ISSN: 1946-6404

International Review of Accounting, Banking and Finance

CONTENTS

1 Market Discipline in Banking: Evidence from U.S. Bank Holding Companies
Fatma Cebenoyan and A. Sinan Cebenoyan

18 Institutional Behavior of Trading Acquirer Stocks around Mergers and Acquisitions
Kai Chen, Yong-Cheol Kim, and Richard D. Marcus

35 Co-authorship Patterns in Accounting Research
Kam C. Chan, Carl R. Chen, and Louis T.W. Cheng

45 An International Comparison of Equity Valuation Models: Hong Kong, Singapore, and Japan
Carol Callaway Dee and Meihua Koo

57 A Note on the Lump Sum Tax of the Rate-of-Return Regulated Monopoly Model
Chin Wei Yang, Ken Hung, and John Fox

2009 Volume 1 Number 2

International Review of Accounting, Banking and Finance

IRABF July 2009 Volume 1 No. 2

Editors:

Beth Cooperman
University of Colorado Denver

Hung-Gay Fung
University of Missouri-St. Louis

Chung-Hua Shen
National Taiwan University

***Associate Editors**:*

James Barth
Milken Institute

Johnny Chan
Western Kentucky University

Tsang-Yao Chang
Feng Chia University, Taiwan

Iftekhar Hasan
Rennselaer Polytechnic Institute

Gary Patterson
University of South Florida

***Editorial Board Members**:*

Aigbe Akhigbe
University of Akron

Richard Burns
University of Alabama Birmingham

Fatma Cebenoyan
Hunter College, The City University of New York

Carol Dee
University of Colorado Denver

Thomas Eyssell
University of Missouri-St. Louis

William E. Jackson
University of Alabama

Susan Jordan
University of Kentucky

Brian Lucey
Trinity College, The University of Dublin

Ronnie Phillips
Colorado State University

Rob Nash
Wake Forest University

Charles Register
Florida Atlantic University

Liu-Rong Sheng
China Construction Bank Xiamen Branch

Chung-Su Wu
Nationial Dong Hwa University Taiwan

Subhrendu Rath
Curtin University of Technology, Perth, Australia

Steve Swidler
Auburn University

Armine Tarazi
University of Limoges, France

John Wagster
Wayne State University

Glenn Wolfe
University of Toledo

Jot Yau
Seattle University

Meng-Nan Zhu
Xiamen University

Editorial Staff: Annie Huang, Managing Editor :
Assistant Editors: Chang Yuan and Kunli Lin

Sponsored by: Association of Chinese Management Exchange
Journal Website: *www.irabf.org*

Published By: University of Missouri-St. Louis & Taiwan Financial Institution Management Association
Print copy ISSN: 1946-6404
Online version ISSN:1946-6412

International Review of Accounting, Banking and Finance

IRABF July 2009 Volume 1 No. 2

CONTENTS

Market Discipline in Banking: Evidence from U.S. Bank Holding Companies
Fatma Cebenoyan and A. Sinan Cebenoyan **1**

Institutional Behavior of Trading Acquirer Stocks around Mergers and Acquisitions
Kai Chen, Yong-Cheol Kim, and Richard D. Marcus **18**

Co-authorship Patterns in Accounting Research
Kam C. Chan, Carl R. Chen, and Louis T.W. Cheng **35**

An International Comparison of Equity Valuation Models: Hong Kong, Singapore, and Japan
Carol Callaway Dee and Meihua Koo **45**

A Note on the Lump Sum Tax of the Rate-of-Return Regulated Monopoly Model
Chin Wei Yang, Ken Hung, and John Fox **57**

International Review of
Accounting, Banking and Finance
Vol. 1, No. 2, July 2009

IRABF
© 2009

Market Discipline in Banking: Evidence from U.S. Bank Holding Companies

Fatma Cebenoyan[a] , A. Sinan Cebenoyan[b]

a. Hunter College/CUNY New York, N.Y.
b. Hofstra University Hempstead N.Y.

Abstract: We investigate market discipline in banking through uninsured depositors and subordinated debt holders, using U.S. bank holding companies data from 2001 to 2005. We test to see both the monitoring and influencing aspects of market discipline. Although our results overall support the presence of monitoring through uninsured deposits, the evidence of influencing is mixed at best. We find some disciplining effect of changes in uninsured deposit levels and prices on bank fundamentals. We find no evidence of any disciplinary influences by subordinated debt holders.

JEL Classification: G21, G28, G32
Keywords: Subordinated debt; Uninsured deposits; Market discipline; Banks.

1. Introduction

The current US and global financial crisis will certainly lead to further regulation of financial institutions. It is not clear yet in what form and direction such regulations will finally take shape. It appears the current US administration is looking for ways to increase regulatory authority and oversight. Opponents seem to push for less. This is not new. There has always been a tug of war between the proponents of more regulatory discipline and those of more market-based discipline. Up until the most recent proposals, new regulations had recently been implemented where, among other factors, market discipline was to play a key role.[1] Proposals have been advanced whereby the issuance of subordinated, junior debt is expected to improve market discipline and reduce the costs of safety nets. The rationale underlying these proposals is the conventional wisdom that uninsured creditors of the bank have strong incentives to discipline the riskier banks either through pricing and/or rationing their credit.

