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The Dynamic Relationship Between Accounting Numbers and Share Prices on the Jakarta Stock Exchange

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The objective of this study is to investigate the nature of the relationship between accounting numbers and share prices of firms listed on the Jakarta Stock Exchange for the period 1992-2001, using dynamic modelling principles in addition to the more usual cross sectional analysis. The results of this study show that the accompanying equilibrium correction relationship between market and book values for firms listed on the Jakarta Stock Exchange (JSX) can often be identified using accounting regressors. The models are typically more informative, plausible and consistent than cross sectional models and are useful in interpreting the context in which the market to book relationship exists in Indonesia. A possibly surprising result is that in Indonesia, compared to similar models estimated using US data, the book value of net assets seems to have a stronger relationship with market value. This may be a function of the relative importance of financial statements as a source of information on the JSX.

Keywords:

Dynamic relationship, accounting numbers, share prices, equilibrium correction.

1. Introduction

The objective of this study is to investigate the nature of the relationship between functions of accounting numbers and functions of stock prices on the Jakarta Stock Exchange (JSX). An important variant of this type of research has become known in the literature as relating to the 'value relevance of accounting numbers'. Financial statements are widely used by stakeholders to assess the economic value of firms on the assumption that accounting numbers have a certain relationship with equity market values. However, the nature of the relationship between accounting data and market values of the firms for this purpose, particularly in emerging markets, has yet to be determined with any degree of certitude. Emerging market studies are gaining importance in accounting and finance studies for a number of reasons (Bruner *et al.* 2002). First, there is no generally accepted model for share price valuation in emerging markets. Second, emerging markets are different from developed markets in a number of respects, for instance: transparency, liquidity, level of corruption, volatility, governance, taxes and transaction costs. Third, the flow of capital into, and the growth of investor numbers in emerging markets have been very substantial.

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Indonesia, as one of the emerging markets in South East Asia has some characteristics that make its capital market an interesting case for investigation. It is one of the largest recipients of foreign investment in the region. However, it was also one of the worst affected by the 1997 financial crises, due to massive, but relatively temporary, capital outflows. Furthermore, corporate governance in Indonesia has yet to be implemented properly (La Porta *et al.*1998). The Indonesian economy generally seems to be volatile with respect to its relationship with the global economy and its internal political situation. An econometric analysis of the general nature of the relationship between share prices and accounting numbers under these circumstances is relatively an uncharted territory and is the subject of this study.

2. Literature Review

Recent academic studies have documented evidence into the power of financial statements to explain movements in share prices. In the US, Collins *et al.* (1997), and Francis and Schipper (1999) using cross-sectional regression modelling techniques concluded that the overall explanatory power of accounting numbers had not declined over the periods of their studies. Although the explanatory power of earnings appeared to have declined, that of book value appeared to have correspondingly increased. In contrast, Chang (1998) and Brown *et al.* (1999) concluded that the explanatory power of earnings, book value and the combination of both had declined over the period through to the mid-nineties. To date, the great majority of empirical research into the value relevance of accounting numbers has been carried out in mature capital market environments, such as the United States (US). In an emerging financial market (EFM) such as in Indonesia, research dealing with the relationship between accounting data and market values has been limited, although this situations is now rapidly changing in the wake of the recent crises in EFMs (Baydoun and Willett, 2000).

Graham and King (2000) investigated the relationship between book values and share prices in a comparative study involving Indonesia, Korea, Malaysia, the Philippines, Taiwan and Thailand and across varying time periods. Using a modified Ohlson model (1995), they assessed the relationship between accounting numbers and market value in the six countries, claiming to find a number of positive and significant relationships. They concluded that the differences in the explanatory power of accounting numbers across the six countries were consistent with differences in their accounting practices.

These brief references to prior research will be returned to in the main body of the study but they illustrate the focus of much current work on a number of issues. These are: (i) the ‘value relevance’ theme; (ii) the belief that cross sectional econometric linear regression analysis can identify the supposed relationship between book and market values; (iii) the narrow focus on the impact of accounting variables and (iv) the fact that much the same techniques and theoretical frameworks can be applied to ask the same questions in an emerging financial market as have been asked in mature markets.

This study extends previous research in several ways to assess these issues. First, the value relevance theme will be amended to that of rely less on unproven assumptions. The modern value relevance literature originates in Ohlson (1995) and Penman (1992). This is essentially an application of neo-classical economic theory supplemented by a general assumption about the efficiency of capital markets. In its strongest manifestation this includes the belief that financial markets reflect 'true' value and that accounting numbers can be assessed by their ability to predict, or at least explains such values. Such a thesis requires a strong commitment to certain beliefs about the structure of markets and the rational behaviour of investors, none of which have ever been tested in a rigorous scientific manner (Lee, 2001).

In this research, as a first point of departure from prior studies, a less theoretical approach to the econometric testing of models will be taken but greater care will be exercised in developing models of relationships between book and market values at different levels of analysis. The expected outcome from this approach will be an improved description and understanding of the relationship between book and market values, unrestricted by interpretations dependent upon debatable assumptions borrowed from economic theory.

