EXAMINATION OF THE CLEAN SURPLUS ASSUMPTION AND EQUITY VALUATION MODELS IN THREE ASIAN PACIFIC MARKETS

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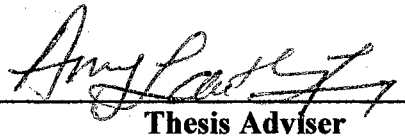

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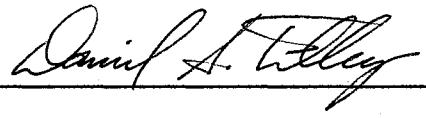

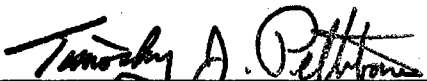

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CHAPTER I

INTRODUCTION

Accounting research has sought a measure that reveals the true value of a firm. The discounted dividend model (DD model hereafter) and the discounted cash flow model (DCF model hereafter) have been the dominant models for estimating the intrinsic value of the firm. Recent studies by Ohlson [1995] and Feltham and Ohlson [1995] have stimulated interest in the so-called Edwards-Bell-Ohlson model (also known as the Residual Income Valuation model or the Discounted Abnormal Earnings model). This Edwards-Bell-Ohlson model (EBO model hereafter) is based on the assumption that accounting measurements satisfy the clean surplus relationship which says that only earnings and dividends will change book value, and equity value is stated as a function of book value and abnormal earnings. The development of the EBO model provides an alternative to the DD model or the DCF model in equity valuation.

Existing empirical research using samples of U.S. companies provides strong support for the EBO model. In comparing the performance for stock price prediction, the EBO model performs better than the DD and DCF models (Bernard [1995], Penman and Sougiannis [1998], and Francis, Olsson, and Oswald [1999]). However, there is very limited evidence to show how the EBO model reveals a firm's intrinsic value under different accounting reporting systems. Wallace and Gernon [1991] suggest that in international accounting research, theories need "to be examined in countries other than those in which they were developed. Such studies can either support or deny the universality of each theory." Frankel and Lee [1999] are the first to apply the model in a multi-national context. They demonstrate the effectiveness of the EBO model in

assessing firm value across 20 countries and suggest that the "EBO model should be an integral part of a broader solution to the problem of international accounting diversity." Therefore, more international empirical results from applying the EBO model are needed to support or deny its universality.

1.1 Motivation of Study

Due to the rapid growth of the global capital market, the need to compare firm values across borders has grown. Differences in accounting and reporting standards raise a significant challenge to investors for cross-border firm value comparisons. Tremendous effort has been put into global or regional accounting harmonization to ease the diversity of accounting practices. Unfortunately, global accounting harmonization may not be achieved in the near future, though some regions (e.g., the European Union and North America) have attained some degree of regional harmonization. Finding a reliable cross-border value estimator becomes an important task for the competitive global capital market.

Frankel and Lee [1999] have shown that the EBO model is immune to differences in financial reporting standards, assuming the clean surplus relationship has been satisfied. The clean surplus assumption implies that any change in book value equals earnings minus dividends, which means that all changes in book value are reported as either income or dividends. In other words, if all countries' financial reporting standards meet the clean surplus assumption, the valuation of the EBO model can serve as a cross-border value estimator. However, due to the differences in financial reporting standards, one cannot make such an assumption without supporting empirical evidence showing the extent of the compliance with the clean surplus assumption. Consequently, the extent to

which various financial reporting systems comply with the clean surplus assumption should be investigated.

Because the current "dirty surplus" of U.S. GAAP either has a zero expected value or is unlikely to affect earnings forecasts, U.S. GAAP can be considered to be relatively "clean" (Johnson, Reither, and Swieringa [1995]). However, in countries not following U.S. GAAP, the allowable equity adjustments (e.g., goodwill recognition, asset revaluation, and recognition of unrealized gains/losses) may violate the clean surplus assumption in those countries. It is necessary to carefully examine the effects of these violations when applying the EBO model to those countries not adopting U.S. GAAP.

Graham and King's [1999] study is the first attempt to apply the EBO model to six Asian countries and to examine their accounting practices. The study examines the impact of five accounting methods on the relationship between book value and market value. It does not directly examine the impact of these accounting methods on the clean surplus assumption. Furthermore, three of the accounting methods examined are not allowable equity adjustment items and should not have any direct effect on book value measurement. Consequently, the conformity with the clean surplus assumption has not been empirically investigated when applying the EBO model in non-U.S. GAAP environments.

Theoretically, the DD model, the DCF model, and the EBO model are mathematically equivalent. However, due to measurement errors in the models' parameters and differences in market expectations, these three valuation models may reflect intrinsic values for a firm differently. Studies have compared these three valuation models for U.S. firms. However, when these three models are applied in non-U.S.

settings, differences in financial reporting standards potentially impact their ability to assess a firm's intrinsic value. This study is the first attempt to compare these three models in non-U.S. GAAP environments.

In recent decades, the enormous economic growth in Pacific Asia has stimulated research interest in this region. Nevertheless, capital markets research in the region has been limited, even though the region has experienced substantial economic growth and significant capital market expansion. Economic integration and the maturity of capital markets have motivated countries within the region to move toward harmonization of accounting standards. However, due to economic, social, and political differences, regional harmonization has not been reached (Saudagaran and Diga [1997]). In this region, the extent to which countries' accounting standards conform to International Accounting Standards (IAS hereafter) can be classified into three levels: high, medium, and low conformity. Some countries have not yet developed national accounting standards, e.g., Vietnam. (Ma, Lambert, and Hopkins [1997]). Variation in the financial reporting standards and the levels of conformity to IAS in this region provides a 'laboratory' for analyzing the impact of the clean surplus assumption on the EBO model.

A comparison of the ability of these three valuation models (i.e., DCF, DD, and EBO models) to predict a firm's intrinsic value within and between markets provides insights into their performance in a non-U.S. GAAP environment. In addition, such a comparison also shows the sensitivity of these three models to different financial reporting requirements. Finally, it may provide evidence to support the superior cross-border performance of the EBO model.

1.2 Objective

The first objective of this study is to examine the validity of the clean surplus assumption when applying the EBO model in non-U.S. GAAP environments. Three markets, Singapore, Japan and Hong Kong, were selected based on their different degrees of conformity to IAS and the maturity of their capital markets. According to Ma et al. [1997], these three markets are classified in three different categories: high conformity to IAS (Singapore), medium conformity to IAS (Hong Kong), and low conformity to IAS (Japan). Given the differences in the levels of conformity to IAS, the allowable equity adjustments are expected to be different in these three markets. IAS have been considered to be reasonably close to U.S. GAAP and will be used as a benchmark for evaluating conformity with the clean surplus relationship. It is expected that the closer a country's GAAP conforms to IAS, the "cleaner" is the clean surplus relationship. Using the "recursive model" (as explained later) as the framework, this study first identifies the accounting practices for allowable equity adjustment items under the IAS and for each of the three selected markets to determine if conformity to IAS is a good indicator of clean surplus relationship compliance.

The performance of the EBO model is further examined in the second objective of this study: to compare the performance of the EBO model with the other two equity valuation models (the DCF and DD models) on their ability to reveal a firm's intrinsic value. For each of the three selected markets, sample firms are obtained from the Research Insight Global Vantage database based on data availability. For each firm, intrinsic firm value is estimated using the three equity valuation models and then compared with its stock price to determine the prediction error. For the three models,

pairwise comparisons of the difference between a firm's estimated intrinsic value and the stock price are made. These comparisons are performed for each market and between markets. Prediction errors and the explanatory power of the model estimates are the two criteria for comparing these three models' performance in revealing a firm's intrinsic value. Finally, this study tries to determine whether a relationship between compliance with the clean surplus assumption and the EBO model's ability to reveal a firm's intrinsic value exists.

The examination and comparison of the accounting standards of the three selected markets with the IAS reveal interesting result. On one hand, the Japanese GAAP has no allowable equity adjustment item and can be considered the cleanest under the clean surplus assumption. On the other hand, Hong Kong and Singapore adopted the IAS and have similar equity adjustment items. However, there are some differences between the latter two countries in treating some equity adjustment items.. For example, Hong Kong's accounting standards require investment properties to be reported at open market value whereas Singapore has the option of treating investment properties as property, plant and equipment or as long-term investments. Consequently, Singapore's accounting standards allow the option of not doing asset revaluation and will have less impact on the clean surplus assumption.

The empirical evaluation of the three equity valuation models in each of the three selected markets show strong support for the superiority of the EBO model based on both its predictive ability and explanatory power of its coefficients. The EBO model has the smallest prediction error and the highest explanatory power for all three markets. For among market comparisons, the empirical results show that the EBO model performs best

in Japan, second in Singapore, and worse in Hong Kong which are consistent with the extent of the three markets' clean surplus assumption compliance. However, market specific environmental factors are not controlled for among market comparisons. The link between the extent of clean surplus assumption compliance and the EBO model's ability to reveal a firm's intrinsic value can only be weakly supported by these results.

The next chapter of this study reviews related research, while Chapter III describes the framework of this study and discusses the theory of the three valuation models. In Chapter IV, the sample design and research methodology are discussed. Chapter V describes the compliance with the clean surplus assumption of different accounting standards, and Chapter VI reports empirical results. Finally, Chapter VII summarizes the study and discusses its limitations.

CHAPTER II

RELATED LITERATURE

Finding an accurate measurement for assessing a firm's intrinsic value has long been a significant task for accounting researchers. Numerous studies have examined the equity value relevance of accounting data. Dividends, cash flows, earnings, and abnormal earnings are the most prevalent competing variables in previous studies. Recent studies by Ohlson [1995] and Feltham and Ohlson [1995] have stimulated research interest in the EBO model. However, in support of using the EBO model as the mainstream equity estimate, the reliability of the EBO model compared to other valuation models becomes a legitimate issue. Based on their objectives, previous studies are grouped into three categories: theoretical development, U.S. empirical assessment, and international empirical assessment of the EBO model. These three categories are briefly summarized in the next subsection. Based on the review, justification for the study will be presented.