Currently in place, the Basel II proposals stand on three pillars: the first pillar -Minimum Capital Requirements; the second – Supervisory Review Process; and the third Market Discipline. The purpose of Pillar 3 – market discipline is to complement the minimum capital requirements (Pillar 1) and the supervisory review process (Pillar 2). The Basel Committee aims to enhance market discipline by developing a set of disclosure requirements which will allow market participants to assess key pieces of information on capital, risk exposures, risk assessment processes, and hence the capital adequacy of the institution. While the focus on disclosure is meant to allow better monitoring, the historical aim and strength of bank

[1] See Basel Committee on Banking Supervision (2001).

regulation has always been on disciplining errant banks to contain systemic risk. Market discipline is to complement regulatory monitoring *and* disciplining through the actions and impact of at-risk claimholders.

All uninsured liabilities and equity are among the sources of funds for banks where such market discipline is expected to be exerted. In a recent working paper, [2] the Bank for International Settlements cites a large number of studies reporting to find some evidence of market discipline. Most of these studies focus on subordinated notes and debentures (SNDs), while some also focus on uninsured deposits, certificates of deposit, and common equity. The expectation of discipline from equity holders has been questioned though, as they may gain from increased risk taking and capture most of the upside potential, while being shielded from the downside due to insensitive pricing of the safety net to changes in risk exposure.[3] There is a considerable body of literature on the effectiveness of SNDs in disciplining banks. Strong empirical evidence also exists that uninsured depositors are effective disciplines of financial institutions (Peria and Schmukler, 2001; Park and Peristiani, 1998; Goldberg and Hudgins, 1996, 2002). Armed with this evidence, there have also been proposals to impose *mandatory* requirements of holding minimum amounts of SND for improved market discipline (e.g., a minimum amount in the range of 1-4 percent of risk weighted assets). [4] Market discipline is narrowly defined in these studies to mostly imply monitoring only, a signaling story from SND prices and spreads to regulators, while leaving aside the actual disciplining dimension. There appears to be a need for further analysis though, into whether banks react to disciplining from at-risk claimants, i.e. do banks behave differently when creditors charge higher prices and/or ration their credit? The answers may potentially help us better evaluate the current proposals.

The questions are complex on many levels. The supply and demand for funds are not independent of one another. The substitutability of various funding sources is difficult to establish and would affect testing of market discipline. If bank management decides not to take risky projects as this would lead to higher costs, we would observe nothing, even though this may be the perfect evidence of disciplining. Or if the manager deems that the benefits of higher risk projects exceed any cost increases, she will take on the riskier projects, and we will potentially find market discipline ineffective. Finally if the bank increases its risk and the cost increases are such that it overwhelms the returns from higher risk projects, the bank may pull back. This is the evidence we are after in this paper.

In this paper we intend to complement the literature by providing evidence on the link between firm performance attributes that include capital ratios, liquidity, profitability, asset portfolio make-up, efficiency, with two sources of potential market discipline: subordinated debt, and uninsured deposits. We study the US banking industry in a period of relative tranquility and growth. Extant literature in this area mostly used data from the late 1980s and early 1990's, a period of economic malaise and regulatory distortions. In the process we hope to display a clearer picture of market discipline where along with monitoring we also see if there is actual behavioral reaction from banks to actions of uninsured liabilities holders. We are aware of potential measurement difficulties, substitution effects between uninsured and other liabilities, the fact that subordinated debt may be issued in large chunks and infrequently, but we believe the hints we give may be valuable to the regulators and the market participants.

---

[2] Basel Committee on Banking Supervision, Working Paper No. 12,"Markets for Bank Subordinated Debt and Equity in Basel Committee Member Countries" August 2003.

[3] Evanoff and Wall (2001) provide an extensive discussion of the potential benefits from reliance on SNDs for market discipline.

[4] Benston et al., 1986; Litan and Rauch, 1997; Cooper and Fraser, 1988; Keehn, 1989; Evanoff, 1993; Calomiris, 1997, 1999.

Given our caveats, we find some evidence of support for market *monitoring* but mostly from the uninsured depositors, and not always in the expected way. The SNDs, on the other hand, don't seem to react to the banks' risk-taking as only a couple of bank characteristics present strong relationship either to funds supplied or the interest charged on those funds. For *disciplinary* market influence, we get sporadic evidence of support at best, and as with monitoring, occasionally not in the expected way. Considering the recent desires to enlist at-risk claimants in disciplining the banks, our results do not provide unequivocal support: not only that the banks may not respond to these disciplining market actions, but they may react in unintended ways. Hence, recent calls for mandatory SND requirements to actually change bank behavior may be misplaced: if monitoring is a more effective tool, then the focus should rather be on transparency and disclosure that would enhance monitoring. We propose that expectations of market discipline be lowered and more focus be given to transparency. This may be taken as support for the proposals that shift away from market discipline.

