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Aggregate Accounting Earnings and Security Returns: China Evidence and the Replication of US Results*

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Abstract

This paper examines the earnings-return association over long return intervals. The research design is built upon one important accounting intuition: as earnings are aggregated over longer intervals, the effect of earnings measurement error and the time lag between earnings recognition and market reaction slowly dwindles. Therefore, over time, we should observe an improving association between (aggregate) earnings and stock return. In this study, we first replicate the results of Easton, Harris, and Ohlson (1992) for the same period of 1968-1986 and find very similar results under refined correlation metrics. Second, we expand coverage to test US data from 1962 to 2011 and find that their prediction holds for the past 50 years in the US market. Third, our post-1992 China and US data generate the same pattern of rising earnings-return correlation as the return interval expands, despite China's immature stock market. Further comparison indicates that the earnings-return correlation in China is lower than that in the US market in the same period of 1992-2011. Finally, to make our results comparable to the original ones in Easton, Harris, and Ohlson (1992), we also report the 1992-2011 results under the original metrics, such as R^2 and concordant pair percentage; we still reach the same conclusions. Overall, the empirical results support Easton, Harris, and Ohlson's theory in both the US market and the emerging China market, extending the external validity of their theory to the international capital market.

Keywords: Aggregation, Long Intervals, Returns-Earnings Association

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I. Introduction

Since the 1960s, accounting researchers have been fascinated by the relation between accounting earnings and security returns. In addition, ever since early 1980s, they have been perplexed by some poor results, especially the very low R^2 associated with the earnings response coefficient (ERC). Three groups of explanations arose in the literature: the imperfect earnings expectation model (Brown *et al*., 1987), the earnings measurement error (Beaver, Lambert, and Morse, 1980), and the time lag between earnings recognition and market reaction. Historically, most researchers prefer short-term event windows or return intervals to carve out a "cleaner" setting for their specific research questions, but research designs with short intervals will inevitably suffer from these three problems.

Inspired by insights from Lev (1989), Easton, Harris, and Ohlson (1992) formalised the earnings aggregation approach to systematically examine the earnings-return association over long intervals. Behind their complex theoretical derivation is a simple accounting intuition: as earnings are aggregated over multiple years, the importance of the measurement error, unexpected earnings, and the time lag between recognised earnings and market return gradually declines. Therefore, over time, earnings are more likely to reflect the impact of value-relevant events, and the earnings-return correlation will rise accordingly. *Although it is not explicitly mentioned in their paper, we note that their approach does not require market efficiency in the short term.* Short-term market inefficiencies will not hurt the earnings-return correlation over longer intervals because these inefficiencies cannot persist as long as 10 years.

In this paper, we employ the methodology of Easton, Harris, and Ohlson (1992) but with refined metrics. We examine three samples here. First, we replicate their results with US data from 1968 to 1986. We find the same high earnings-return correlation as in their original study. We also document a declining correlation as the return interval falls to 5 years, 2 years, and 1 year. Second, we replicate their study with a longer time period, 1962-2011, to examine the external validity of their conclusions. Again, we document the highest earnings-return correlation over the 10-year interval and the same declining trend over shorter intervals. When we separate the US sample into pre-1992 and post-1992 sub-periods and re-perform the same tests, we still reach the same conclusion. Finally, we test the models with data from the "young" and growing Chinese stock market after 1992. We compare the earnings-return correlation in this market with that of the post-1992 US data and still document the same pattern: the earnings-return correlation in both markets increases as the return interval expands. Interestingly, the 10-year earnings-return correlation is lower in the 1992-2011 period in both markets (Spearman correlation of 0.41 and 0.73 respectively for the China sample and the US sample) than it is in the original study (Spearman correlation of 0.82, 1968-1986). In summary, our main conclusion is valid for the past five decades in both the US market and the new, emerging Chinese stock market.

This paper revisits the contemporaneous association between equity returns and accounting earnings over longer intervals of time in both China and the US. We are still interested in the strength of the association as a function of the return interval and believe it is meaningful to re-examine this issue using the same approach for the following reasons. First, we add new external validity to Easton, Harris, and Ohlson's (1992) conclusion by expanding the data coverage to the past 50 years; in their original study, they only used 18 years of US data, from 1968 to 1986, to examine their hypothesis. Second, testing the aggregation method with data from China also extends the external validity of Easton, Harris, and Ohlson's (1992) conclusion into the international capital market in the second largest economy in the world. Third, the results of this study could be informative to Chinese market regulators, practitioners, and academic researchers. Mainland China reopened its stock exchanges in 1990 and has experienced dramatic growth in terms of GDP, global market impact, and stock market capitalisation. But the immature Chinese stock market suffers from market segmentation, corporate governance problems, accounting and regulatory weaknesses, and insider trading. Our paper shows that even in such an immature market, the earnings-return association still improves as the return interval expands.

The remainder of this paper is organised as follows: Section II describes the replication of the results of Easton, Harris, and Ohlson's (1992) original paper using US market data from 1968 to 1986. We briefly describe the models, data, refined metrics, and sample selection and then discuss the results over 10-year, 5-year, 2-year, and, finally, 1-year intervals. In Section III, we employ the same method and models to examine 50 years (1962-2011) of US data. In Section IV, we present the post-1992 China evidence under the same model and discuss the data and sample selection, the correlation table, and the regression results. We present the post-1992 US evidence together with the post-1992 China results for easy comparison. Table 17 provides the summary statistics for both the China and US samples. Although we are fully aware of the potential weaknesses of R^2 and concordant pair percentage in Easton, Harris, and Ohlson (1992), for readers' reference, we still present our post-1992 results under the old metrics in Table 18. Section V concludes the paper.

II. Replication of the Original Paper by Easton, Harris, and Ohlson (1992) over the Time Period 1968-1986

2.1 Model

We utilise the Easton, Harris, and Ohlson (1992) model as derived from their paper. We summarise the major assumptions below:

1. The term structure of interest rates is flat and non-stochastic; therefore, risk-free rates for 1-year, 2-year, 5-year, and 10-year horizons are all the same.

2. Dividends paid between the (0,T) interval are reinvested in risk-free assets (government bonds).

The variables are defined as follows:

1. P_t = the firm's market value at date t on a per-share basis.

2. d_t = dividends paid at date t on a per-share basis.

3. R_t = market return for the (t-1, t) time period, defined as $(P_t + d_t - P_{t-1}) / P_{t-1}$.

4. x_t = reported accounting earnings for the (t-1, t) time period on a per-share basis.

5. R_F = one plus the risk-free rate of return.[2]

6. $AX_T = \sum_{t=1}^{T} X_T$, aggregate earnings over the time interval (0, T).

7. FVS ($d_1, \ldots, d_T$) = future value (a snapshot at the end of year T) of all dividends after both receipt of dividends over multiple years and the subsequent reinvestment of

[2] We follow Easton, Harris, and Ohlson (1992) and use 10% as the risk-free rate. Given the high interest rate between the early 1970s and the late 1980s, the 10% assumption makes sense in their sample period. However, the long-term risk-free interest rate experienced a monotonic decline between the early 1990s and 2011. Therefore, we also replicate Easton, Harris, and Ohlson (1992) under an alternative risk-free rate (5%), yielding similar results. When we test the China data from 1992-2011, we also use a range of risk free interest rates (5% to 10%) and document very similar results. In sum, we reach the same conclusion as Easton, Harris, and Ohlson (1992): there is a "general insensitivity to interest rates".

those dividends in risk-free assets. It can also be written as FVS_T.