2.1 Theoretical Development

Ohlson [1995] analyzes how a firm's market value relates to current and future earnings, book value, and dividends and develops the EBO model from the neoclassical model of security valuation: market value equals the present value of expected dividends. Ohlson replaces dividends with earnings and book value in the present value formula based on the clean surplus assumption and the feature that dividends reduce book value without affecting current earnings. Ohlson concludes that "the market value equals the book value adjusted for current profitability as measured by abnormal earnings and other information that modifies the prediction of future profitability" (p. 669).

Feltham and Ohlson [1995] examine how a firm's market value depends on contemporaneous realizations of accounting data that disclose results from both operating and financial activities. They also demonstrate how conservative accounting influences the relationship between market value and earnings/book value and mathematically how the DD model, the DCF model, and the EBO model are equivalent. Their results show that accrual earnings have better quality than cash earnings in reflecting market value given conservative accounting measurements.

In summary, both studies lay the foundation for how a firm's market value relates to financial statement data and how conservative accounting affects the quality of accrual earnings and cash earnings.

2.2 Empirical Assessment: U.S.

Bernard [1995] discusses the effects of the EBO model on how accounting researchers structure relationships between accounting data and firm value. Value Line forecasts of earnings, book value, and dividends are applied to the models for U.S. companies in his study. Empirical evidence shows the quality of forecasts of accounting numbers and dividends as the estimates of firm value. Overall, the explanatory power of the accounting variable forecasts (68 percent) is greater than that of the Value Line dividend forecasts (29 percent).

Frankel and Lee [1998] adopt the EBO model as the fundamental firm equity value (V) and evaluate the model's ability to explain stock price (P) of U.S. sample firms. The I/B/E/S consensus earnings forecasts are used as a surrogate for market expectations of earnings of the EBO model in this study. This study shows that the estimates of equity valuation dominate book value (B) in cross-sectional correlations with stock price,

and that V/P ratios are better predictors of cross-sectional returns than B/P ratios. The results also lead the researchers to conclude, "much of the current research on accounting-based market ratios can be enhanced by adopting a more complete accounting value measure," which is the EBO model.

Lee, Myers, and Swaminathan [1999] use the EBO model to compute intrinsic value for 30 stocks in the Dow Jones Industrial Average (DJIA). Unlike other research studies, they do not require that price equal intrinsic value at all times. Instead, they model the time-series relation between price and value as a co-integrated system, so that price and value are long-term convergent. Alternative value estimators are evaluated by their relative ability to track price variation in the DJIA over time and their ability to predict market returns. This study finds that a V/P ratio has a statistically reliable power to predict market returns compared to traditional indicators of market value (i.e., B/P, E/P, and D/P ratios)[1] over the time period from 1963 to 1996. Future market returns are related to the V/P ratio and are not related to traditional indicators of market value. Furthermore, time-varying discount rates and analysts' earnings forecasts are both important to the success of the V/P measure.

Penman and Sougiannis [1998] assess how the various techniques (i.e., DD model, DCF model, EBO model, and the capitalization method) perform in revealing the true value of the firm over various time horizons, with and without terminal value calculations. This study is based on the infinite-horizon cash flow and accrual accounting models in Feltham and Ohlson [1995] and the finite-horizon synthesis techniques in Penman [1997] and implements the EBO model using ex-post realized earnings as a

[1] D represents the dividend yield and E stands for the earnings.

proxy for expected earnings. The researchers examine valuation errors by comparing actual traded prices with estimated values calculated from 20 randomly assigned U.S. portfolios for unconditional analysis and from 20 U.S. portfolios assigned by various conditional ranks for the period of 1973 to 1990. Results of both unconditional and conditional analysis show that although the discounted residual earnings approach does not perform particularly well over a five- to eight-year horizon, overall equity valuations based on forecasting GAAP accrual earnings and book values and based on the capitalization method yield lower valuation errors than those based on forecasting dividends and cash flows.

Francis, Olsson, and Oswald [2000] compare the reliability of an individual security's intrinsic value estimates derived from DD, DCF, and EBO models. Reliability of value estimates is measured in terms of accuracy and explainability. Accuracy is measured by the absolute price difference between the value estimates and the security price (i.e., prediction error = $(V^{FUND} - P)/P$, V^{FUND}= value estimates of DD, DCF, and EBO models), and explainability is measured as the ability of value estimates to explain cross-sectional variation in security price (i.e., regress security price on DD, DCF, and EBO models separately). Samples of publicly traded firms followed by Value Line for the period of 1989 to 1993 are included in the study. U.S. firms' Value Line annual forecasts of the elements (e.g., dividend, earnings, and book value) of these three models are used to compute the value estimates. The authors try to replicate a typical situation encountered by an investor in using a valuation model to estimate the intrinsic value of a firm. Sensitivity analyses of the EBO model of firms with high R&D spending or high accruals are tested; these tests have shown no evidence of a weakened reliability of the

EBO model estimate. Their results show that the EBO model estimate, with a 30% prediction error and a 71% explanatory power, dominates value estimates based on the DD model and DCF model. The results support the conclusion that the EBO model estimate outperforms the DD model estimate and the DCF model estimate in terms of both accuracy and explainability.

This study follows that of Francis et al. [2000] in the methods of evaluating accuracy and explainability and in the type of sample: individual firms. However, instead of forecast data, this study uses historical data, following Penman and Sougiannis [1998]. By bringing the comparison of these three valuation models to an international context, my study attempts to seek support for or deny the superiority of the EBO model.

Dechow, Hutton, and Sloan [1999] empirically assess the residual income valuation model of U.S. firms by implementing Ohlson's information dynamics with I/B/E/S analysts' forecast data and financial statement data from 1976 to 1995. They point out that the failure to consider the linkage of current information to future residual income (i.e., information dynamics) in existing empirical research relying on Ohlson's model makes the research similar to that using the DD model. The time-series behavior of abnormal earnings is first evaluated, then the valuation models' ability to predict of the next period's abnormal earnings is tested, and finally the relative ability of the valuation models to predict the stock price is examined. Unlike the findings of Penman and Sougiannis [1998] and Francis et al. [2000], the result of implementing Edward-Bell-Ohlson's information dynamics on the Residual Income Valuation model provides only modest forecasting improvements over traditional valuation models.

Myers [1999] points out that in addition to the clean surplus relation, the link between current accounting numbers and future abnormal earnings is also necessary to implement the residual income valuation model. Myers estimates four linear models of the information dynamics proposed by theory with Compustat data from 1975 to 1996. Contrary to previous studies, Myers finds that the linear information dynamics models of Ohlson [1995] and Feltham and Ohlson [1995] fail to provide better value estimates than book value alone.

In summary, most U.S. empirical assessments support the EBO model, except for Dechow et al. [1999] and Myers [1999]. Although most studies make ad hoc modifications to the linear information of the EBO model as Myers [1999] mentioned, the linear information dynamics assumption itself is confined by assuming unbiased accounting. Overall, it is still fair to conclude that there is enough empirical evidence to document the superiority of the EBO model for the U.S. GAAP environment.

2.3 Empirical Assessment: International

Frankel and Lee [1999] examine the ability of the EBO model to produce comparable firm value estimates across twenty different international accounting systems for eight years, from 1987 to 1994. Analyst forecasts of future earnings are adopted to derive the EBO value estimates (V). Ranked regressions of prices on three variables, book value, earnings, and the EBO value estimate, are used to examine the explanatory power and incremental information content of these three variables. Results show that foreign earnings forecasts are comparable in terms of accuracy to those for U.S. firms and that the hedge strategy based on V/P yields consistently positive returns. Based on the results, Frankel and Lee conclude that the fundamental value measure produced by the

EBO model is conceptually immune to accounting differences across countries and is more correlated with international stock prices than book value or earnings.

Graham and King [1999] analyze the faithfulness to clean surplus accounting as well as the conservatism of six Asian countries' (i.e., Indonesia, Korea, Malaysia, the Philippines, Taiwan, and Thailand) accounting standards. They examine the relation between stock prices and accounting earnings and book values in these six countries, and their sample covers publicly traded firms for the period of 1987 to 1996. For each country, they describe the effects on book value measurement of five accounting methods (recognizing goodwill, revaluing assets, capitalizing leases, capitalizing research and development costs, and applying the equity method to affiliated firms) and evaluate the relative and incremental information content of book value and abnormal earnings. Their results indicate that book value and abnormal earnings are positively related to current stock prices and that the differences in the relationship between accounting numbers and stock prices is also significant across all six countries. However, Graham and King's results are inconclusive because the differences in the explanatory power of book value and abnormal earnings for firm value across countries are not consistent with the accounting practice differences across countries.

Cheng, Etheridge, and Hsu [1998] investigate the value relevance of earnings and the book value of domestically traded Canadian firms and their U.S. counterpart firms. In the study, the EBO model is adopted to test the value relevance, and ex post financial data are used for both U.S. and Canadian sample firms for the period of 1983 to1991. Their results show that U.S. earnings are more value relevant than Canadian earnings and

that the total explanatory power of Canadian earnings and book value is lower than that of U.S. earnings and book value.

Harris, Lang, and Moller [1994] compare the value relevance of German and U.S. accounting measures by applying the EBO model to evaluate the association between the market price and summary accounting measures. Results show that German corporations' stock prices are related to accounting measures and returns. The explanatory power of earnings for returns in Germany is comparable to that in the United States. Nevertheless, both shareholders' equity and accounting measures have lower explanatory power for prices in Germany than in the United States.

Gornik-Tomaszewski and Jermakowicz [2001] examine the value relevance of the new accounting system in Poland using a model derived from the EBO valuation framework. The relation of current earnings and lagged book value to stock prices of Polish listed firms is tested in the study. The results show that current earnings and lagged book value are positively and significantly related to price.

In summary, these studies apply the EBO model to evaluate value relevance within an international context. They either test the explanatory power of different components of the EBO model or use the EBO model to evaluate accounting numbers prepared by different GAAPs. Overall, the related studies support the usefulness of the EBO model.

