakonishok [1991] and French and Poterba [1991]. Yet the international trend is towards increased application of consolidation principles and there is a perception that consolidation differences are a major factor in explaining differences in Japanese P/E ratios (Aron [1989] and French and Poterba [1991]). We also consider the role of depreciation which is presumed to be relevant for explaining international differences in several of the cited studies.

The results suggest that Japanese stock prices were largely unrelated to fundamental values based on accounting measures for most of the 1980s and that, currently, we are seeing a correction towards these fundamentals. Thus, further studies which try to control for other differences in Japanese and U.S. accounting practice in order to explain apparent price differentials are pointless.

2. Development of Hypotheses

Recently, an advisory body to the Ministries of Finance and of International Trade and Industry:

> "proposed the standardization of some national financial regulations around the world. They should include standardized methods of international securities settlements, release of information, (and) accounting standards.....(The committee) said that standardization was needed to create smoother international financial transactions."[1]

This proposal reflects the common sentiment that different accounting practices impact the international financial markets. Survey analysis (Choi and Levich [1990]) indicates that various participants in the capital markets are influenced by different practices and yet there are others who seem to be able to cope with the differences. The earlier quote suggests that some Japanese policy advisors believe that differences between Japanese and other countries' accounting practices impact the operation of international financial markets. Yet others have argued that stock prices and fundamental variables such as accounting earnings and book value of owners' equity are essentially unrelated in Japan. For example, Zielinski and Holloway [1991] state "share prices have gradually lost touch with the earning power of the companies which they represent" (page 16) and Viner [1988] suggests that

> "the Japanese stock market is only a market of stocks.... Japanese investors will decide what they want and what they wish to discard on the basis of trends and fads which have no Western counterpart.... If the Japanese market will give a kingdom for a horse then global valuation techniques and internationalization will have no bearing on that decision." (page 124)

Furthermore, anecdotal evidence exists of "ramping" of prices and deals between brokerage firms and important clients which create short term price movements which may be unrelated

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[1] This was reported in *The Nikkei Weekly* of the week of June 13, 1992. The advisory body is a subcommittee of the Council on Foreign Exchange and Other Transactions.

to the earning power of companies.[2]

These two positions are somewhat contradictory. The first suggests that correcting for accounting differences will create a symmetry in the relations of stock prices and accounting fundamentals across countries. This is consistent with the argument made in Aron [1987, 1989]. The second position suggests that the basic associations are "structurally" different. We have some evidence that correcting for accounting differences does not explain the relative Japanese and U.S. P/Es or costs of capital (for example, Brown, Soybel and Stickney [1991], and Poterba [1991]). Yet there appears to be little empirical evidence analyzing the relative associations between accounting measures and stock prices or returns in Japan.[3] In general, the Japanese accounting system, as prescribed in the Commercial Code, is oriented more towards protection of creditors than to providing information for investors. In addition, there is a tax conformity rule which requires legal entities to include expenses in the reported accounting income if they are to be included as expenses for tax purposes. Together these institutional characteristics suggest that Japanese firms' owners' equity and earnings will be biased downwards and be more conservative than the equivalent measures of their U.S. counterparts. The bias in the reported values will change the expected coefficient (multiple) in cross-sectional tests of the associations between the accounting and stock market measures but need not reduce the strength of the associations themselves. Harris and Ohlson [1987] have shown that U.S. investors rationally discriminate between the relative conservatism of successful efforts and full cost accounting

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[2] It is argued by Viner [1988] and others that the stable shareholdings that exist reduce the quantity of shares available and the difference in tax rules for dividends and capital gains induce a demand for capital gains. Hence, he argues, the laws of supply and demand will drive up the stock price.

[3] In a study of the information content of Japanese earnings over short windows, Darrough and Harris [1991] show that there is a market reaction to the announcement of earnings and the management forecast of earnings with a more noticeable reaction occurring for the parent earnings. This suggests that investors do consider earnings as a measure of information about the firm. Also, Chan, Hamao and Lakonishok [1991] test associations between monthly returns and various fundamental variables, but their tests use 12 return measures for each accounting measure and use various combinations of variables over annual windows without considering the accounting or valuation characteristics of the variables.

for oil and gas producers. Also Harris and Lang [1992] have shown that associations between German accounting and stock market measures are associated in a similar way to U.S. firms despite the potentially strong conservative bias in German accounting practice. In fact, the Japanese accounting system has its early roots (from the time of the Meiji restoration) in German practice. Thus, overall, even if the Japanese accounting system creates some measurement biases it need not reduce the power of associations with stock market measures if in fact Japanese investors consider accounting measures in their pricing decisions in a similar manner to U.S. investors. If Japanese investors largely ignore the accounting measures then it is harder to argue that effort should be spent on trying to adjust the accounting system to obtain measures which are closer to those provided in the U.S., so as to "correct" for apparent differences in valuation.

The major accounting differences are summarized in other papers including Aron [1987, 1989], Brown, Soybel and Stickney [1991], French and Poterba [1991], Harris [1991] and Viner [1988]. Most studies suggest that the large differences relate to the issue of parent versus consolidated reporting and the choice of depreciation method.[4] The understatement of equity and earnings resulting from lack of consolidation varies substantially cross-sectionally, but on average, for our sample, the median ratio of consolidated to parent earnings (owners' equity) ranges from 1.08 (1.02) to 1.12 (1.03) for the years in which consolidation is required. Furthermore, we now have a reasonable period with which to use the consolidated data so that this should not be a concern.[5] The depreciation question is

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[4] The issue of cross-holdings is also sometimes considered (Aron [1987, 1989] and French and Poterba [1991]) but we view this as a moot point when evaluating returns-earnings associations as each share owns a portion of the net assets irrespective of who holds the share. To the extent the company owns in itself there would be a reduction in the net assets as well as the equity. This position is also taken in Brown, Soybel and Stickney [1991].