8. FVF (d_1, …, d_T) = a flow variable that captures the earnings from the investment of dividends. It can also be written as FVF_T.

Our market return is y_t, defined as

$y_T^1 = [P_T + FVS(d_1,...,d_T) - P_0]/P_0$

Our independent earnings variable is

$z_T^1 = [AX_T + FVF(d_1, …, d_T)] / P_0$.

The first cross-sectional regression model is

[M1] $y_{Tj}^1 = \alpha_T^1 + \beta_T^1 z_{Tj}^1 + \varepsilon_{Tj}^1$.

To minimise the impact of FVS_{Tj} and FVF_{Tj} on the correlation between earnings and market return, two alternative models are employed as a robustness check, as recommended in Easton, Harris, and Ohlson (1992).

[M2] $y_{Tj}^2 = \alpha_T^2 + \beta_T^2 z_{Tj}^2 + \varepsilon_{Tj}^2$,

where

$y_{Tj}^2 = (y_{Tj}^1 - \beta_T^1 \mathrm{FVF}_{Tj} / P_{0j})$ and

$z_{Tj}^2 = \beta_T^1 \mathrm{AX}_{Tj} / P_{0j}$.

[M3] $y_{Tj}^3 = \alpha_T^3 + \beta_T^3 z_{Tj}^3 + \varepsilon_{Tj}^3$,

where

$y_{Tj}^3 = (P_{Tj} + \sum_{t=1}^{T} d_{tj} - P_{0j}) / P_{0j}$ and

$z_{Tj}^3 = \mathrm{AX}_{Tj} / P_{0j}$.

The intuition is that as time interval T increases and earnings are aggregated over multiple years, the earnings measurement error (e.g. due to accounting rules or managerial manipulation) and the time lag between earnings recognition and market return will have a dwindling impact. Value-relevant events are better captured in earnings, and thus earnings will have an improving association with market return.[3] Therefore, a testable prediction in Easton, Harris, and Ohlson (1992) is that as time interval (T) increases and approaches infinity, the correlation between y_T^1 and z_T^1 is expected to steadily increase and shift closer to 1.

The correlation results are quite similar across the three models for all three samples, the 1968-1986 US sample, the 1962-2011 US sample, and the 1992-2011 China sample. As a second robustness test, we also apply different risk-free interest rates to test whether the results are sensitive to risk-free rate assumptions.

In the original Easton, Harris, and Ohlson (1992) study, the authors employed three correlation metrics: R^2 from a return-earning OLS regression, concordant pair percentage

3 As we argue in later sections that another possible driver of the low earnings-return correlation could be market inefficiency. But market inefficiency could hardly persist over long intervals, such as the 10-year interval used in this study.

(this measures the percentage of concordant pairs of z_T^1 and y_{Tj}^1 when the independent and dependent variables are partitioned into "high" and "low" segments by using their respective medians), and Spearman correlation.

In our current version, we replace the OLS regression with the Theil-Sen regression. Following a suggestion from Jim Ohlson and other conference participants, we replace α and β under an OLS regression with Theil-Sen estimators (abbreviated as TS-α and TS-β in all tables). One previous measure of correlation, R^2, is also replaced by the TS-correlation index, which measures the rank correlation between the actual and fitted value of the dependent variable derived from a Theil-Sen estimation (Theil, 1950; Sen, 1968). A Theil-Sen regression derives the slope of a linear trend on the basis of the median of pairwise slopes. We argue that the Theil-Sen estimation has the following advantages over the OLS regression in this earnings-return study. First, it has been proved that the Theil-Sen estimator has higher asymptotic efficiency than a least-squares regression. Second, the Theil-Sen method, unlike OLS regression, is insensitive to outliers. It works quite well with skewed and heteroskedastic data, which are common in many return-related accounting datasets. Third, theoretical work indicates that if μ_t (noise in the reported earnings in year t, such as earnings manipulation by the management) reverses in the next time period, R^2 tends to rise *mechanically* as time interval increases from 1 year to 2 years or 5 years.[4] Consequently, OLS regression and its goodness-of-fit measure are dropped from all our main tables, but we do present a concise result summary in Table 18 for readers who might be interested in the results from the OLS regression.

Another refined measure adopted in the current version is the Kendall tau correlation coefficient (abbreviated as "Kendall's tau" in all tables), a rank correlation metric that captures the association between two variables which might be statistically dependent (Kendall, 1938). It has a range of (-1,1) and has an expected value of zero when earnings and return are completely independent from each other. Concordant pair percentage, as defined in Easton, Harris, and Ohlson (1992), is a problematic correlation measure; therefore, it is replaced by Kendall's tau in this study.

2.2 Data and sample selection

Stock returns and trading prices are extracted from the CRSP, and all accounting information comes from the Compustat North America Annual File. We keep only US-based firms and delete foreign companies with American Depositary Receipts (ADRs) traded on the US market. We come up with two US samples, one for the replication of the original results in Easton, Harris, and Ohlson's (1992) study with observations from the period 1968-1986 and the second for the replication of their results over a much longer time period (1962-2011). The results from the second sample are reported in Section III. We impose two requirements for both the 1968-1986 and the 1962-2011 samples: (1) all firms must have annual earnings per share, dividends, and adjustment factors; and (2) all firms must have earnings and dividends information for at least 10 consecutive years, as required by Easton, Harris, and Ohlson (1992).

Publicly traded firms have 90 days after the end of the fiscal year to publish their annual reports. Therefore, we follow Easton, Harris, and Ohlson (1992) and set P_{Tj} as the price on the first trading day 3 months after the end of fiscal year T. We set P_{0j} as the price on the first trading day 3 months after the beginning of the first fiscal year.

Panel A of Table 1 lists the number of firms that satisfy our two data requirements

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[4] We thank the discussant for pointing this out.

listed above. Our replication sample is quite similar to Easton, Harris, and Ohlson's (1992) original sample in terms of overall sample size and sub-period sample size. Small size differences can be explained by the fact that Compustat expanded its historical coverage after 2006 and that we use the post-2006 Compustat North America Annual File instead of the 1987 version of the Compustat Annual Industrial File.

Easton, Harris, and Ohlson (1992) selected observations for their samples using five different selection procedures in order to minimise the effect of interdependence in observations. In Panel B of Table 1, we show again that our replication subsamples from the 1968-1986 sample are similar to the original ones in Easton, Harris, and Ohlson's (1992) paper. Since the results under the five different selection procedures are similar, we follow their approach and only report results under the first selection procedure, "random selection".

Table 1 Summary of numbers of sample observations, 1968-1986

Sample	68-77	69-78	70-79	71-80	72-81	73-82	74-83	75-84	76-85	77-86	Total
					Panel A						
Full	852	971	1,084	1,111	1,165	1,220	1,254	1,265	1,274	1,244	11,440
					Panel B						
1) Random	123	138	124	120	155	125	156	156	165	194	1,456
2) Earliest forward	852	130	139	61	72	66	48	28	30	30	1,456
3) Middle forward	-	-	-	-	-	1,220	48	28	30	30	1,356
4) Middle backward	11	25	33	18	1,165	-	-	-	-	-	1,252
5) Latest backward	11	25	33	18	11	13	17	23	61	1,244	1,456

2.3 Results

2.3.1 Ten-year return interval results

Table 1 shows that our random selection sample in the period 1968-1986 has 1,456 observations. We follow the suggestions from CAFR Special Issue conference participants and delete return and earnings outliers in the top 1% and bottom 1%.[5] The final sample size is 1,399, very close to the sample size of 1,289 in the original Easton, Harris, and Ohlson (1992) study. Table 2 provides descriptive statistics of the primary variables from the random selection sample. The primary variables in our sample are quite similar to those in the original study in terms of distribution. Table 3 presents the TS-correlation and Theil-Sen regression (TS regression) results under model M1 from the random selection sample. Here, the time interval (T) is 10 years and R_F is 1.1 (risk-free rate set at 10%).