2. Review of the Literature

Flannery (2001), Bliss and Flannery (2001), and Hamalainen (2006) distinguish between monitoring (investors react) and influence (firms react). Hamalainen describes effective implementation of market discipline in two phases: *recognition* and *control*. The recognition phase is where rational at-risk bank investors examine bank risk and signal price and/or quantity effects to the borrower. If market discipline is effective, the actions taken in the recognition phase should induce banks to respond in a manner that reduces underlying bank risks, leading to the control phase. Flannery (2001), and Bliss and Flannery (2001) similarly break market discipline down to two distinct components: (a) 'Market Monitoring' which is expected to generate signals that convey useful information to supervisors; and (b) 'Market Influence' where outside claimants influence a firm's actions. The first component involves investors who accurately evaluate changes in a firm's condition, and incorporate those assessments promptly into the firm's security prices. These prices then may be perceived by regulators as signals that may trigger regulatory actions to discipline the bank.[5] Numerous studies have empirically tested whether investors accurately priced securities of firms to reflect its risks, and most conclude affirmatively. A number of studies focused on SNDs and found evidence of market discipline, as in Flannery's 'monitoring' kind for samples of US and international banks for the late 1980's and 1990's (Berger et al., 2000; Covitz et al., 2000; DeYoung et al., 2001; Evanoff and Wall, 2001, 2002; Flannery and Sorescu, 1996; Hancock and Kwast, 2001; Jagtiani et al., 1999, 2000; Morgan and Stiroh , 1999; Gropp and Vesala, 2002; Sironi , 2003). Avery, Belton and Goldberg (1988) looking at subordinated debt of US Bank Holding Companies in the early 1980's, provides a rare dissent by concluding that risk premiums on bank-related long-term debt are virtually unrelated to traditional accounting measures of bank performance. Using the same data Gorton and Santomero (1990) also confirmed the Avery et al. results finding little support for the presence of market discipline in the subordinated debt market. Bliss and Flannery (2001) takes a rarely traveled path and actually investigate to see if US bank holding companies' security price changes reliably influence subsequent managerial actions. This rare test of the 'influence' of market discipline fails to provide strong evidence for equity or especially bond investors regularly influencing managerial actions. Though potential issues with the usage of common equity as tools of market discipline have been raised, Evanoff and Wall (2001), Aharony and Swary (1996), Davies (1993), Gunther et al. (2001), Pettway (1976,1980), and Gropp and Richards

[5] Distinctions have also been made between 'direct' and 'indirect' market discipline, loosely defined, 'indirect' links investor signals to regulatory actions, and 'direct' as increased costs reducing funding opportunities of riskier banks.

(2001) use common stock as the signaling security and conclude that there is evidence of market disciplining/signaling in the prices/returns of common stock. A number of studies provide evidence that uninsured *and* insured depositors and/or holders of certificates of deposit are also potential discipliners of financial institutions (Davenport and McDill, 2006; Peria and Schmukler, 2001; Park and Peristiani, 1998; Goldberg and Hudgins, 1996, 2002; Billett et al., 1998; James, 1988,1990; Jordan, 2000; Keely, 1990). Peria and Schmukler (2001) also discuss the fact that large systemic effects take place during crises, affecting deposits and yields regardless of bank fundamentals.

The focus of the extant literature has been on the reaction of uninsured depositors[6] or subordinated debt, in terms of both the amounts and the prices, to firm attributes, i.e. if a firm was to become riskier, would uninsured depositors or SND holders ration credit and/or charge a higher premium? It remains an empirical question, though, as to how disciplinary responses of these two subsequently affect the bank attributes. In other words, do we see firms actually being disciplined? Are firms changing their capital ratio, portfolio risk, etc. if they observe SNDs or uninsured depositors ration or change their prices? Is there really market disciplining, or do bankers just move on to other creditors who will be happy to accept the firm as is?

In this paper, we investigate both the monitoring action of the uninsured depositors/creditors and the financial institutions reactions to these 'disciplinary' actions.

3. Data and Methodology

Our data come from the "*Consolidated Financial Statements for Bank Holding Companies"* (Y-9C Reports) as recorded by Thomson-Sheshunoff-Highline Data, Inc., for all bank holding companies (BHCs) from July 2001 to December 2005. Our sample starts with 38,044 firm- quarter observations. We lose some observations due to missing information or suspicious data. For example, we dropped the observations with negative prices on uninsured deposits or SNDs and the observations with ratios beyond acceptable ranges. We also Winsorized the ratios with large positive and negative outliers.[7] Further, we dropped the firms with inadequate capital ratios (less than five percent) to mitigate the effects of regulatory capital requirements on our results. By applying this threshold, we try to exclude the BHCs with such low capital ratios that their response to regulatory pressures can be misinterpreted as their response to the credit rationing or higher interest rates charged by the uninsured depositors and SND holders.

The final sample includes 35,999 (quarterly) observations that are used to estimate the models. Due to lagged nature of the models which also employ differenced variables, the reported results on tables two through four come from 23,064 quarterly observations.

3.1. Market Monitoring

Our initial purpose is to test the relationship between the uninsured depositors and SNDs and the firm fundamentals to examine market discipline from the monitoring point of view. Following the extant literature (e.g. Peria and Schmukler, 2001), we measure the reaction of uninsured depositors (*U*) and subordinated debt holders (*SND*) to bank characteristics by testing the following lagged models:

[6] Davenport and McDill (2006) provide interesting evidence that insured depositors are also very sensitive to bank risk.