[5] Of course, this presumes that, in fact, the consolidation rules reflect the notion of capturing the group structure. We would conjecture that in Japan a problem remains because of the nature of the stable shareholdings and the significant influence which exists in the keiretsu. This institutional characteristic would argue for equity accounting of these holdings even though the stakes are below the traditional twenty percent threshold. Thus, in Japan, we might reasonably expect an understatement of earnings and equity based on the as-if

complicated by the fact that it has nothing to do with Japanese accounting per se. Of course one might argue that the tax conformity rules give Japanese companies an incentive to use accelerated depreciation rules but these rules are in conformity with U.S. generally accepted accounting practice (GAAP). Thus, we find U.S. firms using equivalent methods (e.g., General Motors and Ford) and the Japanese firms which use U.S. GAAP for their consolidated statements still use accelerated depreciation methods. The accelerated depreciation combined with a growth of investment in capital equipment can depress reported earnings in the short run but should have little impact over longer windows which cover the depreciation cycle. The methodology we employ will therefore largely control for any influence of "excessive" depreciation.

In testing the associations between accounting and stock market measures we consider two basic approaches. The first simply looks at the basic association between price multiples relative to the fundamental accounting measures. In particular, we focus on the correlation between P/B and return on equity {ROE}. This can be justified formally using the model outlined in Ohlson [1989, 1991]. The model shows price as a weighted average of earnings, book value of owner's equity and other information, formally:

$$P_{it} = k\theta x_{it} + (1 - k)y_{it} - kd_{it} + v_{it} \qquad (1)$$

where:

P_{it} is the share price of security i at time t,

x_{it} is accounting earnings for firm i at time t,

k is a weight indicating the degree of relevance of earnings,

θ is $R_F/(R_F\text{-}1)$ where R_F is the risk free rate,

y_{it} is the book value of owners' equity for firm i at time t,

d_{it} is dividends for firm i at time t, and

v_{it} is other information used to price firm i at time t, and is orthogonal to earnings and owners' equity.

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equity accounting measures that could be used. This does not presume a mark-to-market measure which would create a circularity in the associations.

Dividing through by y_{it} yields the P/B ratio on the left hand side and the ROE, dividend over owners' equity and (deflated) other information on the right hand side.[6] Thus, if earnings is considered to be weighted heavily in pricing companies we should expect a high correlation between P/B and ROE given the historically small dividends. Alternatively, if book value is weighted heavily in the pricing decision then we can expect a high negative correlation between P/E and ROE. If other information is being used primarily, that is accounting measures are being relatively underutilized, then both correlations will be small.[7] Thus, our first test of the relative degree to which accounting measures are used in valuation in Japan is based on the simple correlations outlined above.

The second set of tests considers associations between security returns and measures of accounting earnings. Returns-earnings associations have been the focus of analyzing the value-relevance of accounting information for some time. But the focus has usually been in the form of assessing the information content of unexpected earnings. If one takes the first difference of the variables in equation (1) we have returns as a function of deflated earnings and changes in earnings. Therefore, at least for annual return intervals, we consider both earnings variables for explaining returns.[8]

The general model we use to test the returns-earnings associations is derived in EH and EHO and is represented as follows:

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[6] A similar model derived more heuristically is found in Wilcox [1985]. Ohlson's model is found to have empirical validity in Easton and Harris [1991b] and Maydew [1992]. Dividend terms have been found to be empirically irrelevant in the studies on U.S. data. Given the relatively low dividend payouts in Japan, this insignificance should be even more true there. Consequently, we ignore dividends in the rest of the paper.

[7] Fairfield and Harris [1991] and Penman [1991] have demonstrated a strong correlation between P/B and ROE for US firms.

[8] Ohlson [1989] formally models this relation and Easton and Harris [1991a] derive and empirically test the relation between earnings levels, earnings changes and returns and show that on average the earnings level variable is relevant for explaining returns. Corroborating evidence can also be found in Easton and Harris [1991], EHO, Warfield and Wild [1992] for US companies and Harris and Lang [1992] for German companies.

$$R_{iT} = \alpha_0 + \alpha_1 AE_{iT} + \alpha_2 \Delta AE_{iT} + \epsilon_{iT} \quad (2)$$

where:

R_{iT} is $(P_{iT} - P_{i0} + FVS_{iT})/P_{i0}$, with T being 1 in an annual window and varying up to T=20 years,

FVS_{iT} is the cumulative dividends from time 1 to T and the earnings on the dividends (d_{it}) assuming a reinvestment at the risk free rate (R_F), that is:

$$FVS(d_{i1},\cdots,d_{iT}) \equiv d_{i1}(R_F^{T-1}) + d_{i2}(R_F^{T-2}) + \cdots + d_{iT-1}(R_F) + d_{iT} \equiv FVS_{iT} ,$$

AE_{iT} is $\sum_{t=1}^{T} x_{it} + FVF_{iT}$, with x_{it} being accounting earnings for firm i at time t, and

$$FVF(d_{i1},\cdots,d_{iT}) \equiv d_{i1}(R_F^{T-1}-1) + d_{i2}(R_F^{T-2}-1) + \cdots + d_{iT-1}(R_F-1) \equiv FVF_{iT} ,$$

ΔAE_{iT} is $AE_{iT} - AE_{is}$, that is the change in aggregate earnings with respect to the relevant interval with s being equal to some time period prior to T and depending on the definition of change in earnings used[9], and

ε_{it} is the residual error term.

If accounting data are considered to be valuation relevant, we should expect the earnings variables to be associated with returns. In short windows (up to a year) both the use of other information and potential leads and lags in accounting measurement or recognition of economic events can yield low association metrics. However, as demonstrated in EHO, by extending the window length we minimize accounting measurement problems and, as EHO show, earnings explain more than half the returns over a ten year window in

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[9] EHO and Ohlson and Penman [1991] and Lys, Ramech and Thiagarajan [1992] use alternative definitions of change in earnings. EHO use the simple change based on an equivalent time period while the others view change in earnings based on the difference between earnings at the beginning and the end of the relevant window. In general, as one extends the window, the changes variable becomes less well-defined and has little relevance in explaining returns. Hence we do not incorporate the change variable into our long window analysis.

the U.S.[10] Hence, if the short window associations using Japanese data are lower than the U.S. this may be partly a result of accounting measurement issues. But, by extending the window length, any measurement problems should largely disappear so that any differences in Japanese and U.S. metrics of returns-earnings associations should converge. On the other hand, if differences remain it is more likely that Japanese investors are placing more weight on other information (relative to accounting measures) in their pricing of securities.

The analysis of the value-relevance of accounting measures is extended by comparing the returns-earnings associations for Japanese companies across the two reporting options - parent and consolidated. If the consolidated data are considered to be more value-relevant than the parent-only data then for the comparison using just Japanese companies we should expect the associations to be higher for the consolidated data. However, previous evidence in Darrough and Harris [1991] and anecdotal evidence suggests that investors focus on the parent report.[11] Hence, simple rule changes to provide superficial conformity of accounting rules will not necessarily create uniformity in the uses of the information.