We draw the following conclusions from Table 3:

1. The Spearman rank correlation between aggregate earnings and return is 0.82, very close to the original result of 0.83 in Easton, Harris, and Ohlson (1992). The TS-correlation index (correlation between actual and fitted value of dependent variable) also indicates a high earnings-return correlation (0.82) over the 10-year interval. We

[5] We perform all our tests with the whole sample of 1,456 observations and get very similar results. Our results are robust with or without the deletion of outliers.

reach the same conclusion under all three measures (Spearman correlation, TS-correlation index, and Kendall's tau).

2. Following Easton, Harris, and Ohlson (1992), we define aggregate earnings in different ways and also test M2 and M3. M2 and M3 have Spearman correlation values of 0.81 and 0.80, very close to the 0.82 under M1. Kendall's tau changes little when the model is changed to M2 or M3. In sum, we replicate Easton, Harris, and Ohlson (1992) in the same time period and reach the same conclusion: the use of FVS_T and FVF_T has no significant impact on empirical results.

3. Last, we also test the sensitivity of our results with respect to the R_F assumption by re-performing all the tests with a lower R_F (1.05) and reach the same conclusion: the risk-free rate assumption has no substantive effect on the results.

Table 2 Descriptive statistics for the variables used for the ten-year return interval under the random selection procedure (N = 1,399)

Variable	1st quartile	Median	3rd quartile	Mean	SD	Correlations			
						AX_{Tj}	AD_{Tj}	FVS_{Tj}	FVF_{Tj}
PD_{Tj}	-0.073	0.800	2.695	2.185	4.048	0.408	0.151	0.127	0.086
AX_{Tj}	0.661	1.286	2.439	2.190	3.869		0.789	0.777	0.747
AD_{Tj}	0.152	0.389	0.698	0.602	1.235			0.997	0.980
FVS_{Tj}	0.234	0.616	1.098	0.942	1.978				0.992
FVF_{Tj}	0.081	0.222	0.393	0.340	0.752				

Note:
PD_{Tj} = stock price of firm j by the end of year T (T=10) plus all dividends in the 10 years minus the stock price at the beginning of the return period (P_{oj}), and then deflated by P_{oj}; AX_{Tj} = aggregated earnings from year T-9 to T-1 for firm j, deflated by P_{oj}; AD_{Tj} = sum of the dividends from year T-9 to T-1, deflated by P_{oj}, for firm j; FVS_{Tj} = future value of dividends from year T-9 to T-1 under a compounding reinvestment rate of 10%, divided by P_{oj}, for firm j; FVF_{Tj} = (FVS_{Tj} - AD_{Tj}) / P_{oj}, for firm j.

Table 3 Estimation results for the ten-year return period for the random selection sample (N = 1,399, R_F = 1.10)

Model	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall's tau
M1	-0.544	1.237	0.82	0.82	0.65
M2	-0.507	1.841	0.81	0.81	0.64
M3	-0.530	1.268	0.80	0.80	0.63

Note:

[M1] $y_{Tj}^1 = \alpha_T^1 + \beta_T^1 z_{Tj}^1 + \varepsilon_{Tj}^1$, where $y_T^1 = [P_T + FVS(d_1,...,d_T) - P_0]/P_0$ and

$z_T^1 = [AX_T + FVF(d_1, \ldots, d_T)] / P_0$

[M2] $y_{Tj}^2 = \alpha_T^2 + \beta_T^2 z_{Tj}^2 + \varepsilon_{Tj}^2$, where $y_{Tj}^2 = (y_{Tj}^1 - \beta_T^1 FVF_{Tj} / P_{0j})$ and

$z_{Tj}^2 = \beta_T^1 AX_{Tj} / P_{0j}$

[M3] $y_{Tj}^3 = \alpha_T^3 + \beta_T^3 z_{Tj}^3 + \varepsilon_{Tj}^3$, where $y_{Tj}^3 = (P_{Tj} + \sum_{t=1}^{T} d_{tj} - P_{0j}) / P_{0j}$ and

$z_{Tj}^3 = AX_{Tj} / P_{0j}$

2.3.2 Five-, two-, and one-year return interval results

Since M2 and M3 have results very similar to M1, we only present the results under M1 below. Table 4 reports the results under multiple shorter return intervals. On the basis of the theoretical prediction in Easton, Harris, and Ohlson (1992), we expect earnings-return correlations to decline gradually as the return interval falls from 10 years to 5 years, 2 years, and, finally, 1 year.

Five-year interval: We partition the 10-year sample into two 5-year subsamples and label them “early 5-year period” and “late 5-year period”. All results are presented in Panel A of Table 4. The TS-correlations are 0.68 and 0.77, lower than the 0.82 reported Table 3. We observe a similar pattern under Spearman correlation. Kendall’s tau coefficients are 0.50 and 0.60 respectively, lower than the 0.65 over the 10-year interval. In conclusion, all three correlation metrics indicate that the earnings-return correlation over the 5-year interval is lower than that over the 10-year return interval. We reach the same conclusion as in Easton, Harris, and Ohlson (1992).

Two-year return interval: All results are presented in Panel B of Table 4. Based on our calculation, the average Spearman correlation is now 0.53, with a maximum of 0.58 and a minimum of 0.49. The earnings-return correlation declines further here as compared with the results under the 5-year return interval. The TS-correlation and Kendall’s tau (average tau coefficient is now 0.38 as compared to the average of 0.55 over the 5-year interval) show a similar decline. Our study reaches the same conclusion as the original Easton, Harris, and Ohlson (1992) study.

One-year return interval: All results are presented in Panel C of Table 4. The average TS-correlation (Spearman correlation) is now 0.40 (with a maximum of 0.46 and a minimum of 0.35), and the average Kendall’s tau coefficient is 0.28 (with a maximum of 0.33 and a minimum of 0.24). All correlation metrics indicate a significant and obvious decline in earnings-return correlations over a 1-year interval when compared with those over a 2-year or 5-year interval.