[7] We assigned the 1st and 99th percentile values to the observations with values beyond those to control for outlier influence.

$$\Delta U_t = \alpha_0 + \sum_{k=1}^{11}\sum_{l}\beta_{k,l}F_{k,t-l} + \sum_{l}\alpha_l \Delta U_{t-l} + \sum_{m}\rho_m OCV + \varepsilon_t \quad (1a)$$

$$\Delta SND_t = \alpha_0 + \sum_{k=1}^{11}\sum_{l}\beta_{k,l}F_{k,t-l} + \sum_{l}\alpha_l \Delta SND_{t-l} + \sum_{m}\rho_m OCV + \varepsilon_t \quad (1b)$$

where ΔU and ΔSND are the changes in the quantities of[8] uninsured deposits[9] and subordinated debt issued by a BHC *i*, from time *t-1* to time *t*, and *l* is the lag length (3), in quarters for independent variables. The bank identifier *i* is omitted for notational simplification. *F* (Fundamentals) is a vector of levels in firm-specific variables where, drawing on the previous studies of the market discipline literature, we include variables measuring attributes of a bank that are similar to those used in CAMEL ratings: capital adequacy, earnings, asset and management quality and liquidity (e.g. Peria and Schmukler, 2001; McDill and Maechler, 2003; Hall et al., 2003). The coefficients on *F* are the main interest in these models that would show whether the market (uninsured deposit holders in 1a and subordinated debt holders in 1b) is monitoring the banks' risk taking and adjusting their holdings in these banks accordingly. Eleven ratios employed in these models and their expected relationships to market monitoring are explained next.

Bank's equity level is a good indicator of its health and its ability to weather future financial distresses. We use the equity over total assets ratio as a capital adequacy measure, and expect to find a positive relationship with uninsured deposits and SNDs. Earnings component is measured by the returns on average assets (ROA) with an expected positive relationship with the uninsured depositors and SND holders. Researchers at times have used ROA as a potential capital adequacy proxy, since retained earnings are a good source of capital for banks mitigating the effects of future adverse economic shocks (Berger, 1995).

We report two different measures of asset quality. They include the ratios of loans 90+ days past due to total loans and leases, and non-accruing loans to total loans and leases.[10] We expect these variables to have negative relationship with uninsured deposits and SNDs. To measure the quality of loan portfolios, we use the ratios of residential real estate loans (1-4 family residential loans) to total assets, and other real estate loans to total assets. Real estate loans in general can be expected to have either positive or negative relationship with the uninsured depositors and SND holders: on the one hand, real estate loans can be considered safer since they are mostly mortgage loans with collateral. On the other hand, they can be considered risky since high concentration of real estate loans exposes a bank to a "vulnerable" risky sector. We separate the residential real estate loans since they are considered to be safer loans relative to commercial loans, and are expected to have positive relationship with the uninsured deposit and SND levels. We also use the ratios of commercial and industrial loans and individual loans to total assets as additional measures of loan quality: although the effect

[8] Hamalainen (2006) "…further research … into…the influence of quantity effects in controlling bank risk-taking is necessary" p.110

[9] Uninsured deposits are the deposits >$100,000. Since FDIC insures and protects the depositors less than $100,000 at U.S. banks, the uninsured (at-risk) depositors are always defined as the ones with deposits above that amount. The banks report those deposits and the interest expense on them separately on their call reports.

[10] In Y-9C Reports as recorded by Thomson-Sheshunoff-Highline Data, Inc nonaccrual loans and leases is a line item, and is defined as total loans and lease financing receivables that are in "nonaccrual status". FDIC describes the criteria for placing assets in nonaccrual status in the general rule as follows: " Banks shall not accrue interest, amortize deferred net loan fees or costs, or accrete discount on any asset (1) which is maintained on a cash basis because of deterioration in the financial condition of the borrower, (2) for which payment in full of principal or interest is not expected, or (3) upon which principal or interest has been in default for a period of 90 days or more unless the asset is both well secured and in the process of collection." (http://www.fdic.gov/regulations/resources/call/crinst/2008-06/608GLOSS063008.pdf).

of individual loans on uninsured depositors and SNDs are ambiguous (Peria and Schmukler, 2001), commercial and industrial loans are considered at times by researchers to have more risk than other types of loans, and are expected to have a negative effect on the levels of uninsured deposit and SND holders (Hall, et al. 2003).

Management quality is measured as the ratio of non-interest expense to total assets which is a raw efficiency measure. Although this concept is expected to have a negative relationship with the uninsured deposits and SNDs, ours is a crude measure that doesn't take the quality of services into consideration, and may give us mixed results.

Finally, two ratios are included as measures of bank's liquidity: liquid assets over total assets (Peria and Schmuckler, 2001), and total loans and leases over core deposits (Hall, et al., 2003). Generally more liquid banks are considered to be safer: consequently we expect to see positive (negative) relationship between the first measure (second measure) of liquidity, and the uninsured deposits and SNDs.