3. Data and Sample Selection

Japan

The Japanese stock price data are taken from the database described in Hamao [1991], which covers monthly data from January 1970 to December 1992. Parent accounting and dividend data are provided by Daiwa Institute of Research. This is a monthly database which records the accounting information as it is released for all firms in Tokyo Stock Exchange Sections I and II from January 1970 to December 1991. The consolidated statement data are

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[10] Other studies have corroborated these findings including, Lys, Ramesh and Thiagarajan [1992] and Warfield and Wild [1992].

[11] A report in The Nikkei Weekly of January 11,1992 states
"Sony's stock has been performing poorly in recent months, and stock market observers are critical about the company's consolidated-based management style....Even some Sony officials have begun voicing concern that the emphasis on the consolidation-based management might be wrong.
"That strategy might have resulted in our not paying enough attention to the parent company's profits," said one official." (page 8)

taken from the Nihon Keizai Shimbun Sha (Nikkei) NEEDS database. For each fiscal year we use the month-end price corresponding to the month in which the accounting data was released. The current and lagged prices are then utilized to calculate returns.

While a Japanese firm may choose any month as its accounting cycle end, several firms have changed the end month to March over the years. We drop observations when there is an irregular number of months in an accounting cycle because of the change. We also exclude financial institutions and twelve observations spread over the years with extreme values (e.g., an ROE of 264,000 percent). This leaves us with a minimum of 935 firms in 1971 and a maximum of 1,277 firms in 1986 in the parent sample.

Since full consolidated reporting became mandatory only after 1983, the consolidated data we have are useful only from 1984. The consolidated data sample consists of 364 firms for which current profit and price data are available for every year from 1984 to 1991. We repeated the tests with the full number of observations with consolidated data. As the results were qualitatively identical, we report only the restricted sample results.

Management forecasts of 363 firms' consolidated current profit are collected from the *Japan Company Handbook* published by Toyo Keizai Shimpo Sha. All data are converted to a per share basis adjusted for stock splits. The Gensaki (bond repo) rate, used as a short-term risk-free interest rate, is taken from Hamao and Ibbotson [1992].

United States

U.S. accounting data are collected from the 1991 Compustat Industrial data base. This was the most recent data available so U.S. data are only available up to 1990 fiscal year-ends. Price and adjustment factor data are extracted from the Center for Research in Security Prices database for a date three months following the fiscal year end. T-Bill rates of return are taken from Ibbotson Associates [1992].

The U.S. sample of 262 firms is selected by matching Japanese firms in the consolidated sample on the basis of the 1990 market value of equity and four-digit SIC code. Japanese firms are assigned an SIC code based on their four-digit Securities Identification Code given by the Japan Association for Securities Dealers. These codes yield 66 industry classifications. Japanese and U.S. market values of equity are put on a comparable basis by

converting the Japanese values at the average 1990 exchange rate extracted from Datastream. U.S. firms are required to have return and earnings data in every year from 1983 to 1990, to ensure that we impose the same survival constraints that we use for the Japanese sample.

Data Summary

Some summary descriptive statistics for the samples are reported in Table 1. Panels A, B, and C describe the results for the Japanese parent, consolidated and U.S. data, respectively.

We report medians to eliminate the impact of a small number of extreme observations. The median returns for Japan are consistent with the market patterns. Notice that the rapid run-up in prices began in 1983 and continued through 1989. While 1989 marked the beginning of the slide in Japan's stock market prices, the 1990 returns still reflect a small average increase with 1991 showing the sharp decline of close to 23 percent for both parent and consolidated samples.

It is also interesting to observe that in 1971 through 1982 the median P/E was around 20 with much lower P/Es in 1971 and 1974. The latter was clearly affected by the high interest rates. From 1983 through 1991 the P/Es have remained at high levels with 1986 to 1991 having P/Es over 40. In contrast, for the U.S. sample, the median P/Es have ranged between 11 and 16. The P/B ratios reflect a similar pattern. For Japan, the P/B based on parent data was below 2.0 up to 1978 as well as from 1981 to 1983. But from 1984 the P/B began moving away from this level based on both parent and consolidated samples. The peak was in 1989 with the median of 4.34 for the consolidated sample. In contrast, the median P/B in the U.S. never reached 2.0 with a peak of 1.83 in 1986. In principle, we might expect high P/Bs because of high profitability, but in fact, the trend was quite the opposite. The peak (median) ROEs in Japan occurred in the early 1970s when multiples were lowest. The median ROEs in Japan were below 8 percent from 1983 onwards in Japan while in the U.S., during the same periods, the median ROEs were around 11 percent. Some of this difference is related to accelerated depreciation methods and large capital investment in Japan, and to the interest differentials between Japan and the U.S. But even with these adjustments it would be hard to argue that Japanese firms were extraordinarily

profitable. Next we consider the tests of associations between accounting and stock market measures.

4. Results of Primary Tests

In most of the reported results we use the maximum number of observations available to ensure robust statistics and generalizability. All tests were also run on the limited sample of 364 firms used in the long window analysis of consolidated data for Japanese firms. In all cases the qualitative conclusions are unchanged for all subsets.

Price Ratio Tests

The first set of tests relate primarily to the correlations of P/B and ROE and secondarily to P/E and ROE. As discussed, if investors consider reported earnings to be value-relevant then we can expect that there is a high positive correlation between ROE and P/B. The annual correlations are reported in Table 1. We use rank correlations so that large or small observations do not have an undue weighting. The results are reported in panel A for the Japanese parent data, in panel B for the Japanese consolidated data and in panel C for the U.S. data. For the Japanese data, in all years except 1971 and 1972, we see that the correlation is below 0.40. For the parent reports the correlations are below 0.30 from 1973 to 1989. The correlations range from 0.03 in 1986 to 0.34 in 1989 for the consolidated data. In comparison the matched sample of U.S. firms has only two years in which the correlation is less than 0.50 and in both cases the correlation is greater than 0.45. These results are consistent with the view that on average Japanese investors pay less attention to earnings than do U.S. investors.