Table 4 Estimation results from model M1 for five-, two-, and one-year return periods for the random selection sample (R_f = 1.10)

Sub-period	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall’s tau	N
			Panel A: Five-year return period			
2 (late)	0.049	1.028	0.68	0.68	0.50	1399
1 (early)	-0.526	1.238	0.77	0.77	0.60	1399
			Panel B: Two-year return period			
5 (latest)	0.074	0.886	0.51	0.51	0.36	1399
4	0.041	0.854	0.49	0.49	0.35	1399
3	-0.136	1.012	0.53	0.53	0.38	1399
2	-0.179	1.174	0.58	0.58	0.42	1399
1(earliest)	-0.261	1.337	0.55	0.55	0.40	1399
			Panel C: One-year return period			
10 (latest)	0.043	0.754	0.35	0.35	0.24	1399
9	0.001	0.850	0.39	0.39	0.27	1399
8	-0.008	0.903	0.35	0.35	0.25	1399
7	-0.011	0.810	0.37	0.37	0.26	1399
6	-0.051	0.845	0.37	0.37	0.26	1399
5	-0.127	1.149	0.46	0.46	0.33	1399
4	-0.070	1.006	0.43	0.43	0.30	1399
3	-0.114	1.144	0.45	0.45	0.32	1399
2	-0.140	1.297	0.44	0.44	0.31	1399
1(earliest)	-0.103	1.041	0.38	0.38	0.27	1399

In sum, we replicate Easton, Harris, and Ohlson (1992) using exactly the same method (earnings aggregation) and model over the same sample period. From the descriptive statistics to the correlation tests over all return intervals, we find results that are very similar to those of Easton, Harris, and Ohlson (1992). Therefore, we reach the same conclusion as the original 1992 study: the earnings-return correlation improves as we expand the return interval, and under the longest interval of 10 years, earnings explain most of the stock returns. The results of all tests are robust under different models (M1, M2, and M3) and different model assumptions (e.g. different risk-free interest rates) and with different samples (whole sample or sample without outliers).[6]

In the next section, we take advantage of the expansive Compustat datasets and revisit the earnings-return association question over a much longer time period, 1962-2011. In Section IV, we examine the earnings-return correlation in the emerging market of China with data beginning in its "birth" year of 1992. We then present the Chinese evidence side by side with the American evidence for easy comparison.

III. Replication of Easton, Harris, and Ohlson (1992) over the Past Five Decades, 1962-2011

3.1 Model, data, and sample selection

We apply exactly the same methodology as that described in Section II to the new dataset. All variables and models are as defined in Section 2.1.

Stock returns and trading prices are extracted from CRSP, and all of the accounting information comes from the Compustat North American Annual File. We keep only US-based firms and delete foreign companies with ADR traded on the US market. We also impose the same two requirements for this 1962-2011 sample: (1) all firms in our samples must have annual earnings per share, dividends, and adjustment factors; and (2) all firms must have earnings and dividend information for at least 10 consecutive years. Following suggestions from conference participants, we document the results based on the sample without outliers (N = 5,551) in Tables 6, 7, and 8. The results are actually very similar if we use the whole sample from the random selection (Table 5).

Panel A of Table 5 lists the number of firms that satisfy our two data requirements. The original 1992 study selects observations using five different selection procedures in order to minimise the effect of interdependence in observations. Since the results under the five different selection procedures are similar, we only report the results under the first selection procedure (random selection) in Tables 6, 7, and 8. Table 6 provides descriptive statistics of the primary variables from the random selection sample. The American stock market experienced a 30-year boom after the early 1980s, as seen in a steadily rising market index and many more publicly traded firms in the high-tech industries. This trend is captured by the number of firms in the "full sample" in Panel A of Table 5.

3.2 Results

3.2.1 Ten-year return interval results

Table 7 presents the correlation and regression results under models M1, M2, and M3 for the random selection sample. Here, the time interval (T) is 10 years and R_F is 1.1 (risk-free rate set at 10%). Since the results under M1, M2, and M3 are very similar along

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[6] In Section 2.1, we discuss inherent weaknesses of R^2 and concordant pair percentage. Although we drop them as correlation metrics in the current version, in unreported tests, we find very similar results: earnings-correlation increases as the time interval expands.

all three correlation metrics, our discussion will focus on the results from M1.

We draw the following conclusions from Table 8: (1) the Spearman correlation (TS-correlation) over the 10-year interval 1962-2011 is lower than that of 1968-1986 (0.74 vs. 0.82); (2) the Kendall's tau coefficient between aggregate earnings and return is 0.57, also lower than the 0.65 in 1968-1986; (3) last, we also test the sensitivity of our results with respect to the R_F assumption by re-performing all the tests with a lower R_F (1.05) and find similar results. In sum, the results are robust with respect to the different models (M1, M2, and M3) as well as the different interest rate assumptions.

3.2.2 Five-, two-, and one-year return interval results

Table 8 reports the results under multiple shorter return intervals for firms in the period 1962-2011. Again, we expect aggregation over longer time intervals to lessen the impact of the earnings measurement error and the time lag between earnings recognition and market reaction. As a result, the earnings-return correlation should be highest in the 10-year interval and then gradually decline as the return interval falls to 5 years, 2 years, and, finally, 1 year.

Five-year interval: We partition the 10-year sample into two 5-year samples and label them "early 5-year period" and "late 5-year period". All results are presented in Panel A of Table 8. The Spearman correlations are 0.64 and 0.60, lower than the 0.74 reported in Table 7. Kendall's tau coefficients are 0.47 and 0.44 for the two sub-periods (versus 0.57 in the 10-year interval). In conclusion, all three correlation metrics indicate that the earnings-return correlation in the 5-year interval is lower than that in the 10-year return interval.

Two-year interval: All results are presented in Panel B of Table 8. The average TS-correlation index is now 0.44, with a maximum of 0.48 and a minimum of 0.41. The earnings-return correlation declines further here compared with the results under the 5-year return interval (average TS-correlation at 0.62). The average Spearman rank correlation and average Kendall's tau show a similar decline.

Panel C of Table 8 presents the results in the 1-year return interval. The average Spearman correlation is 0.34, lower than the 2-year average of 0.44. Based on our calculation, the average Kendall's tau coefficient is now 0.24, lower than the average in the 2-year interval (0.32) and 5-year interval (0.46) and the coefficient in the 10-year interval (0.57). We also reach the same conclusion under the TS-correlation index.

In conclusion, with a comprehensive dataset comprised of firms from 1962 to 2011, we reach the same conclusion as Easton, Harris, and Ohlson (1992): the earnings-return association increases as the return interval expands. The results of all tests are robust under different models (M1, M2, and M3), with different samples (whole sample or sample without outliers), and under different risk-free interest rates. We further divide our sample into two time periods,[7] 1962-1991 and 1992-2011, and re-perform the tests from Tables 7 to 8; we still reach the same conclusion. Therefore, the results from Easton, Harris, and Ohlson (1992) are also robust with respect to different sub-periods.

3.3 Summary

The weak correlation between earnings and stock return, as presented in many empirical studies, was a big concern in the accounting literature throughout the 1980s and 1990s. Easton, Harris, and Ohlson (1992) pioneered an innovative research design to

[7] The results from 1962-1991 are not tabulated in this paper. Correlation results from 1992-2011 will be presented side by side when we analyse the 1992-2011 data from the China market.