2.4 Justification for the Study

Since the development of the EBO valuation model, several studies have empirically evaluated the model using U.S. data (i.e., Penman and Sougiannis [1998], and Francis et al. [2000]) and a few, using international data. Comparisons have been made

between the performance of the EBO model and the two traditional valuation models, the DCF model and the DD model for U.S. firms. Overall, most existing U.S. empirical assessments of the three valuation models support the domination of the EBO model. However, it is unclear as to whether the EBO model can persist as the dominant model in non-U.S. GAAP environments. With the lack of empirical evidence, this study would help to fill the void by comparing the performance of these three models in three countries with various degrees of IAS adoption.

In examining six Asian countries, Graham and King [1999] analyze the impact of five accounting methods on the book value measurement. They conclude that the book values of firms in countries that have adopted all five of these accounting methods are more likely to be closer to the market value. However, having an accounting reporting system that provides a book value closer to the market value does not necessarily mean that it does not violate the clean surplus assumption. This is because the violation of the clean surplus assumption comes from making allowable equity adjustments to the equity valuation. Of the five accounting methods examined by Graham and King, only two of (i.e., asset revaluation, and goodwill recognition) are equity adjustment items. Consequently, Graham and King do not examine directly the issue of compliance to the clean surplus assumption. This study examines all of the equity adjustments allowed under the IAS and also for each of the three selected markets. The impact of the allowable equity adjustment items on the compliance with the clean surplus assumption will be determined.

CHAPTER III

RESEARCH FRAMEWORK AND VALUATION MODELS

The first part of this chapter explains the research framework for this study, the recursive model. This model combines elements of causal and consequences models. The second part of this chapter develops these three valuation models and shows how they relate to each other.

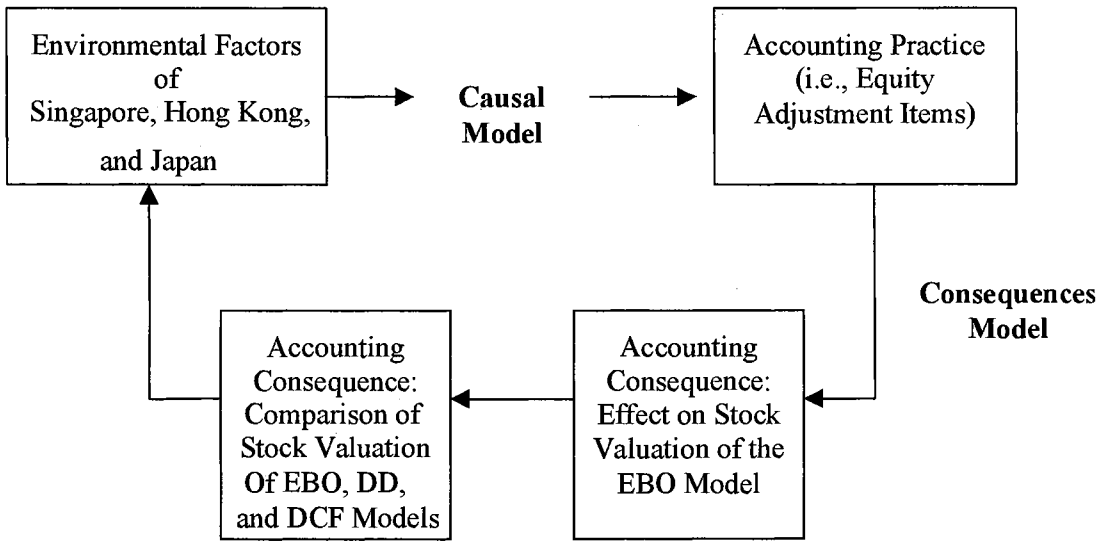
3.1 Research Framework - the Recursive Model

Two generic models are currently being used in comparative international accounting research, a uni-directional model and a recursive model (AAA [1993] and Saudagaran and Diga [1999]). The uni-directional model has two types: the environmental causal model, and the environmental consequences model.

> "The environmental causal model asserts that particular environmental variables (i.e., factors in the national environment) explain the patterns or attributes of accounting systems . . . . In comparison, the environmental consequences model treats accounting system attributes as explanatory variables and examines the effect of these attributes on a country's political, economic or cultural environment. . . . The recursive model acknowledges the reciprocal effects between environmental variables and accounting system attributes and incorporates two sets of explanations: the causal dimension specifies the link between environmental variables and accounting system features; the consequences dimension stipulates how the accounting system, in turn, influences particular environmental variables." (p. 60, Saudagaran and Diga [1999])

Exhibit 1 presents the causal and consequences dimensions of the relationship between the three elements: environmental factors, accounting practices, and accounting consequences. As a framework for this study, the recursive model can be used to examine the relationship between environmental factors, accounting practices, and stock valuation. Since many studies have addressed the environmental causal model (i.e., how environmental factors affect accounting practices), this study focuses on the environmental consequences model (i.e., the relationship between accounting practices and stock valuation). This framework can be considered part of the "functionalist paradigm" discussed in Saudagaran and Diga [1999]. This paradigm focuses on the impact of national financial accounting systems on the measurements of the financial condition of a company. This study can be considered part of the paradigm, as it examines for each market the relationship between accounting practices and stock valuation.

Exhibit 1 The Framework - The Recursive Model



Using this framework, this study does the following:

1. For each market, identify the accounting practices for the allowable equity adjustment items and compare them to the IAS.

2. For each market, determine the impact of the allowable equity adjustment items on compliance with the clean surplus assumption of the EBO model and their effect on stock valuation.

3. For each market, compare the performance of the EBO model with the DCF and DD models.

The first item relates to the causal model of the framework, whereas the last two focus on the consequences model.

3.2 Three Valuation Models

In theory, the EBO model, the DD model, and the DCF model are equivalent representations of market value. Following the theory developed by Feltham and Ohlson [1995], this section shows how these three models are related to each other.

Discounted dividend (DD) model

Finance theory assumes that the market value of the firm equals the present value of expected future dividends:

$$V_t^{DD} = \sum_{\tau=1}^{\infty} \frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} \qquad \text{(DD)} \qquad (3.2.1)$$

where V_t^{DD} = market value of firm at time t based on the DD model;

d_t = net dividends paid at time t; and

R_F = one plus risk-free rate.

Discounted cash flow (DCF) model

The firm's activities can be segregated into financial and operating activities. The book value of a firm equals the sum of the net financial assets and the net operating assets:

$$B_t = FA_t + OA_t, \qquad (3.2.2)$$

where B_t = book value of firm's equity value at time t;

FA_t = net financial assets at time t; and

OA_t = net operating assets at time t.

Earnings consist of interest revenue and operating earnings:

$$X_t = i_t + OX_t, \qquad (3.2.3)$$

where X_t = earnings for period (t-1, t);

i_t = net interest revenue of financial assets for period (t-1, t); and

OX_t = operating earnings for period (t-1, t).

Book value is increased by earnings and decreased by distributions of earnings. Accounting measurements are assumed to satisfy the "clean surplus relationship" (CSR).

$$B_t = B_{t-1} + X_t - d_t. \qquad \text{(CSR)} \qquad (3.2.4)$$

The interest rates for financial assets and liabilities are assumed to be the same. The net interest relationship (NIR) is defined as follows:

$$i_t = (R_F - 1)FA_{t-1}. \qquad \text{(NIR)} \qquad (3.2.5)$$

For period (t-1, t), financial assets earn net interest, and operating activities generate cash flows. At the end of the period, dividends are paid to stockholders. The following defines the financial asset relation (FAR):

$$FA_t = FA_{t-1} + i_t + C_t - d_t, \qquad \text{(FAR)} \qquad (3.2.6)$$

where C_t = cash flows from operations.

Substituting NIR into FAR, one obtains

$$d_t = C_t + R_F FA_{t-1} - FA_t. \qquad (3.2.7)$$

Substituting (3.2.7) into (3.2.1), the market value of the firm is stated in terms of financial assets plus the present value of expected cash flows from operations.

$$V_t^{DCF} = FA_t + \sum_{\tau=1}^{\infty} \frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} \qquad \text{(DCF)} \qquad (3.2.8)$$

This DCF model highlights the role of financial assets and operating cash flows in equity valuation.

Edwards-Bell-Ohlson (EBO) model

Abnormal earnings is defined as

$AE_t = X_t - (R_F-1)B_{t-1}$. The CSR implies

$$d_t = AE_t + R_F B_{t-1} - B_t. \qquad (3.2.9)$$

Substituting (3.2.9) into (3.2.1), the market value of the firm equals the book value of the firm plus the present value of expected abnormal earnings.

$$V_t^{EBO} = B_t + \sum_{\tau=1}^{\infty} \frac{E[\tilde{AE}_{t+\tau}]}{R_F^{\tau}} \qquad \text{(EBO)} \qquad (3.2.10)$$

This EBO model assumes a clean surplus relation and states the equity value as a function of book value and abnormal earnings. Abnormal earnings is assumed to follow a particular time-series behavior. Assume $\{\tilde{AE}_\tau\}_{\tau \geq 1}$ satisfies the following stochastic process:

$$\tilde{AE}_{t+1} = \omega AE_t + Z_t + \tilde{\varepsilon}_{1,t+1} \qquad (3.2.11)$$

$$\tilde{Z}_{t+1} = \gamma Z_t + \tilde{\varepsilon}_{2,t+1} \qquad (3.2.12)$$

where Z= other information; and

$\tilde{\varepsilon}_{i,t+1}$ = the disturbance terms, $\varepsilon_{1\tau}$, $\varepsilon_{2\tau}$, $\tau \geq 1$, which are random,

and $E(\tilde{\varepsilon}_{i,t+1}) = 0, i = 1,2$.