Similarly, the rank correlations of P/E and ROE are negative and quite high in contrast to the U.S. which varies around zero. This is consistent with a greater relative focus on accounting owners' equity than earnings in Japan as compared to the U.S. where earnings seem to be more important.

The comparison of parent and consolidated data for Japanese samples is inconclusive. This suggests that the consolidated data are not necessarily superior as we might naively expect from the push towards consolidation around the world.

Returns-Earnings Associations

First, we consider the tests based on annual return windows. These results are reported in Table 2, with panels A, B and C again reporting the Japanese parent, consolidated and then U.S. samples, respectively. We also report in the last column of panels A and B the adjusted R^2 from the regressions using parent data for the restricted sample of 364 Japanese firms. Beginning with the parent data full sample, we find an R^2 greater than 0.10 in only two years, and in 1982 this appears to be driven by outliers. Furthermore, in several years, particularly in the period from 1983 to 1989, the R^2 is below 0.05. We also find little consistency in the relative importance of the earnings levels versus changes for explaining returns and the size of the coefficients vary from year to year more than one might expect from the interest rate changes reported in Table 1. In analyzing the data we found many extreme observations which had an impact on the parametric analysis so we also provide rank correlations for returns and each independent variable. One pattern that emerges, which is consistent with the regression results, is a generally poorer correlation in the 1980s beginning in 1982.

Moving to the consolidated data, we again find very low R^2 (below 0.03) and rank correlations except for 1991. Use of consolidated data did not affect the associations in any systematic way, in four of the seven year the R^2 are higher for the restricted sample using parent accounting data. Looking at the U.S. sample for a similar period we find much higher R^2 for every year and a higher rank correlation for the independent variables which are significant in the regression models.[12]

The annual window results are consistent with the interpretation that Japanese investors pay less attention to accounting earnings than U.S. investors, but this could plausibly be a reflection of measurement problems in the accounting process. By extending the window length we attempt to control for this explanation. The results, in the annual

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[12] Comparisons of R^2 must always be interpreted cautiously if the dependent variable changes in any way. The spirit of the comparisons is from the sense of accounting measures being fundamental measures of value or change in value and a standard worldwide valuation model. Thus, *ex ante*, each sample can be considered a random drawing from the same population.

window also suggest that the period of the 1980s reflect an even greater disregard for fundamental accounting measures in the valuation of Japanese companies.

As explained in Section 3 of this paper, in analyzing the long window results we were constrained by the availability of data. Japanese companies have only been required to prepare full consolidated reports (that is, including equity accounting for their associate companies) since 1983, and 1984 was the first year with large numbers of companies presenting such data. For the parent data we use a similar interval as used for the consolidated data but also consider tests based on the full sample period available which yields 20 years as a maximum window. We also report results with 1990 and 1991 as the last date. These results should not be considered as independent but the contrast between the two end-periods is quite dramatic for all window lengths and indicates the strength of the adjustment back to fundamentals.

Table 3 reports the results for four and seven year windows for the Japanese parent, consolidated and U.S. data in panels A, B and C, respectively. Panel A also includes the results for 20 year windows ending in 1990 and 1991. To minimize any concerns about independence we use essentially non-overlapping years except for the windows ending 1990 or 1991 for the reasons previously indicated. As large observations can have undue influence on the parametric results we also report the Spearman rank correlations for the return and aggregate earnings variables described in equation (2).

For the seven year windows, with Japanese parent data, we see the adjusted R^2 range from 0.21 with 1978 as the end-date to 0.08 with 1984 as the end-date.[13] While 1991 had nothing unusual about its earnings (see Table 1), the R^2 increased from 0.10 in 1990 to 0.14 in 1991. The relations among the rank correlations are even more striking. For the seven year window ending in 1978 the correlation was 0.53, the 1984 end-date correlation was the lowest at 0.28 and the correlation increased from 0.38 to 0.49 when changing the end-date from 1990 to 1991. Although not reported, the R^2 for seven year windows in the period

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[13] EHO note that the choice of a start-date and end-date and the means of choosing the sample had little bearing on the correlations for the ten-year window correlations and R^2 for U.S. data.

between 1983 and 1989 were all less than 0.10. Note that even when we extend the window to 20 years the R^2 increases to only 0.21 when 1990 is the end-date and then jumps to 0.37 when we move the end-date to 1991. The pattern in the rank correlations shows a similar trend.

The four year window results in Panel A are generally lower than those for the seven year windows but they are very low with R^2 no greater than 0.06 in any four-year window other than the 1975 and 1991 end-years. While we only report the non-overlapping years no other four year window had an R^2 greater than 0.08. The rank correlations are also below 0.40 except for the first and last end-years.

In general, these long window results suggest that even when we extend the window up to 20 years there seems to be little association between aggregate earnings and stock returns. But it still might be perceived that the result is a function of the use of parent data and the general lack of usefulness of accounting data. To address this we first look at Panel B which contains the results for the consolidated data. Unfortunately, we only have the period beginning with 1984 which from the parent and annual window results appears to be a period with relatively low use of accounting data in Japan. The longest window of eight years yields an R^2 of 0.17 and a rank correlation of 0.46. The seven-year window ending in 1991 gives a similar result. But the seven year window ending in 1990 shows a much lower R^2 of 0.05 and the rank correlation drops from 0.48 to 0.32. The last column in Panel A of Table 3 presents the R^2 for the parent data for the subset of 364 firms being considered in Panel B and reflects similar patterns to those of the larger sample of parent data. The four year window results show an R^2 of 0.18 for end-date 1991 but 0.01 and 0.04 for 1990 and 1987 respectively with rank correlations below 0.30 for these two end-dates.

Two points can be made from the long-window results discussed to this point. Using consolidated data does not increase the associations between returns and reported earnings and lengthening the window has some effect but only a marginal one, unlike the pattern reported in EHO and corroborated in other studies. But perhaps these firms are unusual in some way. The results in Panel C report the results of the long-window tests for the matched sample of U.S. firms.

The results for the U.S. firms show that for the seven-year window ending in 1990

we have an R^2 of 0.51 and a rank correlation of 0.80. The four year windows show similar differences to the Japanese results. The differences in association are quite striking and it is hard to conceive that these could be a function of accounting differences or even interest rate differentials (see Table 1). Thus, once again, the results are consistent with the hypothesis that Japanese investors paid much less attention to the fundamental values reflected in accounting measures. The results also suggest that the price adjustments we have observed reflect a movement back towards the fundamentals but it would be hard to argue that this process is complete using only the 1991 data.