Table 5 Summary of numbers of sample observations, 1962-2011

Sample	62-71	63-72	64-73	65-74	66-75	67-76	68-77	69-78	70-79	71-80	72-81	73-82	74-83	75-84	76-85	77-86	78-87	79-88	80-89	81-90	82-91
										Panel A											
Full	105	568	627	667	734	782	852	971	1,084	1,111	1,165	1,220	1,254	1,265	1,274	1,244	1,206	1,139	1,111	1,104	1,122
										Panel B											
1) Random	4	32	30	31	35	47	61	47	74	66	75	63	73	62	85	70	64	60	53	64	62
2) Earliest forward	105	463	62	41	73	54	84	129	138	61	72	66	48	27	29	28	35	29	51	41	48
3) Middle forward	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Middle backward	0	2	0	5	3	11	8	23	28	15	8	8	15	22	50	66	94	74	45	31	1,122
5) Latest backward	0	2	0	5	3	11	8	23	28	15	8	8	15	22	50	66	94	74	45	31	19

Sample	83-92	84-93	85-94	86-95	87-96	88-97	89-98	90-99	91-00	92-01	93-02	94-03	95-04	96-05	97-06	98-07	99-08	00-09	01-10	02-11	Total
										Panel A											
Full	1,245	1,510	1,792	1,931	2,086	2,127	2,043	1,933	1,805	1,888	2,277	2,399	2,411	2,468	2,514	2,456	2,414	2,486	2,456	2,382	63,228
										Panel B											
1) Random	69	142	166	200	216	231	194	163	129	164	255	279	248	293	271	252	290	348	357	371	5,796
2) Earliest forward	138	297	335	247	252	207	120	94	90	225	499	266	170	229	208	173	149	210	129	74	5,796
3) Middle forward	1,245	297	335	247	252	207	120	94	90	225	499	266	170	229	208	173	149	210	129	74	5,219
4) Middle backward	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,630
5) Latest backward	32	54	105	94	160	202	199	208	144	113	149	170	178	173	236	199	145	168	158	2,382	5,796

explain this phenomenon, studying the earnings-return correlation over very long time intervals.

We replicate Easton, Harris, and Ohlson (1992) again with US accounting and stock trading information from 1962 to 2011. We demonstrate that their main conclusion still holds over the past 50 years: the earnings-return association improves as the return interval increases. Given the five-decade data coverage, our results should enjoy better external validity as compared with the original study.

In the next section, we examine the earnings-return correlation in China's emerging market with data from its "take-off" year of 1992 through to 2011. The American evidence from 1992-2011 will be presented side by side for easy comparison.

Table 6 Descriptive statistics for the primary variables used for the ten-year return interval for the random selection sample (N = 5,551)

Variable	1st quartile	Median	3rd quartile	Mean	SD	Correlations			
						AX_{Tj}	AD_{Tj}	FVS_{Tj}	FVF_{Tj}
PD_{Tj}	-0.349	0.483	2.044	1.501	3.102	0.559	0.132	0.107	0.061
AX_{Tj}	-0.038	0.605	1.277	0.692	1.495		0.423	0.400	0.353
AD_{Tj}	0.000	0.077	0.366	0.229	0.324			0.995	0.966
FVS_{Tj}	0.000	0.121	0.583	0.363	0.511				0.987
FVF_{Tj}	0.000	0.039	0.217	0.134	0.192				

Note:
PD_{Tj} = stock price of firm j by the end of year T (T=10) plus all dividends in the 10 years minus the stock price at the beginning of the return period (P_{oj}) and then deflated by P_{oj}; AX_{Tj} = aggregated earnings from year T-9 to T-1 for firm j, deflated by P_{oj}; AD_{Tj} = sum of the dividends from year T-9 to T-1, deflated by P_{oj}, for firm j; FVS_{Tj} = future value of dividends from year T-9 to T-1 under a compounding reinvestment rate of 10%, divided by P_{oj}, for firm j; FVF_{Tj} = (FVS_{Tj} - AD_{Tj}) / P_{oj}, for firm j.

Table 7 Estimation results for the ten-year return period for the random selection US sample (N = 5,551, R_F = 1.10)

Model	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall's tau
M1	-0.102	1.184	0.74	0.74	0.57
M2	-0.123	0.972	0.73	0.73	0.55
M3	-0.105	1.215	0.73	0.73	0.55

Note:

[M1] $y^1_{Tj} = \alpha^1_T + \beta^1_T z^1_{Tj} + \varepsilon^1_{Tj}$, where $y^1_T = [P_T + FVS(d_1,...,d_T) - P_0] / P_0$ and

$z^1_T = [\mathrm{AX_T} + \mathrm{FVF}(\mathrm{d_1}, \ldots, \mathrm{d_T})] / \mathrm{P_0}$

[M2] $y^2_{Tj} = \alpha^2_T + \beta^2_T z^2_{Tj} + \varepsilon^2_{Tj}$, where $y^2_{Tj} = (y^1_{Tj} - \beta^1_T \mathrm{FVF_{Tj}} / P_{0j})$ and

$z^2_{Tj} = \beta^1_T \mathrm{AX_{Tj}} / P_{0j}$

[M3] $y^3_{Tj} = \alpha^3_T + \beta^3_T z^3_{Tj} + \varepsilon^3_{Tj}$, where $y^3_{Tj} = (P_{Tj} + \sum_{t=1}^{T} d_{tj} - P_{0j}) / P_{0j}$ and

$z^3_{Tj} = \mathrm{AX_{Tj}} / P_{0j}$

Table 8 Estimation results from model M1 for five-, two-, and one-year return periods for the random selection sample (R_F = 1.10)

Sub-period	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall's tau	N
			Panel A: Five-year return period			
2 (late)	-0.109	1.222	0.64	0.64	0.47	5551
1 (early)	-0.102	1.344	0.60	0.60	0.44	5551
			Panel B: Two-year return period			
5 (latest)	-0.025	1.149	0.48	0.48	0.34	5551
4	-0.078	1.249	0.46	0.46	0.33	5551
3	-0.054	1.267	0.42	0.42	0.30	5551
2	-0.030	1.244	0.41	0.41	0.29	5551
1(earliest)	-0.083	1.378	0.45	0.45	0.32	5551
			Panel C: One-year return period			
10 (latest)	-0.002	0.966	0.36	0.36	0.26	5551
9	-0.030	1.147	0.34	0.34	0.25	5551
8	-0.038	1.179	0.32	0.32	0.23	5551
7	-0.061	1.300	0.37	0.37	0.26	5551
6	-0.037	1.248	0.33	0.33	0.24	5551
5	-0.030	1.240	0.33	0.33	0.23	5551
4	-0.020	1.196	0.31	0.31	0.22	5551
3	-0.031	1.322	0.33	0.33	0.23	5551
2	-0.029	1.283	0.33	0.33	0.24	5551
1(earliest)	-0.069	1.545	0.38	0.38	0.27	5551

IV. Earnings-Return Correlation Over Long Intervals: Evidence from China (1992-2011) and the US (1992-2011)

4.1 Institutional background of the Chinese stock market

China's first stock exchange was established by overseas businessmen in 1891 in Shanghai. It was shut down in 1949 and remained closed until November 1990. China's former supreme leader, Xiaoping Deng, was a big fan of the stock market. Under his directive, China's government reopened the trading floor at the Shanghai Stock Exchange on 19 December 1990 and started trading at a second exchange in Shenzhen on 3 July 1991. The early transition period was chaotic, and a speculative fad spread like wildfire across the nation. Since then, China's stock market has gone through 20 years of rapid growth, with several rounds of regulatory, accounting, and financial reforms as well as multiple cycles of boom and bust. By the end of 2012, according to the websites of the two exchanges, there were 954 and 1,540 firms listed on the Shanghai Stock Exchange and the Shenzhen Stock Exchange, respectively. Their market capitalisations as of 31 December 2012 were respectively 15.8 trillion yuan (US$2.52 trillion) and 7.17 trillion yuan (US$1.14 trillion).

4.2 Model, data, and sample selection

We apply the same methodology to the Chinese data as that used for the American data. All models are as defined in Section 2.1.