As control variables, first we include past three quarter levels of the dependent variables (ΔU and ΔSND) (as in Bliss and Flannery, 2001; McDill and Maechler, 2003). OCV is a vector of other control variables which include variables for size, time, affiliation, state and a ratio of interest over total liabilities. The size of a bank may affect the decisions of the uninsured depositors and SND holders on whether to keep their money in a particular institution due to their perception that the bank is large and unlikely to fail, or even if it fails, it is highly likely that it would be bailed out (too big to fail). To control for size, instead of imposing a linear relationship between size and our dependent variables, we create five asset groups based on the BHCs total assets, and include four indicators in the model with small BHCs (with assets <$100 million) as the omitted group. Time dummies are to control for the changes in the banking sector and the general macroeconomic variations during our testing period (Peria and Schmukler, 2001; Bliss and Flannery, 2001), and the state dummies to control for the regional variations (Hall et al., 2003). The affiliation dummy variable is used to control for access to internal capital markets: if the outside forces try to exert discipline, a bank with multiple affiliated banks (hence access to internal capital markets) may behave differently than the ones without (stand alone BHC). Finally we use the ratio of total interest expense to total liabilities to control for the substitution effect: for example, the banks may respond to uninsured depositors demand for higher interest by turning to insured depositors and pay higher interest to attract their deposits instead, without adjusting their fundamentals to satisfy uninsured depositors.

We estimate equations 1a and 1b to investigate if the uninsured depositors and subordinated debt holders monitor the banks' risk-taking, and respond with a disciplinary mechanism such as withdrawing their funds. However, finding (or a lack of) support for disciplining behavior of the uninsured depositors and SND holders may not be enough evidence since the depositors and SND holders can also discipline a bank by requiring higher interest rates on their funds. As an additional test of market discipline, we also investigate the changes in interest rate levels to bank fundamentals by replacing the uninsured deposits and SNDs on the left hand side with interest rates charged on those funds:

$$\Delta IU_t = \alpha_0 + \sum_{k=1}^{11} \sum_l \beta_{k,l} F_{k,t-l} + \sum_l \alpha_l \Delta IU_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad (1c)$$

$$\Delta ISND_t = \alpha_0 + \sum_{k=1}^{11} \sum_l \beta_{k,l} F_{k,t-l} + \sum_l \alpha_l \Delta ISND_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad (1d)$$

where ΔIU is the change in interest charged on the uninsured deposits from time *t-1* to *t*. *IU* is calculated as the interest expense on time deposits>$100K divided by time deposits>$100K. Similarly, $\Delta ISND$ in 1d is the change in interest charged on the subordinated debt from time *t-1* to *t*, and *ISND* is calculated as the interest expense on subordinated notes divided by subordinated notes.[11] Since at-risk claimants would charge higher interest to riskier banks, we expect the relationship between interest and bank fundamentals to be the opposite of between quantities of uninsured deposits and SNDs and bank fundamentals. For example, while we expect a decrease in uninsured deposits for banks with low capital ratios, we expect an increase in interest rates to be offered by these banks: the uninsured depositors and SND holders would expect higher interest rates from these risky institutions to remain. Similarly, although highly profitable firms may be attractive to the uninsured depositors and SND holders for safety reasons, "safety" theoretically should have a dampening effect on the interest rates these firms offer.

All the independent variables in the equations 1a-1d are lagged to account for the delay in the financial information announced to the public. Although the literature is in agreement about the lagged relationship between the market reaction and the firm-characteristics due to the timing of firm financial information to become public, there is no consensus about the appropriate number of lags to test this relationship. For example, the lag structure varies from one month/quarter (Peria and Schmukler, 2001) to three quarters (Bliss and Flannery, 2001) to a year (McDill and Maechler, 2003). Since we use quarterly data, we follow Bliss and Flannery (2001), starting with a lag length of two and using a three-lag structure as the most robust lag length for all of our independent variables in all of our models.

3.2. Market Disciplining

Our main goal in this paper is to investigate the banks' responsiveness to the disciplinary actions of uninsured depositors/creditors: Do the banks, following the market's reaction to their risk-taking, try and remedy the situation that caused this reaction in the first place? After all, market discipline would not be a useful mechanism if the banks do not respond to the market's negative reaction "punishing" the banks' risky behavior. We test this concept of possible market influence by examining the changes in firm-specific characteristics (*F*) at time *t* following the changes in the funds (*U* or *SND*) or the prices of these funds (*IU* or *ISND*) separately at time *t-l*, and estimate the following models for each depositor and SND group, one for the quantity of the deposits/debentures and the other for the prices:

$$\Delta F_t = b_0 + \sum_l \chi_l \Delta U_{t-l} + \sum_l b_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad \text{(2a)}$$

$$\Delta F_t = b_0 + \sum_l \omega_l \Delta IU_{t-l} + \sum_l b_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad \text{(2b)}$$

$$\Delta F_t = b_0 + \sum_l \chi_l \Delta SND_{t-l} + \sum_l b_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad \text{(2c)}$$

$$\Delta F_t = b_0 + \sum_l \omega_l \Delta ISND_{t-l} + \sum_l b_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad \text{(2d)}$$

where by all the variables are the changes from time *t*-1 to time *t* for the dependent variables of bank fundamentals, and from time *t-2* to *t*-1 (three lags) for the independent variables. If we are to see any disciplinary action taken by the depositors and SNDs affecting