However, before drawing these conclusions too strongly we consider some additional factors which might be perceived to be omitted variables which would help to explain the results.

5. The Role of Earnings Forecasts and Depreciation

Management's Earnings Forecast

Darrough and Harris [1991] show that while investors do react to earnings announcements of earnings, the reaction is affected by the management forecast of earnings issued simultaneously with historic earnings. We would expect rational investors who use earnings in their valuation of companies to incorporate the forecasted future earnings into the price. Consequently, we use the management forecast of consolidated earnings for 1992 (deflated by beginning price) as an additional variable in the regression model based on equation (2) with 1991 as the end-year, for the consolidated sample. These results are reported in Table 4.

For the seven and eight year windows we obtain an R^2 of 0.23 as compared to 0.15 and 0.17 (respectively) for the aggregate earnings alone. We see some increment in the four year window but only a small difference in the one year window. The results suggest that there is additional information in the earnings forecast but that it still leaves a significant amount of the stock returns unexplained especially as compared to the U.S. sample.

Depreciation

As discussed in section 2 of this paper, many studies have argued that depreciation is

a cause of differences between the U.S. and Japan which affects the relations of accounting and stock market data. While this is spurious as an argument about alternative GAAP, it is conceivable that on average a more conservative depreciation policy may understate earnings in periods of rapid capital expansion as occurred in the 1980s in Japan. We also observe that Chan, Hamao and Lakonishok [1991] find that net income plus depreciation is more highly correlated with monthly returns than reported earnings.[14] In general, depreciation may be useful as an additional explanatory variable reflecting, or proxying for, the expected growth of a company. In relatively short windows depreciation may also reflect measurement errors in reported earnings. However, by extending the window we essentially control for such measurement problems. For U.S. companies, Ohlson and Penman [1992] have analyzed components of earnings within the long window framework. Over a ten year window, they found that depreciation has a negative coefficient approximating the (positive) earnings coefficient in magnitude. This suggests that once we control for measurement problems found in short windows, investors seem to price depreciation like any other expense. Consequently, to evaluate the value-relevance of depreciation in Japan we rerun the analysis for the parent sample using earnings plus depreciation and depreciation as separate variables.[15]

The results of these tests are reported in Table 5. Panels A and B report the results for the Japanese parent and U.S. samples respectively. The results for the Japanese parent show that depreciation seems to help explain more of the cross-sectional variation in returns. The R^2 for the one year regressions increase in each year and the depreciation variable has a

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[14] Chan, Hamao and Lakonishok [1991] term this variable "cash flow" as is often done in the finance literature, but this is clearly a misnomer given that depreciation is the only adjustment made to report earnings.

[15] In principle we should adjust the depreciation addback to earnings for the tax rate. However, Chan, Hamao and Lakonishok [1991] and others have not done this and the data is not readily available to us. Thus the earnings plus depreciation variable is partially misspecified. In addition, we use the parent sample because the consolidated depreciation was only available to us for less than half the 364 firms. Given the lack of difference in consolidated and parent returns-earnings associations this should have little impact on the interpretation of our results.

significant coefficient in most of the years. But we see that in the U.S. sample while the impact on the R^2 is not as large, there is an increase in the one year windows and the coefficient on depreciation is generally positive. These results suggest that depreciation is probably proxying for some other value-relevant information variable or may be reflecting investors' perceptions of a measurement error. As we increase the window the increase in R^2 is maintained in the Japanese sample so, for example, we see the R^2 for the seven year windows ending 1978, 1984 and 1991 increasing from 0.21, 0.08 and 0.14 (in Table 3 panel A) to 0.37, 0.16 and 0.17 respectively. But the coefficients on the depreciation variables are now negative and quite similar in magnitude to the coefficient on aggregate earnings (especially if we adjust for earnings being an after-tax measure). These results are consistent with investors treating aggregate depreciation similarly to any other expense once we control for periodic measurement issues and also that depreciation may proxy for cross-sectional differences in anticipated growth via capital expenditure. The results for the seven year window for the U.S. sample shows a similar result in terms of the coefficients but the aggregate depreciation makes no incremental contribution to the R^2. Given the relatively heavy investment in capital equipment in Japan through much of the sample period it is perhaps not surprising that the depreciation expense proxies for some value-relevant information, however given the long window results it is hard to argue that this is purely a consequence of accounting measurement questions. Further analysis of this question is beyond the scope of this particular research.

6. Summary and Conclusions

The debate on the consequences of differences in accounting practices and the effect of these differences on the valuation of securities has frequently considered adjustments to the accounting system with an assumption, at least implicitly, that this would "normalize" the comparative associations between accounting and stock market measures. Yet there has been little systematic evaluation of these associations, particularly where many of the measurement concerns are largely controlled for.

In this paper, we analyze the return-earnings associations over varying window lengths and compare the results for samples of Japanese and U.S. firms. Our results are

consistent with the perception that Japanese investors utilize accounting information, particularly earnings, less in their pricing of companies than do U.S. investors. The corollary is that Japanese investors place a larger weight on "other information" in their valuations. This conclusion was particularly evident in the "boom" period of the mid-1980s when the fundamental values inherent in the accounting data appear to have been largely ignored. The increased associations we find with the inclusion of 1991 prices suggest that the current fall in prices is consistent with a return to more emphasis on fundamental values but that this process may not be complete.

We also find results consistent with the notion that depreciation is treated simply as an expense over long windows but it also appears to act as a proxy for anticipated growth from capital investment. Further research would be needed to test this hypothesis more directly.

A further implication of the research findings is that it is implausible that accounting differences can ever explain differences in the associations between accounting and stock market measures in Japan relative to other countries. The fact that the associations are so similar for consolidated and parent data itself indicates that using the lack of consolidation as an explanation for past differences is implausible. Rather, investors seeking to make investment decisions in Japan need to reconsider the underlying pricing and institutional practices. Using differences in accounting practice to justify the valuation differentials across countries is essentially using accounting as a scapegoat for more fundamental structural differences.