In China, domestic Chinese firms issue two kinds of stocks to investors: A-shares and B-shares. B-shares are priced in foreign currencies (US dollars for B-shares on the

Shanghai Stock Exchange and HK dollars for those on the Shenzhen Stock Exchange) and are only open to international individual or qualified institutional investors or local residents with convertible foreign currencies. A-shares are open only to domestic investors and are priced in Chinese yuan. As a result, the A-share market has a much larger trading volume and better liquidity. Therefore, this study only examines the A-share market segment.

Stock returns, trading prices, and accounting information are all taken from the CSMAR, a well-known Chinese stock market data vendor. Firms in our final sample have at least 10 consecutive years of data after 1992. The stock price variable is CLSPRC. Since A-share firms are only required to file their annual reports within 4 months of the end of the fiscal year, the stock prices P_{0j} and P_{Tj} are the closing prices on the first trading day 4 months after the fiscal year end for Year 0 and Year T, respectively. Our earnings per share variable is T60200 from the CSMAR accounting database. When dividend per share is missing, our alternative measure is the product of the dividend payout ratio (T60900) and earnings per share (T60200). When both dividend per share and dividend payout ratio are missing from the CSMAR database, we assume dividends in that year to be zero.[8]

We then replicate Easton, Harris, and Ohlson's (1992) study using the US data from the period 1992-2011 for a quick comparison. Stock return and price information is extracted from the CRSP, and all accounting information is derived from the Compustat North American Annual File. We impose the same data requirements as those explained in Section 2.2.

Panel A of Table 9 lists the Chinese A-share firms that satisfy our two data requirements. We follow Easton, Harris, and Ohlson (1992) and employ five different selection procedures to the data. Given the similarity of the results under the other selection approaches, we only report the results under the random selection approach. Table 11 presents the descriptive statistics of the key variables for the random selection sample of 917 firms with outliers deleted.[9]

Table 9 Summary of numbers of the China sample observations, 1992-2011

Sample	92-01	93-02	94-03	95-04	96-05	97-06	98-07	99-08	00-09	01-10	02-11	Total
						Panel A						
Full	26	82	233	251	273	454	558	622	689	808	848	4844
						Panel B						
1)Random	4	16	37	37	46	87	85	94	130	196	225	957
2) Earliest forward	26	56	156	26	40	195	124	72	78	134	50	957
3) Middle forward	-	-	-	-	-	-	558	72	78	134	50	892
4) Middle backward	0	5	8	18	14	454	-	-	-	-	-	499
5) Latest backward	0	5	8	18	14	20	8	11	15	10	848	957

[8] This is a reasonable assumption since the CSMAR customer service department confirmed that missing values of dividend per share in year T implies that a firm did not pay cash dividends in year T.

[9] We perform all our tests with the whole random selection sample of 957 observations (Table 9) and get very similar results. Our results are robust with or without the deletion of outliers.

Table 10 Summary of numbers of the US sample observations, 1992-2011

Sample	92-01	93-02	94-03	95-04	96-05	97-06	98-07	99-08	00-09	01-10	02-11	Total
Panel A												
Full	1,888	2,277	2,399	2,411	2,468	2,514	2,456	2,414	2,486	2,456	2,382	26,151
Panel B												
1) Random	369	394	401	348	339	347	331	335	381	382	444	4,071
2) Earliest forward	1,888	504	271	181	235	220	178	157	217	137	83	4,071
3) Middle forward	-	-	-	-	-	-	2,456	157	217	137	83	3,050
4) Middle backward	113	149	170	178	173	2,514	-	-	-	-	-	3,297
5) Latest backward	113	149	170	178	173	236	199	145	168	158	2,382	4,071

Table 11 Descriptive statistics for the primary variables used for the ten-year return interval for the random selection China sample, 1992-2011 (N = 917)

Variable	1st quartile	Median	3rd quartile	Mean	SD	Correlations			
						AX_{Tj}	AD_{Tj}	FVS_{Tj}	FVF_{Tj}
PD_{Tj}	-0.522	-0.288	0.067	-0.113	0.625	0.372	0.265	0.222	0.153
AX_{Tj}	0.024	0.112	0.229	0.144	0.189		0.723	0.685	0.607
AD_{Tj}	0.010	0.032	0.070	0.050	0.056			0.990	0.940
FVS_{Tj}	0.018	0.058	0.124	0.088	0.094				0.979
FVF_{Tj}	0.007	0.025	0.051	0.037	0.039				

Note:
PD_{Tj} = stock price of firm j by the end of year T (T=10) plus all dividends in the 10 years minus the stock price at the beginning of the return period (P_{oj}) and then deflated by P_{oj}; AX_{Tj} = aggregated earnings from year T-9 to T-1 for firm j, deflated by P_{oj}; AD_{Tj} = sum of the dividends from year T-9 to T-1, deflated by P_{oj} for firm j; FVS_{Tj} = future value of dividends from year T-9 to T-1 under a compounding reinvestment rate of 10%, divided by P_{oj}, for firm j; FVF_{Tj} = (FVS_{Tj} - AD_{Tj}) / P_{oj}, for firm j.

Table 12 Descriptive statistics for the primary variables used for the ten-year return interval for the random selection US sample, 1992-2011 (N = 3,890)

Variable	1st quartile	Median	3rd quartile	Mean	SD	Correlations			
						AX_{Tj}	AD_{Tj}	FVS_{Tj}	FVF_{Tj}
PD_{Tj}	-0.400	0.445	1.890	1.260	2.586	0.515	0.077	0.056	0.019
AX_{Tj}	-0.116	0.489	1.086	0.484	1.228		0.345	0.325	0.284
AD_{Tj}	0.000	0.018	0.275	0.170	0.257			0.995	0.964
FVS_{Tj}	0.000	0.027	0.435	0.269	0.407				0.986
FVF_{Tj}	0.000	0.006	0.158	0.099	0.154				

Note:
PD_{Tj} = stock price of firm j by the end of year T (T=10) plus all dividends in the 10 years minus the stock price at the beginning of the return period (P_{oj}) and then deflated by P_{oj}; AX_{Tj} = aggregated earnings from year T-9 to T-1 for firm j, deflated by P_{oj}; AD_{Tj} = sum of the dividends from year T-9 to T-1, deflated by P_{oj} for firm j; FVS_{Tj} = future value of dividends from year T-9 to T-1 under a compounding reinvestment rate of 10%, divided by P_{oj}, for firm j; FVF_{Tj} = (FVS_{Tj} - AD_{Tj}) / P_{oj}, for firm j.

Panel A of Table 10 lists the American firms that satisfy our data requirements. Panel B lists the number of firms selected under the five selection approaches over each 10-year time interval. Since the results under the five different selection procedures are similar, we only report the results under the first selection procedure, random selection. Table 12 provides descriptive statistics for the primary variables of the random selection sample of 3,890 firms with outliers deleted. A quick comparison of the means and medians of PD_{Tj} and AX_{Tj} between the China and US samples show that the American sample firms, on average, have much higher market returns and aggregate earnings than the Chinese sample firms over the 10-year interval.

4.3 Results

4.3.1 Ten-year return interval results

Table 13 and Table 14 present the correlation and regression results under models M1, M2, and M3 for the random selection China sample and the random selection US sample over the 10-year interval. Since the results under M1, M2, and M3 are very similar along all three correlation metrics, our discussion will focus on the results from M1.