Models with Terminal Value

For an accurate value estimate, τ should be set to an infinite horizon for all three models. However, practically, a finite estimation horizon must be used due to the limitation of data availability. This limitation requires a terminal value estimate. Based on Penman [1998], these original models need to be expanded to T terms, and perpetuity is assumed beyond T terms. Models with estimations of terminal values are developed in this study and stated as follows:

$$V_t^{DD*} = \sum_{\tau=1}^{T} \frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{d}_{t+T+1}]}{R_F^{T}(R_F - 1)} \qquad \text{(DD*)} \qquad (3.2.13)$$

$$V_t^{DCF*} = FA_t + \sum_{\tau=1}^{T} \frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{C}_{t+T+1}]}{R_F^{T}(R_F - 1)} \qquad \text{(DCF*)} \qquad (3.2.14)$$

$$V_t^{EBO*} = B_t + \sum_{\tau=1}^{T} \frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} + \frac{E[A\tilde{E}_{t+T+1}]}{R_F^{T}(R_F - 1)} \qquad \text{(EBO*)} \qquad (3.2.15)$$

Adding terminal value to the model can reduce the estimation error caused by truncating the estimation horizon. These three value estimates with terminal value estimations as shown above are adopted in this study to accommodate the data limitation.

CHAPTER IV

RESEARCH DESIGN AND STATEMENT OF HYPOTHESES

Based on the recursive model, this study first examined the clean surplus relation of each sample market. Hypotheses of three model comparisons were developed to test predictive ability and explanatory power. Most comparisons were limited to within-market comparisons to avoid the problem of environmental differences between markets.

4.1 Data and Sample Selection

Due to a lack of ex ante numbers (i.e. analysts' forecasts) in selected markets, ex post (actual) financial numbers were used in this study, assuming perfect foresight. "Inferring ex ante valuation errors from ex post data and actual prices assumes that average realizations are equal to their ex ante rational expectations and observed market prices are efficient." (Penman and Sougiannis [1998], p.354) As we know, actual financial numbers are expected to have a smaller measurement error than analysts' forecasts. Although using historical numbers has a favorable bias because of smaller measurement error, the focus of this study is to provide empirical evidence of a comparison of three different equity valuation models rather than to establish a profitable trading strategy. Because such bias applies to all three models, model comparison should still produce meaningful results. To avoid the era of Asian economic crisis which started in 1998, the samples for this study are non-financial companies from Singapore, Hong Kong, and Japan with the necessary historical data (1990 to 1997) from Research Insight Global Vantage. According to models with a terminal value estimate (i.e., equations 3.2.13, 3.2.14, and 3.2.15), the valuation model requires some estimation horizons. Data of 1995 to 1997 were used as the estimation horizons for 1994. Therefore, market

reactions from 1990 to 1994 of these three valuation models were examined in this study. Market value, the number of common shares outstanding, common equity, income before extraordinary items, dividends, and other required variables for calculating cash flow had to be available for the firm-year to be included in the sample. The empirical analysis was conducted on a per-share basis to attenuate the size effect.

Since the intrinsic value of a firm (V) is not directly observable, there is a general consensus among financial accounting researchers that a firm's stock price is the best available empirical proxy for firm's intrinsic value. For the DD model, actual dividend paid to shareholders was used to calculate the DD estimate. For the DCF model, as Penman and Sougiannis [1998] defined it, financial assets equal the sum of total debt and preferred stock. Since the cash flow statement was not required for all firms in the selected markets during the sample periods, the cash flow from operations based on the indirect method was calculated as follows:

	Net Income before Extraordinary Items
+	Depreciation
+	Increase (-decrease) in Deferred Taxes
+	Equity Income from Unconsolidated Subsidiaries
+	increase (-decrease) in Accrued Expenses (non-current)
+	increase (-decrease) in Deferred Income (non-current)
–	Non-operating Income
-	increase (+decrease) in Accounts Receivable
-	increase (+decrease) in Inventory
-	increase (+decrease) in Prepaid Expenses
+	increase (-decrease) in Accounts Payable
+	increase (-decrease) in Accrued Liabilities
=	Cash Flow from Operations

A risk-free rate was assumed as the normal earnings of a company's investment. The abnormal earnings for the EBO model was calculated by taking the difference between income before extraordinary items and the assumed normal earnings of the beginning book value. Due to the limitations of the data, the interest rates for deposit and treasury bills, and the yield from government bonds, were adopted as proxies for the risk-free rate for Singapore, Hong Kong, and Japan respectively. The common shareholder's equity was used as the proxy for the book value.

Based upon the criteria above, all available observations from each year were pooled into the sample pool for each market. Firm-year observations with any missing variables were deleted from the final sample. As seen in Table 1, the final number of firm-year observations for each market are as follows: 327 firm-year observations for Singapore, 191 firm-year observations for Hong Kong, and 1429 firm-year observations for Japan.

TABLE 1

SAMPLE SELECTION -
NUMBER OF FIRMS

	1990	1991	1992	1993	1994	Total Firm Years
Singapore	33	48	52	84	110	327
Hong Kong	21	33	36	47	54	191
Japan	187	178	162	223	679	1429

4.2 Evaluation of Clean Surplus Assumptions

Ma, Lambert, and Hopkins [1997] classify Pacific Asian countries into four groups based on the levels of conformity to IAS (see Table 2). Singapore, Hong Kong, and Japan were selected because each market represents one of the first three groups. Furthermore, these three markets are selected due to their capital market maturity and rigorous security regulations.

TABLE 2

LEVELS OF CONFORMITY TO IAS IN PACIFIC ASIAN COUNTRIES, 1995-1996

High Conformity	Medium Conformity	Low Conformity	No National Standards
Malaysia	New Zealand	Philippines	China
Singapore	Taiwan	Thailand	Vietnam
	Australia	**Japan**	
	Indonesia	South Korea	
	Hong Kong		

Notes: IAS 1,2,4,5,7-32 but excluding 15 and 29.

Source: Ma, Lambert, and Hopkins [1997].

The clean surplus relationship means that only income, loss, net capital investment, and dividends will change book value. The clean surplus relation is violated whenever changes made to equity do not come from income or distributions of income items. Most previous studies basically assumed that a country's GAAP usually satisfy the clean surplus assumption (e.g. Frankel and Lee [1999]). However, this assumption may not hold true for countries having significant equity adjustment items. For each market, this study analyzed how equity adjustment items affect book value measurements and

determined the extent of compliance with the clean surplus assumption. Since these three sample markets were chosen based on their levels of conformity to IAS, IAS were used as a benchmark for the evaluation of the clean surplus assumption. The extent of a market's conformity to IAS is expected to have a positive relationship with compliance with the clean surplus assumption. The three markets were compared on equity adjustment items and the extent of compliance with the clean surplus assumption.

4.3 Comparison of Three Models

A methodology similar to that used by Francis et al. [1999] and Penman and Sougiannis [1998] was used to compare the EBO model, the DD model, and the DCF model within and between each of these three selected markets. Assuming market efficiency, a firm's security price should reflect its true value. The ability of accounting variables of a model to predict and explain the firm's value in a finite horizon was used to assess the reliability of these three models. To control for market specific economic and environmental factors, the focus of this study was to compare the predictive ability and the explanatory power of the three models in each market instead of across markets.

4.3.1 Predictive Ability

In terms of predictive ability, a pairwise comparison of the absolute prediction error deflated by the price of all models was conducted to assess the accuracy of the prediction power of each model within each market. Based on the empirical results of previous studies (e.g., Penman and Sougiannis [1998] and Francis et al. [1999]), the predictive performance hypotheses are stated in alternative format as follows:

H_{1A1}: For each selected market, the prediction error of the EBO model is smaller than the prediction error of the DD model.

H_{1A2}: For each selected market, the prediction error of the EBO model is smaller than the prediction error of the DCF model.

The prediction error D^F_j was measured as

$$D^F_j = | P_j - V^F_j | / P_j$$

where D^F_j = difference in security price and valuation estimator of model F for firm j;

F = DD, DCF, and EBO;

P_j = security price of firm j; and

V^F_j = value estimator of firm j for valuation model F.

This prediction error D^F_j was used to measure a model's predictive ability. The smaller the difference, the more accurate the model is. The t statistics of pairwise comparisons between the three models' prediction errors was used as the criterion to evaluate the first two hypotheses.

4.3.2 Explanatory Power

For the explanatory power test, the percentage of cross sectional variation in current security price explained by the value estimate of each of the three models was examined. Based on previous studies (e.g., Penman and Sougiannis [1998], and Francis et al. [2000]), hypotheses on explanatory power are stated in alternative format as follows:

H_{2A1}: For each selected market, the explanatory power of the EBO model is greater than the explanatory power of the DD model.

H_{2A2}: For each selected market, the explanatory power of the EBO model is greater than the explanatory power of the DCF model.

To test these hypotheses, the security price of each sample firm was regressed on each estimated valuation separately.

$$P_j = \beta_0^{DD*} + \beta_1^{DD*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{d}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{DD*}$$

$$P_j = \beta_0^{DCF*} + \beta_1^{DCF*}FA_t + \beta_2^{DCF*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{C}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{DCF*}$$

$$P_j = \beta_0^{EBO*} + \beta_1^{EBO*}FA_t + \beta_2^{EBO*}OA_t + \beta_3^{EBO*}\{\sum_{\tau=1}^{T}\frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} + \frac{E[A\tilde{E}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{EBO*}$$

The ability of the value estimate to explain cross-sectional variation in current security prices was used to measure the explanatory power of each model. The adjusted R^2 and the significance of the coefficients of the regressed models were used as criteria to evaluate hypotheses H_{2A1} and H_{2A2}.

In addition to these three regression models, a model with all variables combined was regressed on the market price to explore any increase in explanatory power using a combination of all accounting variables from the three models. Multicollinearity of all independent variables was also examined.

$$P_j = \beta_0 + \beta_1 FA_t + \beta_2 OA_t + \beta_3^{DD*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{d}_{t+T+1}]}{R_F^{T}(R_F-1)}\} +$$
$$+ \beta_4^{DCF*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{C}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \beta_5^{EBO*}\{\sum_{\tau=1}^{T}\frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} + \frac{E[A\tilde{E}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j$$

4.3.3 Ranking Comparisons among the Three Markets

Each market's ranking in the predictive ability and explanatory power of the three valuation models was compared to those of the other markets. Results of these comparisons provide some ideas as to whether certain valuation estimators perform consistently better in all three markets with different financial reporting standards. These rankings were used to test the following:

$H_{3,1}$: Among the three markets, there is no difference in the rankings of the predictive ability performance of the three equity valuation models in each market.