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Table 1
Summary Statistics

Panel A
Japan - Parent

Yr	Median Return (%)	Median P/E	Median P/B	Median ROE (%)	Spearman Correlation			Int. Rate (%)	N
					P/E, ROE	P/B, ROE	Ret, ROE		
71	6.25	10.55	1.31	12.70	-0.20	0.53	0.17	6.61	935
72	41.18	17.38	1.85	10.05	-0.25	0.40	-0.06	4.83	967
73	7.00	15.61	1.79	11.14	-0.50	0.21	-0.06	7.40	985
74	0.47	13.55	1.70	11.83	-0.58	0.15	0.11	13.29	1009
75	-4.70	17.06	1.65	8.45	-0.23	0.14	0.20	11.21	1012
76	10.83	21.56	1.86	7.03	-0.16	0.18	0.27	7.20	1050
77	4.27	20.94	1.90	8.11	-0.27	0.21	0.19	5.94	1141
78	16.39	23.52	2.22	7.89	-0.17	0.14	0.04	4.94	1158
79	0.99	20.38	2.12	9.31	-0.39	0.10	-0.05	5.48	1166
80	-0.56	18.53	2.00	9.99	-0.50	0.19	0.09	10.74	1184
81	-3.98	19.53	1.86	8.87	-0.35	0.17	0.31	7.54	1194
82	-3.74	19.67	1.67	7.98	-0.31	0.00	-0.07	6.88	1203
83	16.11	25.45	1.94	6.95	-0.21	0.06	0.16	6.57	1213
84	14.46	29.19	2.25	6.83	-0.21	0.09	0.06	6.37	1230
85	17.95	32.04	2.56	7.01	-0.36	0.14	-0.07	6.55	1245
86	28.27	45.82	3.20	6.04	-0.29	0.03	0.13	5.19	1277
87	16.00	56.27	3.61	5.54	-0.26	0.16	0.14	3.93	1260
88	27.37	59.39	4.22	6.39	-0.38	0.18	-0.05	3.98	1197
89	12.32	59.24	4.29	6.95	-0.51	0.23	-0.01	4.68	1165
90	5.89	59.15	3.90	6.25	-0.48	0.32	0.17	7.00	1207
91	-22.76	45.61	2.99	6.36	-0.47	0.35	0.27	7.38	996

Table 1
Summary Statistics

Panel B
Japan - Consolidated

Yr	Median Return (%)	Median P/E	Median P/B	Median ROE (%)	Spearman Correlation			N
					P/E, ROE	P/B, ROE	Ret, ROE	
84	15.71	27.90	2.26	7.24	-0.21	0.15	0.07	364
85	16.73	28.69	2.47	7.97	-0.39	0.22	-0.02	364
86	30.18	44.17	3.18	6.48	-0.30	0.03	0.15	364
87	14.20	50.00	3.46	5.48	-0.00	0.04	0.13	364
88	28.78	55.30	4.31	6.95	-0.28	0.22	-0.04	364
89	14.96	52.45	4.34	7.66	-0.42	0.34	0.02	364
90	0.36	53.78	3.86	6.77	-0.52	0.19	0.00	364
91	-22.82	41.27	2.82	6.61	-0.41	0.24	0.29	364

Table 1
Summary Statistics

Panel C
U.S. - Consolidated

Yr	Median Return (%)	Median P/E	Median P/B	Median ROE (%)	Spearman Correlation			Int. Rate (%)	N
					P/E, ROE	P/B, ROE	Ret, ROE		
84	6.77	10.76	1.34	12.80	0.03	0.53	0.43	9.85	262
85	18.53	12.36	1.49	10.97	0.18	0.46	0.43	7.72	262
86	25.01	15.79	1.83	9.87	0.21	0.52	0.45	6.16	262
87	-1.78	13.30	1.61	11.86	0.05	0.59	0.33	5.47	262
88	7.59	11.52	1.60	14.35	-0.15	0.57	0.10	6.35	262
89	11.52	11.08	1.58	13.34	0.14	0.54	0.38	5.46	262
90	-2.05	12.73	1.46	11.31	0.21	0.53	0.44	6.34	262

Notes to Table 1: The ROE is defined as earnings divided by book value of equity.

Table 2
One Year Window Regressions

Panel A
Japan - Parent

Yr	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	Adjusted R^2	Spearman Corr.	N	Adjusted R^2 for 364 firms
71	0.08 (4.9)	0.62 (6.6)	0.02 (0.6)	0.052	0.41 0.49	935	0.042
72	0.58 (25.8)	-0.01 (-0.1)	0.52 (5.9)	0.042	0.35 0.33	969	0.074
73	0.11 (6.1)	0.42 (2.1)	0.41 (3.7)	0.031	0.31 0.33	986	0.050
74	0.08 (5.4)	-0.60 (-3.5)	1.61 (10.4)	0.160	0.34 0.51	1009	0.107
75	0.01 (0.6)	0.36 (3.1)	0.10 (1.1)	0.021	0.37 0.27	1012	0.060
76	0.23 (15.7)	0.12 (0.8)	0.82 (6.6)	0.070	0.37 0.37	1051	0.239
77	0.09 (9.4)	0.28 (3.3)	0.06 (0.8)	0.034	0.39 0.35	1143	0.098
78	0.27 (19.7)	0.16 (1.2)	0.26 (3.4)	0.025	0.22 0.37	1157	0.047
79	0.10 (8.3)	-0.78 (-4.8)	1.51 (8.8)	0.065	0.05 0.25	1166	0.016
80	0.03 (2.2)	0.39 (2.2)	0.15 (1.3)	0.011	0.19 0.29	1184	0.022
81	0.01 (1.1)	0.62 (3.8)	0.59 (4.6)	0.070	0.41 0.39	1194	0.067
82	0.01 (0.8)	-0.21 (-1.8)	1.03 (11.6)	0.164	0.08 0.22	1203	0.000
83	0.30 (22.4)	-0.23 (-1.6)	0.98 (8.2)	0.059	0.13 0.31	1214	0.019

Yr	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	Adjusted R^2	Spearman Corr.	N	Adjusted R^2 for 364 firms
84	0.24 (17.6)	0.04 (0.2)	0.68 (4.0)	0.019	0.09 0.29	1229	0.004
85	0.25 (15.3)	0.28 (1.0)	0.19 (1.3)	0.003	0.18 0.12	1246	0.011
86	0.43 (20.7)	-0.61 (-1.6)	0.94 (2.4)	0.007	0.26 0.31	1277	0.023
87	0.25 (14.2)	1.30 (4.6)	0.29 (1.6)	0.048	0.23 0.28	1260	0.009
88	0.37 (18.7)	0.50 (0.8)	1.02 (1.8)	0.016	0.16 0.22	1197	0.030
89	0.17 (12.1)	0.39 (0.7)	0.02 (0.0)	0.000	0.16 0.17	1165	0.004
90	-0.02 (-0.9)	7.34 (8.3)	-1.4 (-2.5)	0.062	0.34 0.28	1207	0.023
91	-0.27 (24.5)	3.95 (7.0)	-1.38 (-2.6)	0.096	0.43 0.37	997	0.102