Table 13 Estimation results for the ten-year return period for the random selection China sample (N = 917, R_F = 1.10)

Model	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall's tau
M1	-0.393	1.049	0.41	0.41	0.29
M2	-0.408	0.752	0.36	0.36	0.25
M3	-0.402	1.071	0.37	0.37	0.26

Note:

[M1] $y_{Tj}^1 = \alpha_T^1 + \beta_T^1 z_{Tj}^1 + \varepsilon_{Tj}^1$, where $y_T^1 = [P_T + FVS(d_1,...,d_T) - P_0] / P_0$ and

$z_T^1 = [\mathrm{AX_T} + \mathrm{FVF}(\mathrm{d_1}, \ldots, \mathrm{d_T})] / \mathrm{P_0}$

[M2] $y_{Tj}^2 = \alpha_T^2 + \beta_T^2 z_{Tj}^2 + \varepsilon_{Tj}^2$, where $y_{Tj}^2 = (y_{Tj}^1 - \beta_T^1 \mathrm{FVF_{Tj}} / P_{0j})$ and

$z_{Tj}^2 = \beta_T^1 \mathrm{AX_{Tj}} / P_{0j}$

[M3] $y_{Tj}^3 = \alpha_T^3 + \beta_T^3 z_{Tj}^3 + \varepsilon_{Tj}^3$, where $y_{Tj}^3 = (P_{Tj} + \sum_{t=1}^T d_{tj} - P_{0j}) / P_{0j}$ and

$z_{Tj}^3 = \mathrm{AX_{Tj}} / P_{0j}$

Table 14 Estimation results for the ten-year return period for the random selection US sample (N = 3,890, R_F = 1.10)

Model	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall's tau
M1	-0.087	1.255	0.73	0.73	0.55
M2	-0.091	1.113	0.71	0.71	0.54
M3	-0.080	1.278	0.71	0.71	0.54

Note:

[M1] $y_{Tj}^1 = \alpha_T^1 + \beta_T^1 z_{Tj}^1 + \varepsilon_{Tj}^1$, where $y_T^1 = [P_T + FVS(d_1,...,d_T) - P_0] / P_0$ and

$z_T^1 = [\mathrm{AX_T} + \mathrm{FVF}(\mathrm{d_1}, \ldots, \mathrm{d_T})] / \mathrm{P_0}$

[M2] $y_{Tj}^2 = \alpha_T^2 + \beta_T^2 z_{Tj}^2 + \varepsilon_{Tj}^2$, where $y_{Tj}^2 = (y_{Tj}^1 - \beta_T^1 \mathrm{FVF_{Tj}} / P_{0j})$ and

$z_{Tj}^2 = \beta_T^1 \mathrm{AX_{Tj}} / P_{0j}$

[M3] $y_{Tj}^3 = \alpha_T^3 + \beta_T^3 z_{Tj}^3 + \varepsilon_{Tj}^3$, where $y_{Tj}^3 = (P_{Tj} + \sum_{t=1}^T d_{tj} - P_{0j}) / P_{0j}$ and

$z_{Tj}^3 = \mathrm{AX_{Tj}} / P_{0j}$

We draw the following conclusions from Tables 13 and 14:

1. The Spearman correlation over the 10-year interval from 1992 to 2011 for both the China market (0.41) and the US market (0.73) is lower than that of the 1968-1986 data for the US market (0.82).[10] We draw the same conclusion from the TS-correlation and Kendall's tau coefficient (0.65 for the US sample in the period 1968-1986 vs. 0.55 for the US sample in the period 1992-2011 and 0.29 for the China sample in the period 1992-2011).

2. In the period 1992-2011, the earnings-return correlation is much stronger over the 10-year interval for the US sample than for the China sample. It is also consistent across all metrics: the Spearman correlation (0.73 vs. 0.41), the TS-correlation, and the Kendall's tau coefficient (0.55 vs. 0.29). In sum, accounting information is value-relevant in both markets but to a lesser extent in the largest emerging market, China.

3. We also test the sensitivity of our results with respect to the R_F assumption by re-performing all the tests with a lower R_F (1.05) and find similar results, as shown in Table 13 and Table 14. Therefore, our results are robust with respect to different risk-free interest rates.

4.3.2 Five-, two-, and one-year return interval results

Table 15 and Table 16 report the results under multiple shorter return intervals for the China sample and US sample in the period 1992-2011. Since M2 and M3 generate results similar to M1, we only present the results under M1.

We follow the same approach as Easton, Harris, and Ohlson (1992). First, the 10-year interval China sample is divided into two 5-year subsamples (the "early 5-year period" and the "late 5-year period"), and we derive three correlation measures (TS-correlation, Spearman rank correlation, and Kendall's tau). The results are presented in Panel A of Table 15. Second, the 10-year interval sample is redivided into five 2-year samples and the same three metrics are recalculated. Finally, as seen in Panel C of Table 15, we divide the sample into ten 1-year sub-periods and recalculate the three correlation metrics. We also calculate the average TS-correlation index, Spearman correlation, and Kendall's tau coefficient and present them in Table 17 for easy comparison of the China and US samples.

For the US sample for 1992-2011, we repeat all of the procedures above; detailed results are provided in Table 16. The average TS-correlation index, Spearman correlation, and Kendall's tau coefficient of the US sample are summarised in Table 17.

Table 17 focuses on the overall trend across different intervals. For both the China and US samples, the earnings-return correlation declines as the return interval narrows. The trend is obvious across all three correlation metrics. For example, in the China sample in the period 1992-2011, the average Spearman rank correlation falls from 0.41 (10-year) to 0.39 (5-year), then to 0.35 (2-year), and finally to 0.30 (1-year). The average TS-correlation index and the average Kendall's tau coefficient demonstrate the same trend for the China sample. Another example is the average Kendall's tau coefficient for the US sample in the period 1992-2011: it falls from 0.55 (10-year) to 0.45 (5-year), then to 0.31 (2-year), and finally to 0.24 (1-year). Under all metrics, the earnings-return correlation is higher for the US sample than for the China sample. We also recalculate with a range of risk-free interest rates (1.05 to 1.10) and test both samples without outlier

[10] Such a difference could be explained by a change in accounting quality, a change in sample industry composition, or governmental interference in the equity market. The purpose of this study is to examine the earnings-return correlation as a function of the length of return interval. Therefore, we leave the question of potential explanations to fellow researchers.

deletion; the results are similar and not reported here.

In conclusion, using the two most recent datasets from China and the US for 1992-2011, we still reach the same conclusion as Easton, Harris, and Ohlson (1992): the earnings-return association increases as the return interval expands and accounting earnings are useful to equity investors. The results of all tests are robust under different models (M1, M2, and M3) and different correlation metrics, with or without extreme observation exclusion, and under different risk-free interest rates. Our paper is the *first* to show that Easton, Harris, and Ohlson's (1992) conclusion is also valid in the world's largest emerging market despite market segmentation (Chen, Lee, and Rui, 2001), the "casino perception" of the Chinese stock market in the media and academia (Girardin and Liu, 2003), and corporate governance problems (Fan, Wong, and Zhang, 2007; Jian and Wong, 2010; Jiang, Lee, and Yue, 2010).