[11] Alternatively as in some studies bond spreads could be used here. There are concerns on such use though as spreads may behave differently with different bonds of the same bank, and credit risk issues may contaminate implications.

the bank's fundamentals in the following period, we should get significant χ's and ω's: for example, we should see a significant relationship between the current change in a bank's capital ratio and the lagged changes in the uninsured deposits of the same bank if the management of this bank takes the uninsured depositors' action (e.g. withdrawal of their funds or higher prices) seriously and responds to them by making the institution attractive (e.g. less risky) again.

Equations 2a through 2d capture the reaction of firm fundamentals to changes in the levels of uninsured deposits and SNDs and to the changes in the prices charged. The inherent assumption here is that reactions to changes in either direction are as important and meaningful. Obviously, firms may be more responsive to the market's negative reactions but choose to stay the course in the presence of positive reactions (Bliss and Flannery, 2001). In other words, the banks may not respond to an increase in uninsured deposits in prior periods by engaging in a risky behavior (e.g. lowering their capital ratio) immediately, but they may respond more promptly in subsequent periods when the uninsured depositors start withdrawing their funds or start charging the institutions higher prices due to their risky behavior (both negative reactions by the at-risk claimants). Consequently, we reconsider our model(s) by focusing on this relationship for the banks with reductions in the levels of funding (credit rationing) and with increases in funding costs (higher interest rates). As we discussed earlier, we expect disciplining behavior of the market to be the opposite of each other in fund levels and fund prices. We define *D1* as the dummy indicator that takes the value of 1 when the change in levels of uninsured deposits and SNDs are negative at time *t-1* and *D2* as the dummy indicator that takes the value of 1 when the change in the prices charged on uninsured deposits and SNDs are positive at time *t-1.* To test if the negative (positive) changes of funds (prices) have any influence on subsequent bank behavior, we estimate the following:

$$\Delta F_t = c_0 + \sum_l \tau_l \Delta U_{t-l} + \sum_l \psi_l \Delta U_{t-l} * D1 + \sum_l c_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad (3a)$$

$$\Delta F_t = c_0 + \sum_l \sigma_l \Delta IU_{t-l} + \sum_l \phi_l \Delta IU_{t-l} * D2 + \sum_l c_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad (3b)$$

$$\Delta F_t = c_0 + \sum_l \tau_l \Delta SND_{t-l} + \sum_l \psi_l \Delta SND_{t-l} * D1 + \sum_l c_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad (3c)$$

$$\Delta F_t = c_0 + \sum_l \sigma_l \Delta ISND_{t-l} + \sum_l \phi_l \Delta ISND_{t-l} * D2 + \sum_l c_l \Delta F_{t-l} + \sum_m \rho_m OCV + \varepsilon_t \quad (3d)$$

where all the variables are defined as before. The interactive terms with dummy indicators show the additional powers of disciplining variables in explaining the changes in bank fundamentals above all other variables. If the at-risk claimants play any role in disciplining the bank behavior by rationing credit and/or charging higher interests, we should see significant coefficients on these interactive terms, ψ and ϕ respectively. For example, we expect to see positive relationship between the changes in non-accruing loan ratio and the decrease in uninsured deposits (e.g. if the uninsured depositors left the bank due to its risky loan portfolio in time *t-1*, we expect the bank to respond at time *t* by decreasing its non-accruing loans to attract them back, hence same directional change in these variables).