Second, the econometric methods used to test the models specifying the relationships between book and market values is cross sectional analysis. An emphasis on cross sectional techniques places much reliance on being able to identify equilibrium relationships between the variables analysed, (see Kim *et al.* 2002). The econometric procedures used in specification and diagnostic testing will follow the design recommended by Hendry (2002). This is quite novel in an accounting context.

Third, the research methods will incorporate broader macroeconomic variables to give an improved understanding of the overall relationship between book values and share prices in Indonesian financial markets. The econometric techniques described above will be used to inform the assessment of this relationship, rather than test a central, single research hypothesis concerning the relationship. The literature on EFMs suggests that the conventional assumptions of capital markets research (CMR) such as the Capital Asset Pricing Model (CAPM), efficient markets and portfolio theory, even if applicable to the analysis of mature financial markets, are inappropriate to achieving an understanding of the workings of EFMs. In this case, context becomes especially important. Consequently, a combined quantitative and qualitative analysis of the broader macro-economy and institutional settings of Indonesian financial markets becomes important to appreciating the nature of the relationship of market to book values.

3. Research Question

It is often assumed that accounting numbers are used in decision making as a 'proxy' for market value. To date however, the nature of the relationship between accounting numbers and market values still remains unclear. With regard to the specific research described above, some studies have

documented that the explanatory power of accounting information has increased (e.g. Collin *et al.*, 1997; Francis and Schipper 1998), while others have concluded that the opposite is the case (Chang 1988; Lev and Zarowin 1999; Brown *et al.*,1999). This study aims to explore this issue through an examination of the evidence from the Indonesian capital market regarding the nature of the relationship between book values and share prices. The focus of this study may therefore be expressed as asking the research question: What is the nature of the relationship between accounting numbers and share prices on the Jakarta Stock Exchange (JSX)? This is a general question and is exploratory in nature.

4. Sample of firms

4.1 Sources of data and selection criteria

There are two main samples of market and book data, one annual, the other quarterly. The sampling frame for the annual data consists of all firms listed on the Jakarta Stock Exchange (JSX) for the period 1992-2001. Annual book data was obtained from the Indonesian Capital Market Directory published by the Institute for Economic and Financial Research (IECFIN, 1992-2001). Quarterly book data was obtained from the quarterly reports of listed firms from the JSX website from the first quarter 1992 to the third quarter 2002. Share price data was obtained from the Pusat Pengembangan Akuntansi, FE UGM data base (one of the data bases of The Centre for Accounting Development, Faculty of Economics, Universitas Gadjah Mada) for the respective study periods. Sample selection from the entire population of firms is based on the following criteria:

Data used in cross-sectional analyses (annual only).

a. Firm-years included in the sample had to have at least share price, book value of net assets and earnings per share data for the year concerned
b. Book values of net assets had to be positive.

Table 1. Number of firms in sample

Year	Number of firms
1992	123
1993	121
1994	118
1995	159
1996	207
1997	127
1998	160
1999	152
2000	191
2001	174
Total	1532

Table 2. Means, standard deviations and correlations matrix of the data for the investigative time series analysis

	ΔPRICE	$\Delta PRICE_{t-1}$	ΔBVPS	$\Delta BVPS_{t-1}$	$PRICE_{t-1}$	$BVPS_{t-1}$
Means	455.75	-395.75	21.95	-143.72	2633.1	1665.4
Std. Dev						
	3752.9	3998.7	2178	2388.1	4622	2115

Correlation matrix

	ΔPRICE	$\Delta PRICE_{t-1}$	ΔBVPS	$\Delta BVPS_{t-1}$	$PRICE_{t-1}$	$BVPS_{t-1}$
$\Delta PRICE_{t-1}$	-0.59358					
ΔBVPS	0.21545	-0.0631				
$\Delta BVPS_{t-1}$	-0.08338	0.19003	-0.37993			
$PRICE_{t-1}$	-0.79125	0.61673	-0.05998	0.12928		
$BVPS_{t-1}$	-0.19506	0.15405	-0.49358	0.54258	0.40495	

Variable definitions

ΔPRICE = Change in price current year
$\Delta PRICE_{t-1}$ = Change in price previous period
ΔBVPS = Change in book value current year
$PRICE_{t-1}$ = Stock price previous year
$BVPS_{t-1}$ = Book value per share previous year

5. Results

1.5.1 ECM Model

Table 3. shows the results of constructing ECM models on the rolling two year cross sections between1993-2001 and for the pooled sample data over the ten year period 1992-2001. The pooled sample results seem to summarise quite well the overall impression presented by the rolling cross section data and appears to give strong support for including an equilibrium correction variable in modelling price on book for this data. The scatter plot of the dependent variable against the lagged price regressor for the pooled sample illustrates quite well the issues that need to be taken into account in interpreting the model and the relative strength of the ECM model compared to the other models, including the impact of outliers.

The strong negative relationship is in evidence with and without taking into account the outliers. Eliminating the outliers in fact just rescales the data to make other observations appear as outliers without significantly altering the coefficient estimates, so that it is not apparent that the extreme observations

are in fact “outliers” in the pejorative sense that this term is sometimes used (Kennedy, 1992). This positive assessment is subject to a number of provisos regarding specification issues. These characteristics are evident in both the pooled and rolling cross section samples.