Table 15 Estimation results from model M1 for five-, two-, and one-year return periods for the random selection China sample, 1992-2011 (R_F = 1.10)

Sub-period	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall's tau	N
Panel A: Five-year return period						
2 (late)	-0.190	2.741	0.39	0.39	0.28	917
1 (early)	-0.580	2.628	0.39	0.39	0.28	917
Panel B: Two-year return period						
5 (latest)	-0.203	2.752	0.26	0.26	0.19	917
4	-0.340	3.909	0.33	0.33	0.23	917
3	-0.282	6.789	0.43	0.43	0.31	917
2	-0.416	1.881	0.26	0.26	0.18	917
1(earliest)	-0.487	6.256	0.49	0.49	0.34	917
Panel C: One-year return period						
10 (latest)	-0.207	3.902	0.28	0.28	0.19	917
9	-0.081	2.795	0.22	0.22	0.15	917
8	-0.195	4.086	0.28	0.28	0.19	917
7	-0.258	4.672	0.31	0.31	0.21	917
6	-0.222	6.930	0.34	0.34	0.24	917
5	-0.176	6.011	0.35	0.35	0.24	917
4	-0.227	2.377	0.22	0.22	0.15	917
3	-0.252	2.611	0.21	0.21	0.14	917
2	-0.270	5.480	0.37	0.37	0.25	917
1(earliest)	-0.328	7.953	0.39	0.39	0.27	917

Table 16 Estimation results from model M1 for five-, two-, and one-year return periods for the random selection US sample, 1992-2011 (R_F = 1.10)

Sub-period	TS-α_T	TS-β_T	TS-Correlation Index	Spearman correlation	Kendall's tau	N
Panel A: Five-year return period						
2 (late)	-0.196	1.406	0.64	0.64	0.48	3890
1 (early)	-0.029	1.510	0.56	0.56	0.42	3890
Panel B: Two-year return period						
5 (latest)	-0.034	1.269	0.47	0.47	0.34	3890
4	-0.146	1.446	0.44	0.44	0.32	3890
3	-0.053	1.530	0.40	0.40	0.29	3890
2	-0.007	1.606	0.38	0.38	0.28	3890
1(earliest)	-0.040	1.541	0.44	0.44	0.32	3890

Panel C: One-year return period						
10 (latest)	-0.007	1.138	0.36	0.36	0.26	3890
9	-0.037	1.320	0.34	0.34	0.25	3890
8	-0.041	1.279	0.30	0.30	0.22	3890
7	-0.121	1.439	0.32	0.32	0.23	3890
6	-0.046	1.475	0.32	0.32	0.23	3890
5	-0.027	1.530	0.30	0.30	0.22	3890
4	-0.016	1.620	0.30	0.30	0.22	3890
3	-0.016	1.633	0.32	0.32	0.23	3890
2	-0.015	1.451	0.31	0.31	0.22	3890
1(earliest)	-0.060	1.780	0.40	0.40	0.28	3890

Table 17 Average correlation metrics from model M1 for five-, two-, and one-year return periods for the random selection, China sample of 917 firms (1992-2011) and the US sample of 3,890 firms (1992-2011) (R_F = 1.10)

	China Sample, 1992-2011				US Sample, 1992-2011			
Return Interval	Average TS-Correlation Index	Average Spearman Correlation	Average Kendall's tau	N	Average TS-Correlation Index	Average Spearman Correlation	Average Kendall's tau	N
10-Year	0.41	0.41	0.29	917	0.73	0.73	0.55	3890
5-Year	0.39	0.39	0.28	917	0.60	0.60	0.45	3890
2-Year	0.35	0.35	0.25	917	0.43	0.43	0.31	3890
1-Year	0.30	0.30	0.20	917	0.33	0.33	0.24	3890

4.3.3 Earnings-return correlation under the original three metrics in Easton, Harris, and Ohlson (1992) for the China and US samples in the 1992-2011 period

As pointed out in Section 2.1, R^2 from the OLS regression could mechanically increase as the return interval expands. Concordant pair percentage, as employed in Easton, Harris, and Ohlson (1992), also has an inherent weakness as a correlation metric. Therefore, these metrics are not reported in the main body of this paper. In order to help readers compare results between this paper and Easton, Harris, and Ohlson (1992), we also present our China and US sample results under the same correlation metrics as those used in the original paper. Table 18 shows that in the 1992-2011 period, in both the China and US markets, earnings-return correlation increases when the time interval expands. The results are consistent across all three measures and for both samples.

Table 18 Average correlation metrics from model M1 for five-, two-, and one-year return periods for the random selection, China sample of 917 firms (1992-2011) and the US sample of 3,890 firms (1992-2011) (R_F = 1.10)

Evidence from the original correlation metrics in Easton, Harris, and Ohlson (1992)

	China Sample, 1992-2011				US Sample, 1992-2011			
Return Interval	Average R^2	Average Spearman Correlation	Average Concordant Pairs (High-low)	N	Average R^2	Average Spearman Correlation	Average Concordant Pairs (High-low)	N
10-Year	0.20	0.41	43%	917	0.30	0.73	65%	3890
5-Year	0.14	0.39	42%	917	0.07	0.60	56%	3890
2-Year	0.05	0.35	40%	917	0.01	0.43	45%	3890
1-Year	0.03	0.30	37%	917	0.00	0.33	39%	3890

V. Conclusion

The poor earnings-return association documented in various accounting studies has been a headache to accounting researchers since the 1980s. Twenty years ago, Easton, Harris, and Ohlson (1992) came up with the earnings aggregation approach, which utilises a *longer* interval study, to better understand the association between accounting earnings and stock return. This innovative and straightforward research design comes out of a simple accounting intuition: as earnings are aggregated over multiple years, the importance of the measurement error, unexpected earnings, and the time lag between recognised earnings and market return gradually declines. Using this model, Easton, Harris, and Ohlson (1992) showed that over a 10-year interval, the earnings-return correlation from 1968 to 1986 was as high as 63%. Therefore, over time, earnings are more likely to reflect the impact of key economic events, and the earnings-return correlation will rise accordingly.[11] Put simply, accounting earnings are still value-relevant [when viewed over a longer interval] and investors still "buy earnings".

In this study, we employ the methodology of Easton, Harris, and Ohlson (1992) and examine three samples. First, we replicate their results using US data from 1968 to 1986. We document the same high earnings-return correlation during a 10-year interval as in their study and also document a declining correlation as the return interval falls to 5 years, 2 years, and 1 year. Second, we replicate their study with a longer time period, 1962-2011, to examine the external validity of their conclusions. Again, we document the highest earnings-return correlation in the 10-year interval and the same declining trend over shorter intervals. We also separate our sample into pre-1992 and post-1992 sub-periods, re-perform the tests, and still reach the same conclusion. Finally, we test the models with data from the "young" and growing Chinese stock market after 1992 and compare the earnings-return correlation with the post-1992 US data. Interestingly, we still document the same pattern: the earnings-return correlation in both markets increases along all three metrics as the return interval expands, but the correlation is stronger in the US market than in China. In summary, our main conclusion is valid for the past five decades in both the US market and the new, emerging Chinese stock market.

To conclude, we would like to repeat one important suggestion from Easton, Harris and Ohlson (1992): do not overlook long intervals in research design. If well employed, long intervals can be a powerful tool to address some complicated and controversial research issues. *In our humble opinion, this is the most significant contribution of their paper.*

[11] We would like to add a final benefit of this research design: results are less vulnerable to the fallacy of assuming market efficiency *since market inefficiency could not persist over a long interval*. The traditional earnings-return literature is built upon a crucial assumption that the US equity market is efficient. However, modern literature has identified multiple examples of equity market inefficiencies, such as the January effect, the recent credit bubble and its collapse (e.g. the credit derivative index lead stock return "as much as three weeks ahead during the subprime crisis", as documented in Longstaff, 2010), and the accrual anomaly (Sloan, 1996). These inefficiencies could not persist as long as 10 years.

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