Table 2
One Year Window Regressions

Panel B
Japan - Consolidated

Yr	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	Adjusted R^2	Spearman Corr.	N
85	0.23 (8.4)	0.06 (0.1)	0.70 (2.2)	0.015	0.14 0.20	364
86	0.45 (11.7)	0.31 (0.4)	1.14 (1.5)	0.020	0.23 0.30	364
87	0.20 (10.6)	0.36 (0.7)	1.20 (2.8)	0.025	0.16 0.24	364
88	0.37 (9.7)	0.47 (0.3)	1.54 (2.1)	0.009	0.16 0.25	364
89	0.17 (7.1)	-0.15 (-0.1)	0.50 (0.5)	0.000	0.09 0.15	364
90	0.04 (1.5)	2.39 (2.0)	-1.07 (-0.8)	0.007	0.16 0.14	364
91	-0.29 (-22.4)	3.93 (6.8)	-0.20 (-0.3)	0.140	0.44 0.29	364

Table 2
One Year Window Regressions

Panel C
U.S. - Consolidated

Yr	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	Adjusted R^2	Spearman Corr.	N
83	0.19 (4.0)	0.68 (3.2)	0.46 (4.5)	0.066	0.34 0.28	262
84	-0.08 (-2.3)	1.41 (5.9)	-0.92 (-4.1)	0.112	0.57 0.19	262
85	0.12 (3.9)	0.78 (4.5)	-0.68 (-6.2)	0.123	0.46 0.17	262
86	0.17 (4.6)	0.47 (3.8)	0.44 (5.5)	0.560	0.45 0.19	262
87	-0.14 (-4.0)	1.07 (4.2)	0.37 (5.6)	0.223	0.38 0.36	262
88	0.03 (1.0)	0.23 (1.4)	0.47 (3.4)	0.116	0.43 0.36	262
89	-0.05 (-1.3)	1.47 (4.7)	-0.54 (-4.1)	0.074	0.28 0.29	262
90	-0.06 (-2.1)	0.21 (2.4)	-0.12 (-1.1)	0.015	0.38 0.27	262

Notes to Table 2: The model is $R_{iT} = \alpha_0 + \alpha_1 AE_{iT} + \alpha_2 \Delta AE_{iT} + \epsilon_{iT}$. See text for notations in the equation. The first row of Spearman correlation is between R and AE, the second row is between R and ΔAE.

Table 3
Long Window Regressions

Panel A
Japan - Parent

Ending yr. - length of window	α_0 (t-stat)	α_1 (t-stat)	Adjusted R^2	Spearman Corr.	N	Adjusted R^2 for 364 firms
90 - 20	6.51 (13.7)	1.84 (13.0)	0.211	0.50	647	
91 - 20	3.35 (8.1)	1.84 (13.0)	0.372	0.56	507	
78 - 7	1.00 (14.0)	1.22 (15.6)	0.214	0.53	898	0.120
84 - 7	0.67 (7.8)	1.54 (9.9)	0.080	0.28	1111	0.139
90 - 7	2.27 (16.7)	3.03 (10.3)	0.102	0.38	923	0.058
91 - 7	1.36 (15.9)	1.88 (10.4)	0.136	0.49	688	0.167
75 - 4	0.43 (12.7)	0.88 (15.5)	0.207	0.52	924	0.036
79 - 4	0.61 (16.6)	0.79 (7.7)	0.054	0.34	1019	0.144
83 - 4	0.18 (5.4)	0.90 (7.1)	0.041	0.30	1159	0.058
87 - 4	1.49 (20.2)	1.60 (5.7)	0.026	0.28	1170	0.042
90 - 4	0.87 (19.2)	1.68 (6.4)	0.038	0.30	990	0.000
91 - 4	0.00 (0.0)	4.26 (14.7)	0.223	0.52	750	0.195

Table 3
Long Window Regressions

Panel B
Japan - Consolidated

Ending yr. - length of window	α_0 (t-stat)	α_1 (t-stat)	Adjusted R^2	Spearman Corr.	N
91 - 8	1.26 (8.9)	2.29 (8.7)	0.170	0.46	364
90 - 7	2.48 (13.9)	1.85 (4.7)	0.054	0.32	364
91 - 7	0.95 (7.7)	2.43 (8.1)	0.151	0.48	364
87 - 4	1.32 (12.4)	1.66 (3.8)	0.035	0.24	364
90 - 4	0.91 (11.1)	1.26 (2.1)	0.012	0.29	364
91 - 4	-0.04 (-0.8)	3.60 (9.0)	0.183	0.47	364

Table 3
Long Window Regressions

Panel C
U.S. - Consolidated

Ending yr. - length of window	α_0 (t-stat)	α_1 (t-stat)	Adjusted R^2	Spearman Corr.	N
90 - 7	-0.30 (-2.4)	2.04 (16.5)	0.510	0.80	262
87 - 4	0.07 (1.1)	1.91 (15.8)	0.489	0.76	262
90 - 4	-0.24 (-3.6)	1.64 (11.2)	0.323	0.55	262

Notes to Table 3: The model is $R_{iT} = \alpha_0 + \alpha_1 AE_{iT} + \epsilon_{iT}$.

Table 4

Japan - Consolidated with Management Forecast

Ending yr. - length of window	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	Adjusted R^2	Spearman Corr. between ret. and forecast	N
91 - 8	1.16 (8.4)	1.74 (6.4)	2.30 (5.4)	0.229	0.56	364
91 - 7	0.83 (6.8)	1.55 (4.8)	3.41 (6.1)	0.227	0.55	364
91 - 1	-0.29 (-23.7)	3.33 (5.8)	0.46 (1.8)	0.146	0.43	364

Notes to Table 4: The model is $R_{iT} = \alpha_0 + \alpha_1 AE_{iT} + \alpha_2 FE_{iT} + \epsilon_{iT}$, where *FE* is forecast of earnings by management divided by the beginning stock price.