$H_{3,2}$: Among the three markets, there is no difference in the rankings of the explanatory power of the three equity valuation models in each market.

A simple ranking comparison was used to evaluate these hypotheses. Consistent results in the rankings among the three markets will provide stronger support for the preeminence of the model.

CHAPTER V

COMPLIANCE WITH CLEAN SURPLUS ASSUMPTION

The clean surplus relationship means that only income, net loss, net capital investment, and dividends will change book value. The clean surplus relationship is violated whenever changes made to equity do not come from income or distributions of income items. To perform the analysis, the financial reporting standards of IAS are reviewed to identify the allowable equity adjustment items and to serve as the benchmark for the evaluation. Then, the financial reporting standards of the three selected markets are compared to IAS to identify the allowable equity adjustment items separately. Considering time lag to reflect a new standard and the sample period of this study, only standards made or adopted before the end of 1994 are included in the comparisons in this study, which means the examination stops with IAS 31.

5.1 International Accounting Standards

Among all IAS, four reporting standards are identified as violating the clean surplus relationship. IAS 8 states that net profit or loss for the period allows that "the amount of error correction relating to periods prior to those included in the comparative information is adjusted against the opening balance of retained earnings in the earliest period presented" (Cairns [1997], p. 208). IAS 16, regarding property, plant, and equipment, states that an increase in carrying amount arising on asset revaluation is credited directly to equity, and the related revaluation surplus of gains or losses on retirement or disposal of a revalued asset is transferred directly to retained earnings. IAS 21 states that the effects of changes in foreign exchange rates require translation adjustments to be reported as a separate component of shareholders' equity for a self-

sustaining foreign entity. Exchange differences arising on a monetary item or on a foreign currency liability accounted for as a hedge of an enterprise's net investment in a foreign entity should be classified as equity in the enterprise's financial statements until the disposal of the foreign entity's net investment. In IAS 25, an increase in the carrying amount of a long-term investment should be credited to a revaluation surplus and a decrease should offset a previous increase on the same investment; otherwise, the increase should be expensed. For current asset investments that are carried at market value, movements are treated either as a revaluation surplus or as an income/expense. When disposing of an investment, if an increase in the amount in previous revaluation had transferred to the revaluation reserve, the amount of any remaining related revaluation surplus may be treated as income or transferred directly to retained earnings provided that the policy is applied consistently.

All of the above IAS show changes to equity which do not come from income or distribution of income, and thus they violate the clean surplus relationship. IAS have clean surplus violations on fundamental error correction (IAS 8), asset revaluation (IAS 16), foreign currency translation adjustments (IAS 21), and unrealized gains/losses on investments carried at market value (IAS 25). Fundamental error correction is considered an exceptional situation and should have little or no impact on earnings forecasts. A foreign currency translation adjustment, as discussed in Johnson et al. [1995], has zero expected value and is unlikely to affect earnings forecasts. Asset revaluation (IAS 16) and unrealized gains/losses on investment carried at market value (IAS 25) are more likely to have an impact on earnings forecasts and should be the focus of the analysis of each market's standards.

5.2 Singapore

The accounting standards in Singapore, Statements of Accounting Standards (SAS), are issued by the Accounting Standards Committee of the Institute of Certified Public Accountants (ICPAS) and are largely based on the IAS. Except for three IAS (IAS 15, IAS 29, IAS 30), all standards issued by the IASC have been adopted as SAS. Of the twenty-nine IAS issued, nineteen have been adopted and issued as SAS without any notable non-conforming items; seven have non-conformity with IAS. Two domestic standards (SAS 6 "Earnings Per Share" & SAS 28 "Accounting for Goods and Services Tax") have no applicable IAS. (Teoh and Ng [1997]) Table 3, based on Teoh and Ng [1997], summarizes conformity of SAS with IAS. As seen in Table 3, these non-conformity items do not seem to affect the clean surplus relationship, and IAS 8, IAS 16, IAS 21, and IAS 25 have been adopted without major non-conforming items. Concerning the clean surplus relationship, Singapore's accounting standards are as clean as the IAS.

5.3 Hong Kong

"The Hong Kong Society of Accountants (HKSA) issues two types of financial accounting pronouncements: the mandatory Statement of Standards Accounting Practice (SSAP), and the non-mandatory Accounting Guideline (AG) and Industry Accounting Guideline (IAG)" (Auyeung [1997]). The differences between Hong Kong accounting standards and IAS are significant. As seen in Table 4, which is based on Auyeung [1997], eighteen standards issued by the IASC have corresponding SSAP or AG and eleven IAS have no corresponding standards. Six Hong Kong professional pronouncements have no corresponding IAS. Only seven IAS conform to SSAP or AG.

TABLE 3

SUMMARY OF CONFORMITY OF SINGAPORE SAS WITH IAS

Panel A: Conformity of SAS with IAS

IAS		Conforms with IAS	Does not conform with IAS	Not-adopted
IAS 1	Accounting policies disclosure	SAS 1		
IAS 2	Inventory	SAS 2		
IAS 4	Depreciation	SAS 4		
IAS 5	Disclosures		SAS 5	
IAS 7	Cash flow		SAS 7	
IAS 8	Unusual items in profit and Loss	SAS 8		
IAS 9	Research and development costs	SAS 9		
IAS 10	Contingencies	SAS 10		
IAS 11	Construction contracts	SAS 11		
IAS 12	Taxes		SAS 12	
IAS 13	Current assets	SAS 13		
IAS 14	Segments		SAS 23	
IAS 15	Changing prices			N/A
IAS 16	Property, plant, and equipment	SAS 14		
IAS 17	Leases	SAS 15		
IAS 18	Revenue recognition	SAS 16		
IAS 19	Retirement benefit costs	SAS 17		
IAS 20	Government grants	SAS 18		
IAS 21	Exchange rate changes	SAS 20		
IAS 22	Business combinations	SAS 22		
IAS 23	Borrowing costs		SAS 19	
IAS 24	Related Party		SAS 21	
IAS 25	Investments	SAS 25		
IAS 26	Retirement plans	SAS 24		
IAS 27	Consolidation	SAS 26		
IAS 28	Associates		SAS 27	
IAS 29	Hyper-inflationary economies			N/A
IAS 30	Banks			N/A
IAS 31	Joint ventures	SAS 29		

Panel B: Domestic standards for which there are no applicable IAS

SAS 6	Earnings per share
SAS 28	Accounting for good and services tax

SAS: Statement of Accounting Standards

Adapted from: Hai Yap Teoh and Eng Juan Ng, Singapore, in *Financial Reporting in the Pacific Asia Region*, Edited by Ronald Ma, 1997.

TABLE 4

SUMMARY OF CONFORMITY OF HONG KONG ACCOUNTING STANDARDS WITH IAS

Panel A: Conformity of Hong Kong Accounting Standards with IAS

IAS		Conforms with IAS	Does not conform with IAS	No-corresponding standard
IAS 1	Accounting policies disclosure	SSAP 1		
IAS 2	Inventory		SSAP 3	
IAS 4	Depreciation	SSAP 17		
IAS 5	Disclosures			---
IAS 7	Cash flow		SSAP 15	
IAS 8	Unusual items in profit and loss		SSAP 2	
IAS 9	Research and development costs	SSAP 16		
IAS 10	Contingencies	SSAP 8		
		SSAP 9		
IAS 11	Construction contracts	SSAP 3		
IAS 12	Taxes		SSAP 12	
IAS 13	Current assets			---
IAS 14	Segments		AG 6	
IAS 15	Changing prices			---
IAS 16	Property, plant and equipment		SSAP 13	
			SSAP 17	
IAS 17	Leases	SSAP 14		
IAS 18	Revenue recognition			---
IAS 19	Retirement benefit costs			---
IAS 20	Government grants			---
IAS 21	Exchange rate changes		SSAP 11	
IAS 22	Business combinations		AG 4	
IAS 23	Borrowing costs		AG 5	
IAS 24	Related Party			---
IAS 25	Investments		SSAP 13	
IAS 26	Retirement plans			---
IAS 27	Consolidation		SSAP 7	
IAS 28	Associates	SSAP 10		

TABLE 4 (Continued)

IAS		Conforms with IAS	Does not conform with IAS	No-corresponding standard
IAS 29	Hyper-inflationary economies			---
IAS 30	Banks			---
IAS 31	Joint ventures			---
Panel B: Professional Pronouncements with no Corresponding IAS				
SSAP 5	Earnings per share			
AG 1	Preparation and presentation of accounting from incomplete records			
AG 2	The effect of international accounting standards			
AG 3	Accounts of dealers in securities			
AG 7	Accounting for textile quota entitlements			
IAG 1	Accounting for general insurance business			

SSAP: The mandatory Statement of Standard Accounting Practice
AG: The non-mandatory Accounting Guideline
IAG: The non-mandatory Industry Accounting Guideline

Adapted from: Pak Auyeung, Hong Kong, in *Financial Reporting in the Pacific Asia Region*, Edited by Ronald Ma, (1997), pp. 295-297.

However, concerning the clean surplus relationship, Hong Kong accounting standards are not much worse than IAS. Even though IAS 8, IAS 16, IAS 21, and IAS 25, do not totally conforms to Hong Kong accounting standards, related SSAP consistent with the IAS also allow changes to equity for these issues.