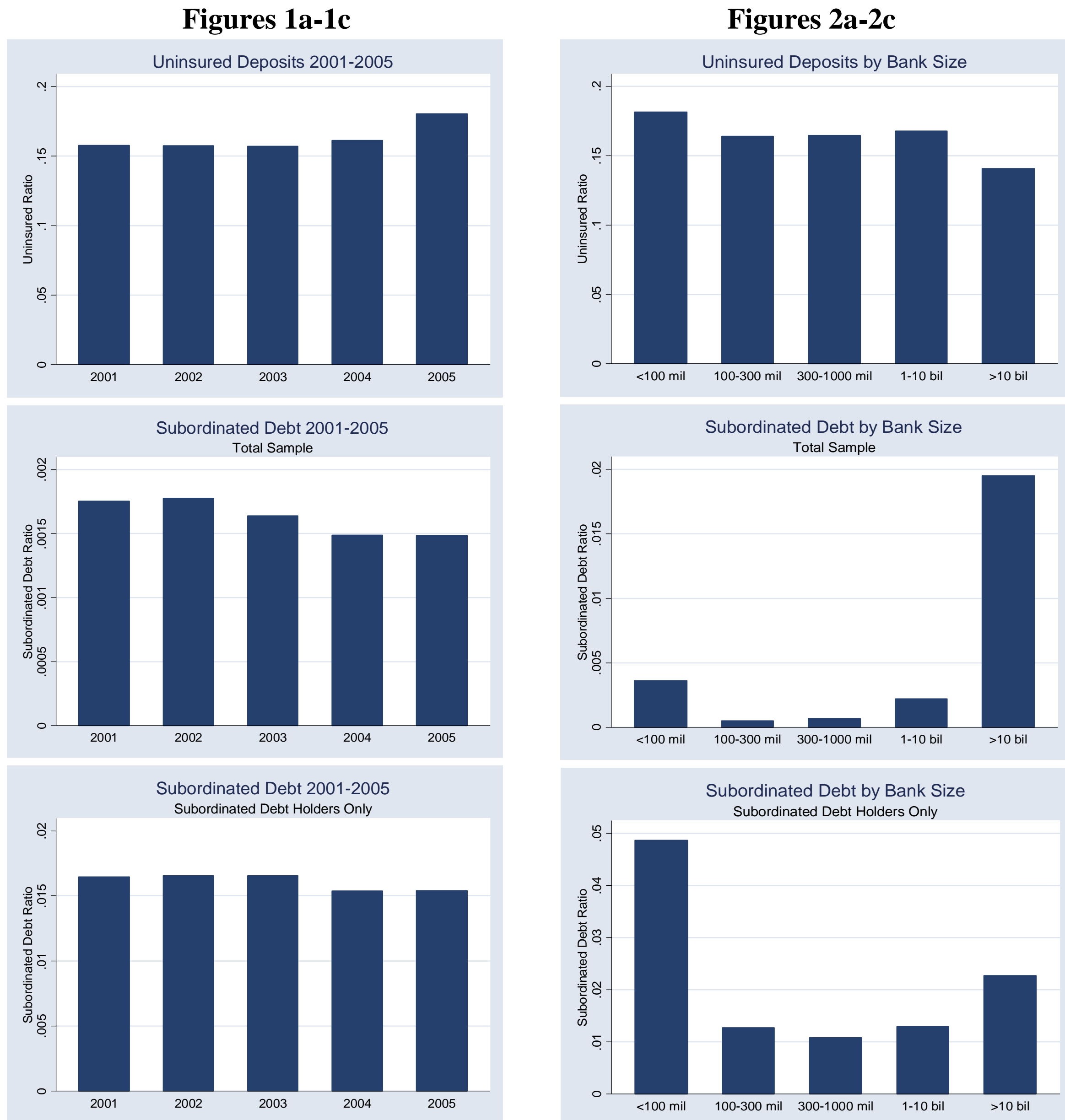
We estimate all of our models using GMM dynamic panel estimators developed by Arellano and Bond (1991) to avoid a possible bias that can be generated from using lagged dependent variables as regressors. As recommended for better inference on the coefficients (Arellano and Bond, 1991), we use one-step robust estimator. The estimated coefficients

reported on all tables for all models are the sum of three lags for each variable with z statistics computed from tests for a linear combination of coefficients of these lags.

4. Results

The uninsured deposits have been stable at the beginning of our sample period and showed an increase over the last two years while the subordinated debt has been stable throughout our sample period with a slight decrease at the end, showing an opposite trend (See Figures 1a through 1c).

Figures 1a-1c **Figures 2a-2c**



Another observation in our sample period regarding these two groups is that uninsured deposits are about equally prominent in all bank sizes (the mega banks –greater than $10 billion in assets holding the least amount) while the subordinated debt is a mega bank issue (See Figures 2a through 2c). When we look at the total sample (Figure 2b), we see that the majority of the subordinated debt is concentrated in the largest banks. The more focused sample of just subordinated debt holders shows an interesting picture, however, with much

higher subordinated debt ratio for very small banks than for all bank sizes (Figure 2c). The magnitude of subordinated debt holdings by these extremely different sized bank groups, and its possible implications[12] are interesting topics, but our current sample prevents us from investigating this further: The (un-tabulated) highlight of our sample is that only about 10% has subordinated debt of which about 60% is large banks (with total assets >$1 billion) while 0.1% is small banks (with total assets<$100 million). As a result, we acknowledge that most of our analysis regarding subordinated debt applies almost exclusively to larger banks.

Table 1 defines our variables and summarizes the mean statistics of the variables of interest for our final sample of 35,999 firm-quarters for uninsured deposits and 3,511 for subordinated debt analysis.

Table 1

Descriptive Statistics

Estimation sample of 35,999 firm-quarters for uninsured deposits and 3,511 for subordinated debt.