Table 5
Regressions with Depreciation

Panel A - 1
Japan - Parent (Long Windows)

Ending yr. - length of window	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	Adjusted R^2	Spearman Corr.	N
78 - 7	0.28 (3.1)	1.48 (15.6)	-1.08 (-8.9)	0.371	0.69 0.59	789
84 - 7	-0.13 (-1.1)	2.53 (12.4)	-2.04 (-8.2)	0.163	0.41 0.32	977
90 - 7	1.79 (9.6)	3.92 (9.5)	-3.51 (-7.0)	0.127	0.41 0.29	781
91 - 7	1.10 (10.4)	2.12 (10.6)	-1.82 (-6.9)	0.170	0.44 0.21	631
83 - 4	0.05 (1.1)	1.28 (8.6)	-1.15 (-6.4)	0.064	0.28 0.12	1069
87 - 4	1.34 (13.0)	1.80 (4.3)	-1.33 (-2.6)	0.024	0.32 0.23	1089
90 - 4	0.70 (12.6)	1.95 (7.3)	-1.12 (-3.0)	0.078	0.32 0.19	871
91 - 4	-0.15 (-3.4)	5.09 (16.7)	-4.85 (-12.9)	0.296	0.49 0.24	729

Table 5
Regressions with Depreciation

Panel A - 2
Japan - Parent (One Year Windows)

Yr	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	α_3 (t-stat)	α_4 (t-stat)	Adjusted R^2	N
71	-0.03 (-1.1)	1.12 (7.1)	-0.18 (-1.3)	-1.05 (-5.0)	0.61 (2.4)	0.092	925
72	0.27 (8.3)	0.88 (4.5)	1.12 (6.0)	0.61 (3.0)	-0.48 (-2.8)	0.260	945
73	-0.11 (-4.6)	1.09 (5.0)	0.26 (1.7)	0.44 (1.9)	-0.21 (-1.7)	0.183	966
74	-0.10 (-5.2)	0.30 (1.7)	1.25 (8.1)	0.85 (4.2)	-1.10 (-5.0)	0.277	993
75	0.01 (0.5)	0.57 (3.2)	0.21 (1.3)	-0.55 (-2.6)	1.06 (4.4)	0.066	966
76	0.12 (5.0)	0.55 (2.7)	1.00 (6.2)	0.53 (2.1)	0.30 (0.9)	0.140	977
77	0.05 (3.5)	0.46 (4.0)	-0.02 (-0.2)	-0.05 (-0.3)	0.22 (0.6)	0.047	1073
78	0.17 (7.9)	0.65 (3.1)	0.70 (5.0)	0.36 (1.3)	-1.30 (-2.7)	0.070	1089
79	-0.04 (-2.3)	-0.26 (-1.3)	1.07 (6.0)	2.14 (8.3)	-4.30 (-5.4)	0.141	1113
80	0.04 (2.0)	0.22 (0.9)	0.27 (1.5)	-0.33 (-1.0)	0.26 (0.3)	0.004	1146
81	-0.02 (-1.2)	0.95 (5.1)	0.28 (1.8)	-0.73 (-3.1)	1.91 (2.6)	0.049	1153
82	-0.05 (-3.9)	0.16 (1.2)	0.16 (1.8)	0.24 (1.4)	-0.80 (-1.7)	0.020	1154
83	0.27 (12.8)	0.04 (0.2)	0.85 (3.8)	0.13 (0.5)	-0.53 (-0.7)	0.019	1150

Yr	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	α_3 (t-stat)	α_4 (t-stat)	Adjusted R^2	N
84	0.20 (9.6)	0.10 (0.3)	0.48 (1.9)	0.51 (1.4)	-1.32 (-3.1)	0.012	1164
85	0.18 (8.2)	0.29 (0.8)	0.60 (2.1)	0.95 (2.1)	-1.00 (-2.5)	0.030	1200
86	0.47 (16.3)	-1.00 (-2.1)	1.22 (2.6)	0.84 (1.4)	-2.10 (-1.3)	0.005	1232
87	0.16 (5.9)	3.58 (4.8)	0.33 (1.7)	-2.36 (-2.6)	-10.93 (-4.0)	0.040	1198
88	0.17 (6.8)	3.03 (3.7)	0.36 (0.5)	0.85 (0.9)	0.00 (0.0)	0.086	1155
89	0.12 (6.9)	1.89 (2.8)	-0.44 (-2.1)	-1.70 (-2.1)	-2.98 (-1.4)	0.010	1091
90	0.02 (1.1)	5.75 (5.4)	1.18 (1.1)	-5.32 (-4.3)	0.91 (0.3)	0.062	1113
91	-0.27 (-20.7)	4.14 (6.7)	-1.27 (-2.0)	-4.35 (-6.2)	1.77 (1.0)	0.096	994

Table 5
Long Window Regressions with Depreciation

Panel B
U.S. - Consolidated

Ending yr. - length of window	α_0 (t-stat)	α_1 (t-stat)	α_2 (t-stat)	Adjusted R^2	Spearman Corr.	N
89 - 7	-0.39 (-1.9)	1.94 (12.9)	-1.59 (-5.4)	0.502	0.69 0.26	260
90 - 7	-0.23 (-1.6)	2.11 (15.0)	-2.28 (-8.7)	0.510	0.69 0.31	260
87 - 4	0.01 (0.1)	1.85 (14.3)	-1.6 (-6.5)	0.492	0.68 0.20	260
90 - 4	-0.43 (-5.4)	1.57 (11.0)	-0.95 (-4.4)	0.365	0.46 0.09	260

Notes to Table 5: In Panel A-1 and B, the model is
$R_{iT} = \alpha_0 + \alpha_1(AE_{iT} + D_{iT}) + \alpha_2 D_{iT} + \epsilon_{iT}$, where D_{iT} is cumulative depreciation per share divided by beginning stock price. In Panel A-2, the model is
$R_{iT} = \alpha_0 + \alpha_1(AE_{iT} + D_{iT}) + \alpha_2\Delta(AE_{iT} + D_{iT}) + \alpha_3 D_{iT} + \alpha_4\Delta D_{iT} + \epsilon_{iT}$.
The first row of Spearman correlation in Panesl A-1 and B is between R and $(AE + D)$, the second row is between R and D.