SSAP 13, accounting for investment properties, is related to IAS 16 "Property, Plant, and Equipment" and IAS 25 "Investment". "SSAP 13 requires that, except in certain specified circumstances, investment properties must be stated at market value determined by suitably qualified persons and not subject to depreciation. Any changes in the value of investment properties should be treated as an adjustment to an investment property revaluation reserve" (Moliterno [1993], p. 18). IAS 25 allows investment

properties to be accounted for either as property in accordance with IAS 16 or as long-term investments. Under IAS 16, revaluation is optional. Although both SSAP13 and IAS 25 allow asset revaluation, it is optional in IAS 25 but is mandatory in SSAP 13. The impact of asset revaluation should be significant in Hong Kong because of the volatility of investment properties in the Hong Kong market. In addition, under SSAP 13, revaluation surpluses or deficits are considered on a portfolio basis whereas IAS 25 deals with them on an individual asset basis. SSAP 17 "Property, Plant, and Equipment", like IAS 16, allows asset revaluation to be credited to equity directly and the related revaluation surplus of gains or losses on retirement or disposal of a revalued asset to be transferred to retained earnings. Conforming to IAS 8, benchmark treatment is the only permitted treatment for prior period adjustments in SSAP 2 "Extraordinary Items and Prior Period Adjustment". SSAP 11 "Foreign Currency Translation" is consistent with IAS 21, which requires any exchange differences rising from hedging, preparing group accounts, and profit or loss of a foreign enterprise to be recorded in a reserve account. Other SSAP and AG have no impact on the clean surplus relationship.

Based on the previous discussion, the number of allowable equity adjustment items in Hong Kong GAAP is the same as in Singapore GAAP and IAS. However, since asset revaluation is mandatory in Hong Kong GAAP and is optional in IAS and Singapore GAAP, the impact of allowable equity adjustment items on the clean surplus relationship of Hong Kong GAAP is greater than that of the other two GAAP. Therefore, Hong Kong GAAP can be considered the least compliant with the clean surplus relationship among these three accounting standards.

5.4 Japan

Japanese GAAP are composed of the statutory regulations contained in the three major laws, Commercial Code (CC), Corporation Tax law (CTL), and Securities and Exchange Law (SEL), and the accounting standards issued by the Business Accounting Deliberation Council (BADC). Table 5, which is based on Shiba and Shiba [1997], summarizes conformity of Japanese GAAP with IAS. The discrepancies between Japanese GAAP and IAS are considerable. Japanese GAAP correspond in some way to twenty-three IAS; eight of the twenty-three conform to IAS completely. Six IAS have no corresponding Japanese GAAP. The summary of the conformity of Japanese GAAP with IAS is presented in Table 5. Despite the significant discrepancy between Japanese GAAP and IAS, we cannot conclude that Japanese GAAP is less compliant with the clean surplus relationship without performing a closer analysis of these discrepancies.

Japanese GAAP does not allow benchmark treatment of IAS 8, which applies an adjustment retrospectively to the opening balance on retained earnings on fundamental errors. Regarding IAS 16 "Property, Plant, and Equipment", there is no practice of revaluing assets in Japanese GAAP. For a self-sustaining foreign entity, translation adjustment is reported as a separate component of assets or liabilities, not like IAS 21, in which it is reported as a separate component of shareholder's equity. Japanese GAAP have no specific rule for offsetting exchange differences in reserves. Gains or losses resulting from translation of foreign currency transactions are included in determining net income. Related to IAS 25, "Investment", generally, no revaluation gain should be recorded since marketable securities are stated at the lower of cost or market. Therefore, no unrealized gains on current investments are recognized. The difference between the

TABLE 5

SUMMARY CONFORMITY OF JAPANESE GAAP WITH IAS

IAS		Conforms with IAS	Does not conform with IAS	No-corresponding standard
IAS 1	Accounting policies disclosure	JAS; RAD 3; RFS 8-2, 8-3; RCFS 13, 14		
IAS 2	Inventory		JAS; CC285-2; RFS 81, 82; RCFS 23	
IAS 4	Depreciation	JAS; CC 285; RAD 15; RFS 25; RCFS 27		
IAS 5	Disclosures	JAS; RFS 8-2 to 8-5; RCFS 13 to 16		
IAS 7	Cash flow		JAS	
IAS 8	Unusual items in profit and loss		JAS; RAD 14, 42; RFS 95-2, 95-3; RCFS 62, 63	
IAS 9	Research and development costs		JAS; RFS 86	
IAS 10	Contingencies	JAS; RAD 32; RFS 58, 58-2		
IAS 11	Construction contracts		JAS	
IAS 12	Taxes		RCFS 11	
IAS 13	Current assets	JAS; CC 285-2; RFS 15 to 20; RCFS 23		
IAS 14	Segments	JAS; RCFS 15-2		
IAS 15	Changing prices		RFS 42	
IAS 16	Property, plant, and equipment		JAS; CC 285; RFS 22 to 26	
IAS 17	Leases		JAS; RAD 18-2; RFS 8-5; RCFS 15-3	

TABLE 5 (Continued)

IAS		Conforms with IAS	Does not conform with IAS	No-corresponding standard
IAS 18	Revenue recognition		JAS	
IAS 19	Retirement benefit costs		JAS	
IAS 20	Government grants	JAS		
IAS 21	Exchange rate changes		JAS; RAD 23-2, 32-2; RFS 44, 56	
IAS 22	Business combinations			X
IAS 23	Borrowing costs			X
IAS 24	Related party	RAD 40; RFS 39, 55		
IAS 25	Investments		JAS; CC 285-5, 285-6	
IAS 26	Retirement plans			X
IAS 27	Consolidation		JAS; all RCFS	
IAS 28	Associates		JAS; CC 285-5, 285-6; RA9D 9; RFS 31	
IAS 29	Hyper-inflationary economies			X
IAS 30	Banks			X
IAS 31	Joint ventures			X

JAS: Japanese Accounting Standard
CC: Commercial Code
RAD: Regulations for Accounting Documents (under Commercial Code)
RFS: Regulations for Financial Statements (under Securities and Exchange Law)
RCFS: Regulations for Consolidated Financial Statements (under Securities and Exchange Law)
Source: Kenji Shiba and Lilia Shiba, Japan, in *Financial Reporting in the Pacific Asia Region*, Edited by Ronald Ma, (1997), p223.

proceeds from disposing investment and the carrying value should be recognized as income or expense, and provisions for losses on investments should be charged to income. Other Japanese GAAP, which have no corresponding IAS, have been carefully examined and no allowable equity adjustment item was found. Overall, Japanese GAAP, dominated by the Commercial Code, are very conservative, charging everything directly to expenses, and do not violate the clean surplus relationship.

Conservatism is the general perspective for code-law environments, which prevails in Japan. For interpreting of earnings, Japanese GAAP has the reputation of the most conservative practice under which gains and losses are included in determining net income. No IAS clean surplus violations have been adopted by Japanese GAAP, and Japanese GAAP have no allowable equity adjustment item. Regarding the clean surplus relationship, Japanese GAAP are actually very clean. It appears that conservatism does have an impact on compliance with the clean surplus relationship.

5.5 Summary

Based on the previous discussion, the accounting standards of Singapore have the highest conformity with IAS compared to the other two capital markets, which is consistent with Ma et al. [1997]. Contrary to what was expected, conformity with IAS is not a good indication of the compliance with the clean surplus relationship. For instance, Japanese GAAP deviate the most from IAS, but these deviations actually eliminate all possible equity adjustment items from Japanese GAAP, which makes Japanese GAAP the cleanest GAAP among these three capital markets. Table 6 shows the allowable equity adjustment items of each accounting standard, which represents the level of clean surplus violations. As seen in Table 6, the number of allowable equity adjustment items is the

same in IAS, Singapore GAAP and Hong Kong GAAP. Further study of the accounting practices in each market would provide valuable insight for better understanding the impact of the clean surplus relationship. According to prior analysis, because of the mandatory asset revaluation in Hong Kong GAAP and the volatile investment property in Hong Kong market, the extent of clean surplus violation impact of Hong Kong GAAP is significant. Even thought with the same number of allowable equity adjustment items, the extent of clean surplus violation impact on the actual practices of Hong Kong GAAP is higher than that of Singapore GAAP. However, it is not clear how much the conformity with clean surplus relationship would affect the performance of the equity valuation model. We will look into the empirical results presented in the next chapter for some answers.

TABLE 6

SUMMARY OF ALLOWABLE EQUITY ADJUSTMENT ITEMS

	Fundamental Error Correction	**Asset Revaluation**	**Foreign Currency Translation Adjustment**	**Unrealized Gain/Losses on Investments**
IAS	**Yes**	**Yes**	**Yes**	**Yes**
Singapore	**Yes**	**Yes**	**Yes**	**Yes**
Hong Kong	**Yes**	**Yes**	**Yes**	**Yes**
Japan	**Not Allowed**	**Not Allowed**	**Not Allowed**	**Not Allowed**

CHAPTER VI

EMPIRICAL RESULTS

The functionalist paradigm emphasizes that national financial accounting systems will have an impact on financial condition measurements. Compliance of each market's accounting standards with the clean surplus relationship was examined in Chapter V. The empirical results from comparing the ability of the EBO model to reveal a firm's intrinsic value with that of the DD and DCF models are presented in this chapter. To further support the functionalist paradigm, the link between the compliance of the clean surplus assumption with the performance of the EBO model will be discussed. Empirical results are reported according to predictive ability, explanatory power, and rank comparison separately.

6.1 Predictive Ability

The first set of hypotheses are restated here in alternative form:

H_{1A1}: For each selected market, the prediction error of the EBO model is smaller than the prediction error of the DD model.

H_{1A2}: For each selected market, the prediction error of the EBO model is smaller than the prediction error of the DCF model.

This set of hypotheses addresses whether the EBO model has better predictive power than the other two models. These hypotheses were tested by (1) regressing security price on the independent variable(s) in each model using 1990 to 1992 data; (2) estimating each model's value by applying the coefficients of regression obtained in step one to each model using 1993 and 1994 data (the holdout sample); (3) calculating the absolute prediction error by firm by taking the difference between the security price and the estimated value deflated by the security price for each model; (4) subtracting the

prediction error of the EBO model from the prediction error of the DD or DCF model; and (5) determining the significance of the difference by t-statistics of pair-wise comparisons. The same steps are repeated for each sample market. The better predictive ability of the EBO model can be supported if positive and significant t-statistics are found.

A positive mean deviation indicates that the difference between the security price and the estimated value is smaller with the EBO model than with the other two models. The pair-wise comparisons of prediction error between the DD model and EBO model and between the DCF model and EBO model are all positive and significant in all three markets. The results of the pair-wise comparison of prediction error, as seen in Table 7, are almost all significant at 1% level, except that for the Japanese DD model vs. EBO model, the result is marginally significant at the 11% level. Such results reject the first set of hypotheses and show strong support for the alternative hypotheses that the EBO model has better predictive ability than either the DD model or the DCF model in all three markets.