7. Implications of Results

This research contributes to the growing but still relatively sparse CMR in Indonesia and emerging markets in general. Compared to the findings from previous CMR studies of Indonesian capital market, the results show a stronger relationship between market and book values.

The results from the explicit process of replication undertaken of key prior studies (not presented here), suggest these findings should be consistent with earlier findings. Replications are often not reported in published work for reasons of space availability. However, replications of the type carried out on the study data seem to be essential if any kind of generalisations is to be claimed from the findings. Not only do they, as in this case, show whether the coefficients on model variables have similar values and the same signs but they also allow examination of specification statistics. This enables an improved judgement of the reliability of results from previous studies to be made. Such a step in research design seems essential when so many different approaches to modelling are available and used by researchers. Consequently it is held that explicit replications of prior research should be reported as standard practice in CMR research using originally collected sample data.

Method issues arise most obviously in this study in the inclusion of dynamic models and, in particular the estimation of ECMs of the relationship between market and book values. The unexpected, apparently strong relationships between market and book values produced by the use of these methods and the relatively superior performance in specification tests.

8. Conclusion

The objective of this study has been to investigate the nature of the relationship between share prices and accounting numbers of a sample of listed companies on the Jakarta Stock Exchange over the period 1992-2001. In this respect, the study is a quite comprehensive analysis of the research question. The ECM approach to investigating the relationship between market and book values is relatively new to CMR and the results of this study strongly support the validity of using ECMs.

The substantive and method aspects of the research reported here both contribute in novel ways to CMR. The method used emphases the importance of the dynamic modeling of the relationship between market and book values. This is done through ECMs interpreted within a broader investigative

framework. The results show that this strategy is likely to lead to more well specified, stable and plausible models of the market-to-book relationship, which also possess greater explanatory power than existing models.

Table 3. ECM coefficient estimates and summary inferential statistics for rolling cross section and pooled samples

$\Delta PRICE_t = \beta_0 - \beta_1 \Delta PRICE_{t-1} - \beta_2 \Delta BVPS_1 + \beta_3 \Delta BVPS_{t-1} - \beta_4 PRICE_{t-1} + \beta_5 BVPS_{t-1} + \varepsilon_{tit}$

Year	β_0	β_1	β_2	β_3	β_4	β_5	R^2	N
1993-4	2796 (6.040)***	0.032 (0.513)	0.278 (2.641)***	-0.77 (-0.414)	-0.751 (-13.006)***	0.256 (1.661)	0.479	239
1994-5	73.49 (0.363)	-0.47 (-1.882)	0.146 (3.014)	0.068 (0.960)	-0.414 (-11.92)***	0.15 (1.665)	0.457	277
1995-6	368.39 (-2.719)***	-0.02 (-1.276)	0.368 (6.085)***	0.103 (2.767)***	-0.547 (-17.39)***	0.299 (5.399)***	0.491	366
1996-7	682.47 (5.485)***	-0.012 (-8.02)	0.507 (8.980)***	0.078 (2.179)**	-0.721 (-25.472)***	0.378 (6.947)***	0.706	334
1997-8	361.46 (2.993)***	0.023 (0.650)	0.244 (7.125)***	0.43 (0.693)	-0.734 (-21.309)***	0.327 (5.191)***	0.648	287
1998-9	587.751 (4.421)***	-0.025 (-0.450)	0.345 (8.198)***	-0.025 (-0.311)	-0.722 (-12.866)***	0.379 (5.059)	0.482	312
1999-0	196.04 (1.749)	-0.526 (-11.75)***	0.599 (15.86)***	0.29 (0.835)	-0.438 (-12.81)***	0.558 (10.72)***	0.919	343
2000-1	-210.039 (-2.256)**	-0.381 (-10.72)***	0.831 (18.63)***	-0.18 (-0.607)	-0.520 (-18.89)***	0.547 (10.66)***	0.932	365
Pooled	333.70 (4.287)***	-0.100 (-5.755)***	0.538 (19.007)***	-0.015 (-0.548)	-0.678 (-41.334)***	0.565 (15.611)***	0.729	1409

Analysis of substantive issues by placing the econometric results in context also demonstrates the potential of the approach to improve analysis of issues, such as the efficiency of markets, the impact of accounting standards and other matters that are important in policy making. Reliable statistical descriptions of economic data through improved econometric techniques are the basis of the potential for the approach taken in this study to improve the standards of CMR in emerging markets and elsewhere.

The contribution of this study is embodied in the issues it addresses, referred to above. First, the study takes a less theory laden-approach to the examination of the research question than is normally taken but at the same time develops models of the relationship between market and book that are more well specified and have better explanatory power than most other published models of that relationship. Second, it focuses on a dynamic specification that models disequilibrium, as well as equilibrium, processes.

The results from the research reported and analysed in appear to be robust and interesting and should make a contribution to the academic literature and in improving policy making. In particular the findings are relevant to a better understanding of CMR in emerging financial markets

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