The differences in predictive ability are not so significant for the Japanese DD and EBO model comparisons, and for Hong Kong's DD and DCF model comparisons. It seems that the EBO model performs well in reflecting market value in the Japanese market with the cleanest GAAP and so does the DD model. In the Hong Kong market, with the least clean surplus compliance, the EBO model performs better than the DD and DCF models in reflecting market value, and the difference between the DD and DCF models is not significant. The EBO model also performs the best in Singapore. The prediction error of DCF model is much higher than that of the EBO model in Singapore.

TABLE 7

SUMMARY STATISTICS FOR PAIR-WISE COMPARISON OF PREDICTION ERROR

Panel A: DD Model vs. EBO Model

Market	N	Mean	Std. Error Mean	t	p-value
Singapore	178	.157	.035	4.535	.000
Hong Kong	101	.989	.223	4.204*	.000
Japan	903	.054	.034	1.598	.110

Panel B: DCF Model vs. EBO Model

Singapore	178	.753	.093	8.077	.000
Hong Kong	101	.808	.192	4.204*	.000
Japan	903	1.060	.204	5.193	.000

*** The t-statistic of pair-wise comparison of prediction error DD model vs. DCF model of Hong Kong market is not significant.**

Among these three valuation models, the EBO model has the smallest prediction error in all three markets regardless various levels of clean surplus relationship violation in these three markets. There are two possible explanations for the results. The first one is that the clean surplus relationship violation does not affect the predictive ability of the EBO model. To some extent, the clean surplus assumption does matter to the EBO model's predictive ability, however the differences in compliance of clean surplus assumption of three sample markets are not significant enough to affect the EBO model's

predictive ability. After all, it is difficult to draw a conclusion regarding the relation between the extent of clean surplus compliance and the valuation models' predictive ability based on these results. Further analysis of the EBO model's explanatory power may shed some light on this issue.

6.2 Explanatory Power

The second set of hypotheses examines the association between security price and each estimated model.

> H_{2A1}: For each selected market, the explanatory power of the EBO model is greater than the explanatory power of the DD model.
>
> H_{2A2}: For each selected market, the explanatory power of the EBO model is greater than the explanatory power of the DCF model.

Within each selected market, the security price of each sample firm was regressed on each estimated valuation separately using all available data. Coefficients of variables and adjusted R-squares are used to evaluate the percentage of cross sectional variation in security price explained by the value estimate of each of the three models.

As shown in Table 8, coefficients of variables are significant at 2% or higher in all three markets, and the adjusted R-squares of the EBO model in all three markets are larger than those of the DD model and the DCF model. The results of all three capital markets reject the second set of null hypotheses and show strong support for the second set of alternative hypotheses, that the EBO model has better explanatory power than the other two models. Consistent with predictive ability test, despite the different levels of clean surplus compliance in these three markets, the EBO model outperforms the other two models in explaining market value. With the same possible explanations as prior discussion, the link between the extent of clean surplus compliance and the EBO model's

TABLE 8

ESTIMATED COEFFICIENTS (t STATISTICS) OF REGRESSION OF SECURITY PRICE ON MODELS

Panel A: DD model

$$P_j = \beta_0^{DD*} + \beta_1^{DD*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{d}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{DD*}$$

Market	N	Constant	DD	Adjusted R^2	F
Singapore	327	.888*	.889*	.697	750.333*
		(7.930)	(27.392)		
Hong Kong	191	.626*	.457*	.457	160.794*
		(5.773)	(12.680)		
Japan	1429	-8.354	9.338*	.843	7677.509*
		(-1.000)	(87.621)		

Panel B: DCF model

$$P_j = \beta_0^{DCF*} + \beta_1^{DCF*}FA_t + \beta_2^{DCF*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{C}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{DCF*}$$

Market	N	Constant	FA	DCF	Adjusted R^2	F
Singapore	327	1.129*	2.153*	.0483*	.274	62.548*
		(5.866)	(7.986)	(7.560)		
Hong Kong	191	.656*	1.233*	.092*	.436	74.485*
		(6.005)	(9.002)	(7.011)		
Japan	1429	-3.598	1.546*	.183*	.829	3456.174*
		(-.413)	(36.180)	(25.986)		

Panel C: EBO model

$$P_j = \beta_0^{EBO*} + \beta_1^{EBO*}FA_t + \beta_2^{EBO*}OA_t + \beta_3^{EBO*}\{\sum_{\tau=1}^{T}\frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} + \frac{E[A\tilde{E}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{EBO*}$$

Market	N	Constant	FA	OA	EBO	Adj-R^2	F
Singapore	327	.301*	2.043*	.969*	.115*	.729	292.852*
		(2.366)	(11.857)	(13.804)	(6.598)		
Hong Kong	191	.302*	.956*	.969*	.067*	.694	144.440*
		(3.443)	(8.977)	(10.016)	(8.264)		
Japan	1429	-1.368	2.848*	2.750*	-.178**	.955	10012.436*
		(-.305)	(90.994)	(77.360)	(-2.460)		

*Significant at 1% level; **Significant at 2% level

explanatory power is not clear based on within market comparisons. Results of between market comparisons are needed to draw the conclusion on this issue.

Also noticed that the constants of all three Japanese models and the coefficient of the EBO estimate variable are negative. A further examination of Japanese sample firm-years reveals that a good portion of Japanese firms have negative book value which means they rely heavily on debt. Since the sample periods were during the collapse of the Japanese bubble economy, market value's negative correlation to abnormal earnings probably suggests that a lot of firm-years did not have positive expected abnormal earnings during the sample periods. The lack of focus of earnings in Japanese firms is likely due to heavy debt and government control. However, this does not appear to affect the EBO model's ability to explain market value in the Japanese market.

In addition to these three regression models, Table 9 shows that the explanatory power of the model with all variables combined improves in all three markets. Pearson correlation matrices of variables of each market are shown in Table 10. Although several Pearson correlations appear high, especially for some Japanese variables, after further assessment based on SPSS collinearity diagnostics, the collinearity appears not to be a problem.[2] Evidence of improving in explanatory power of the model with all variables suggests the possibility that a new equity valuation model can be developed. However, not all variables are significant for all three markets which fails to suggest variables to be included in the new model. Furthermore, the possible linkage with the clean surplus assumption of the model is also examined. Japan is the only market meeting the clean surplus assumption, and in this market, the EBO model estimate for the combination

[2]model is significant at the 5% level but not in the other two markets. This result does show some support for the link between the clean surplus relationship and the EBO model.

A ".959", ".840", or ".740" adjusted R-square shows that a significant portion of the market value can be explained by these variables. Although the inconclusive significance of the variables fails to identify a new model, the relatively high adjusted R-square suggests further study can be done in this area.

TABLE 9

SUMMARY RESULTS OF EXPLANATORY POWER OF A MODEL WITH ALL VARIABLES

$$P_j = \beta_0 + \beta_1 FA_t + \beta_2 OA_t + \beta_3^{DD*}\{\sum_{\tau=1}^{T} \frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{d}_{t+T+1}]}{R_F^{T}(R_F - 1)}\} +$$

$$+ \beta_4^{DCF*}\{\sum_{\tau=1}^{T} \frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{C}_{t+T+1}]}{R_F^{T}(R_F - 1)}\} + \beta_5^{EBO*}\{\sum_{\tau=1}^{T} \frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} + \frac{E[A\tilde{E}_{t+T+1}]}{R_F^{T}(R_F - 1)}\} + \varepsilon_j$$

Market	Adjusted R^2	Significant variables at 5% level of confidence	Significant variables at 10% level of confidence	Significant variables at 15% level of confidence
Singapore	.840	Constant, FA,OA, DD, DCF		EBO
Hong Kong	.740	FA, OA, DD, DCF	Constant, EBO	
Japan	.959	FA, OA, DD, DCF, EBO		

Constant-intercept; FA-Financial assets; OA-Operation assets; DD-Discount dividend model estimate; DCF-Discount cash flow model estimate; EBO-EBO model estimate.

[2] For SPSS collinearity diagnostics, a collinearity problem is indicated when a variable has a condition index above 30 and variance proportions above .50 percent.

TABLE 10

PEARSON CORRELATION MATRIX OF VARIABLES OF EACH MARKET

Panel A: Singapore

	DD	FA	OA	DCF	EBO
DD	1.000	.413	.570	.471	.775
FA		1.000	-.037	.033	.190
OA			1.000	.572	.674
DCF				1.000	.451
EBO					1.000

Panel B: Hong Kong

	DD	FA	OA	DCF	EBO
DD	1.000	.274	.510	.410	.538
FA		1.000	.333	.129	.029
OA			1.000	.178	.318
DCF				1.000	.783
EBO					1.000

Panel C: Japan

	DD	FA	OA	DCF	EBO
DD	1.000	.952	-.139	.882	.817
FA		1.000	-.335	.719	.872
OA			1.000	.102	-.409
DCF				1.000	.618
EBO					1.000

6.3 Comparisons among the Three Markets

Based on the discussion in Section 6.1 and the results reported in Table 7, it may be concluded that the EBO model has the smallest prediction error in all three markets. Further, the EBO model has the smallest prediction error, the DD model is the second, and the DCF has the largest prediction error among these three models for both Singapore and Japan. The difference between the DD model and the DCF model is not very significant for Hong Kong. The consistent rankings of the predictive ability in both Singapore and Japan markets shows strong support for rejection of the hypothesis $H_{3,1}$. The results of the Hong Kong market show marginal support for the rejection of hypothesis $H_{3,1}$.

> $H_{3,1}$: Among the three markets, there is no difference in the rankings of the predictive ability performance of the three equity valuation models in each market.

Based on the discussion in Section 6.2 and the results reported in Table 8, the EBO model has the highest adjusted R-square, the DD model is second, and the DCF model is third in all three markets. This consistent ranking of the models' explanatory power across these three markets shows strong support for rejection of hypothesis $H_{3,2}$.

> $H_{3,2}$: Among the three markets, there is no difference in the rankings of the explanatory power of the three equity valuation models in each market.

Although market specific environmental factors are not controlled among the market comparisons, all empirical results presented in this study show that the EBO model performs best in Japan, second in Singapore, and worst in Hong Kong which is consistent with the extent of compliance of clean surplus relationship for these three

markets. This comparison is by no means rigorous enough to draw any conclusions. However, it does somehow show some support for the link between the clean surplus relationship compliance and the EBO model.

6.4 Discussion

These results bring up two interesting questions: (1) Why does the EBO model perform better than the other two models in all three markets? (2) Does the link between the EBO model and the clean surplus assumption exist?

Results discussed above show strong support for all three sets of hypotheses. Table 11 summarizes the adjusted R-squares of different model combinations and indicates the incremental explanatory power of each model. Orthodox non-nested F-tests are calculated to support the regression results which are shown in Table 12. Each of the three valuation models adds explanatory power to the combination model. The DD model and DCF model show very little incremental explanatory power over the EBO model for all three markets especially in Japan. Among these three models, the DCF model has the lowest explanatory power in all three markets. One possible reason for the poor performance of the DCF model is that during the time period studied, statements of cash flows were not required in all three markets. An indirect method was used to calculate cash flows from operations for this study. Perhaps investors in these markets did not rely on cash flow information since firms did not provide a cash flow statement during the sample period.

The EBO model consistently outperformed the other models in all three markets, consistent with most U.S. empirical results. That the superiority of the EBO model is immune to different accounting systems is consistent with the assertion by Frankel and

TABLE 11

SUMMARY ADJUSTED-R^2 OF DIFFERENT MODEL COMBINATIONS

Model	Singapore	Hong Kong	Japan
Panel A: DD model			
DD	.697	.457	.843
DD + DCF	.698	.625	.844
DD + EBO	.815	.736	.956
DD + DCF + EBO	.840	.740	.959
Panel B: DCF model			
DCF	.274	.436	.829
DCF + DD	.698	.625	.844
DCF + EBO	.738	.698	.958
DCF + DD + EBO	.840	.740	.959
Panel C: EBO model			
EBO	.729	.694	.955
EBO + DD	.815	.736	.956
EBO + DCF	.738	.698	.958
EBO + DD + DCF	.840	.740	.959

Lee [1999]. Results support the preeminence of the EBO model and show that the combination of a firm's fundamental financial information (e.g., financial assets, operation assets, or book value) and abnormal earnings estimates does provide additional

information regarding the firm's intrinsic value under the circumstances of limited estimation horizons.

TABLE 12

ORTHODOX NON-NESTED F-TEST (P-Value) FOR MODEL'S INCREMENTAL EXPLANATORY POWER

Model	Singapore	Hong Kong	Japan
DD	**74.324**	**52.322**	**1010.885**
	(0.00)	**(0.00)**	**(0.00)**
DCF	**385.374**	**74.042**	**1516.328**
	(0.00)	**(0.00)**	**(0.00)**
EBO	**114.381**	**17.491**	**77.760**
	(0.00)	**(0.00)**	**(0.00)**

Table 8 shows that the explanatory power of Japanese variables is much higher than that of the variables in the other two markets. As seen in the results of the combination model (Table 9), out of the three markets, the Japanese EBO estimate is the only EBO estimate which is significant at 5% level. The Hong Kong EBO estimate is significant at the 10% level and the Singapore EBO estimate is significant at the 15% level. The results for Japan provide indirect evidence of the importance of the clean surplus assumption for the EBO model: the EBO model performs best in Japan and Japanese GAAP is the only one that meets the clean surplus assumption.

CHAPTER VII

CONCLUSION AND LIMITATIONS

The primary purpose of this study is to assess the ability of three valuation models to reveal a firm's intrinsic value under different accounting standards. The analysis of the clean surplus compliance of different accounting standards attempts to disclose how the EBO model performs in non-U.S. GAAP environments and any link between clean surplus compliance and the EBO model's ability to reflect a firm's intrinsic value.

After examining each market's accounting standards, Japanese GAAP which do not allow any equity adjustment items are found to be the cleanest. The allowable equity adjustment items are similar in Singapore and Hong Kong, except that Hong Kong's mandatory asset revaluation of investment properties is more extreme and has a larger impact on a firm's earnings quality. Empirical results show that the EBO model outperforms the DD and DCF models in both predictive ability and explanatory power in all three markets. Moreover, the incremental explanatory power of the DD and DCF models to the EBO model is relatively small, further supporting the preeminence of the EBO model. These findings contribute to the international accounting literature by adding evidence that the EBO model can serve as a cross-border value estimate if market specific factors are controlled and that compliance with the clean surplus assumption of accounting practices has a positive impact on the performance of the EBO model. Furthermore, contrary to what was expected, the extent of compliance with IAS is not a good indication for clean surplus assumption compliance. Japanese GAAP, with the largest deviation from IAS, were found to be the cleanest GAAP among all investigated

GAAP. Apparently, using IAS as the benchmark for evaluating the clean surplus assumption is not the best way.

This study has some limitations. First, the analysis of the clean surplus violations is purely descriptive. Due to lack of available data, no attempt was made to adjust earnings to meet the clean surplus assumption. Secondly, the results of the comparisons among the three equity valuation models could be driven purely by the impact of capital market efficiency on the models and not by the models themselves because the market price is used as a proxy for intrinsic firm value, based on the assumption that the capital market is efficient. Finally, due to unavailability of forecast data, historical data are used for this study, which cause different effects on variables. For instance, dividends are taken directly from historical data, and cash flow from operations are calculated indirectly, based on historical data. Actual earnings and various interest rates are used to obtain abnormal earnings based on the assumption that these interest rates are good proxies of the risk free rate. Inconsistency in acquiring variables does undermine the significance of the results. However, even all these limitations do not diminish the importance of the research question: how the ability of equity valuation models reveals a firm's intrinsic value under different accounting environments.

Unlike U.S. empirical studies in this area, the information dynamics of the EBO model have not been applied to an international context. Further studying the impact of information dynamics on the EBO model in non-U.S. GAAP environments will help us to understand the validity of applying the EBO model internationally.

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APPENDIX

The appendix describes the equity adjustment items of IAS 8, IAS 16, IAS 21, and IAS 25.

IAS 8 "Net Profit or Loss for the Period"
Changes in accounting policy:
A change in accounting policy should only be made if required by statute or by a standard setting body or so as to give a more appropriate presentation.
A change made on the basis of a new IAS should be accounted for in accordance with the transitional provisions specified in the standard.
Benchmark treatment- other changes should be applied retrospectively with an adjustment to the opening balance on retained earnings.

Source: Deloitte Touche Tohmatsu, An International Accounting Comparison-Focus on Asia Pacific, 1997, p.72.

IAS 16 "Property, Plant and Equipment"
Revaluation accounting:

- an increase in carrying amount arising on the revaluation of an item of PP&E should be credited directly to equity under the heading of revaluation surplus.
- an decrease in carrying amount arising on the revaluation of an item of PP&E. (recognized as an expense)
- gains or losses on retirement or disposal of a revalued item of PP&E are determined as the difference between the net disposal proceeds and the carrying amount of the asset. The related revaluation surplus is to transferred directly to retained earnings and not through the income statement. (p. 353)

IAS 21 "The Effects of Changes in Foreign Exchange Rates"
Net investment in a foreign entity:
Exchange differences arising on the following two items should be classified as equity in the enterprise's financial statements until the disposal of the net investment in a foreign entity:

- differences on a monetary item that, in substance, forms part of an enterprise's net investment in a foreign entity; and
- differences on a foreign currency liability accounted for as a hedge of an enterprise's net investment in a foreign entity.

On disposal of the net investment in the foreign entity, the exchange differences should be recognized as income or as expenses. (p.645)

An enterprise should disclose the following:

- the amount of exchange differences included in the net profit or loss for the period;

- net exchange differences classified as equity as a separate component of equity, and a reconciliation of the amount of such exchange differences at the beginning and end of the period; and
- the amount of exchange differences arising during the period which is included in the carrying amount of an asset in accordance with the allowed alternative treatment. (p.654)

Source: David Cairns, *A Guide to Applying International Accounting Standards*. 1995.

IAS 25 'Investment'
Changes in carrying amount of investments:
For current asset investment at market value, choice between treatment of movements as income/expense or as revaluation movements, as long as the policy is applied consistently.
Long-term investment:

- an increase to be credited to a revaluation surplus, except where it reverses a previous decrease relating to the same investment, which was expensed, to which extent it should be treated as income; and
- a decrease to be treated as an expense except where it reverses a previous increase, which was credited to revaluation surplus, to which extent it should be debited to revaluation surplus.

Source: Deloitte Touche Tohmatsu, An International Accounting Comparison-Focus on Asia Pacific, 1997, p.180.

VITA

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Doctor of Philosophy

Thesis: **EXAMINATION OF THE CLEAN SURPLUS ASSUMPTION AND EQUITY VALUATION MODELS IN THREE ASIAN PACIFIC MARKETS**

Major Field: Business Administration

Biographical:

Education: Graduated from Min-Dao High School, Taichung, Taiwan, July 1982; received Bachelor of Arts degree majoring in Public Finance from National Chung-Hsing University, Taipei, Taiwan; received Master of Business Administration degree concentrating in both Finance and Accounting from University of Rochester, Rochester, New York. Completed the requirement for the Doctor of Philosophy degree with a major in Business Administration at Oklahoma State University, December 2001.

Experience: Graduate Teaching Associate, Oklahoma State University, 1999 to 2001; Graduate Research Assistant, Environmental Institute, Oklahoma State University, 1995 to 2001.

Fellowship, Scholarship, Grants, and Honor: Wilton T. Anderson Distinguished Graduate Fellowship, Ernest and Young Research Grant, KPMG Peat Marwick Research Grant, Amoco Scholarship; AAA Southwest Doctoral Consortium.

Professional Membership: American Accounting Association - International Accounting Section.