$Variable_t$	Definition	Sample Statistics Mean	Std. Dev.
Capital Adequacy and Earnings:			
Capital Ratio	Equity /Total Assets (TA)	0.093	0.034
Return on Average Assets (ROA)	Net Income/Average Assets	0.011	0.006
Asset Quality:			
Past Due Ratio	Loans 90+ days Past Due/Total Loans and Leases (TLL)	0.002	0.003
Non-Accruing Ratio	Non-accruing loans/TLL	0.006	0.009
Residential Real Estate Loans Ratio	1-4 Family Residential Loans/ TA	0.182	0.105
Other Real Estate Loans Ratio	(Total Real Estate Loans -1-4 Family Residential Loans)/ TA	0.280	0.140
Commercial and Industrial Loan Ratio	Commercial and Industrial Loans/TA	0.106	0.068
Individual Loans Ratio	Loans to Individuals/TA	0.053	0.058
Management:			
Inefficiency Ratio	Net Non-interest Expense/TA	0.005	0.004
Liquidity:			
Liquidity Ratio	Liquid Assets/TA	0.095	0.066
Loans to Core Deposits Ratio	TLL/Core Deposits	1.021	0.299
Other:			
Size	Log of TA	13.123	1.299
Uninsured deposits (UD)	Time deposits >100K/ Total Deposits	0.163	0.092
Price of Uninsured Deposits	Interest on Time deposits >100K / UD	0.008	0.006
*Subordinated Notes and Debentures (SND)	SNDs/Total Liabilities	0.015	0.014
*Price of SND	Interest on SNDs/ SNDs	0.028	0.113

* The subordinated debt statistics only includes the banks with subordinated debt.

4.1. Market Monitoring

Table 2 reports the results where monitoring is to be picked up as at-risk claimholders respond to firm attributes by either price or quantity adjustments (Equations 1a-1d). In general, we find some evidence of monitoring by uninsured deposits that are reported in the first two columns on Table 2. Specifically, we find that the quantity of uninsured deposits respond positively to certain bank characteristics such as loan concentrations in real estate implying that uninsured depositors consider real estate loans, residential and commercial, safe. Non-accruing assets have a negative impact on depositors' behavior as expected. Liquidity's negative impact is somewhat surprising that one expects depositors to value the safety of liquid assets. But results are perhaps implying that too much liquidity is considered to be too costly, and hence undesirable by uninsured depositors.

[12] One would expect smaller banks with relatively sizable amounts of subordinated debt would be more sensitive to market discipline as their 'too big to fail' protections should be smaller. Our sample size restricts further analysis in this direction.

Table 2

Monitoring by Uninsured Depositors and SND Holders

UD and SND are uninsured deposits and subordinated debt. All of the dependent variables reflect the change in that variable from the last period. Variable definitions are as in Table 1. The estimated coefficients reported on all tables for all models are the sum of three lags for each variable with *z* statistics computed from tests for a linear combination of coefficients of these lags (not reported for cleaner display, though available). All models have Size, Region, Time, Affiliation and Interest control variables. Significant levels***, ** are at the 1 and 5% levels.

Explanatory Variables$_{t-1}$	UD_t	Price of UD_t	SND_t	Price of SND_t
Capital ratio	0.120	-0.001	0.015	0.035
ROA	-0.139	**0.062*****	**-0.197*****	0.949
Past Due Ratio	-0.237	**0.030*****	-0.189	0.910
Non-Accruing Ratio	**-0.164****	0.002	-0.013	**-0.288****
Residential Real Estate Loans Ratio	**0.089****	0.002	0.005	-0.156
Other Real Estate Loans Ratio	**0.094****	0.003	0.001	-0.081
Commercial and Industrial Loan Ratio	0.078	**0.006****	-0.028	-0.157
Individual Loans Ratio	0.063	0.010	0.007	-0.021
Inefficiency Ratio	-0.156	**0.141****	**-0.377*****	0.234
Liquidity Ratio	**-0.038****	0.002	-0.00008	-0.080
Loans to Core Deposits Ratio	-0.030	0.0004	0.0006	0.028
AR1	-12.78	-2.74	-4.07	-1.39
AR2	0.52	0.47	1.61	0.78
Wald test	200.42	566.23	221.43	3448.61
Number of observations	23,064	23,064	1,843	1,843

Response of these depositors to the bank fundamentals in terms of the interest they charge on their funds is reported in the second column of Table 2. Levels of the past due ratio, commercial and industrial loan ratio, and inefficiency ratio all have the expected (increasing) effect on the prices. Uninsured depositors seem to demand higher returns from firms with high nonperforming assets, with high inefficiency and with high loan concentration in commercial and industrial loans that are deemed to be more risky. Overall, uninsured depositors seem to monitor bank fundamentals and respond expectedly in terms of both their deposits and the price they demand on these deposits.

The last two columns of Table 2 report the results of the same tests for the subordinated debt holders. While we see some evidence of monitoring by uninsured depositors, we don’t find any meaningful relationship between the changes of subordinated debt levels and the prices charged on these funds, and bank characteristics. Although we see some strong relationship in some bank characteristics, such as high inefficiency followed by lower SND levels in the next period, overall we don’t get any pattern or a particular story.

4.2. Market Disciplining

We report the results of our general equations 2a through 2d in Table 3, testing if banks respond to the changes in quantities of uninsured deposits and SNDs and to the changes in prices charged by them. Although we don’t find strong support across the board, we see some evidence of market influence on certain fundamentals. Liquidity seems to be one attribute strongly linked to these changes in both UDs and SNDs but of the remaining characteristics, non-performing assets have a significant relationship to changes in UD while loan portfolio types seem to be the attributes related to changes in SND.

Table 3

Influence of Uninsured Depositors and Subordinated Debt (SND)-holders on Bank Fundamentals

UD and SND are uninsured deposits and subordinated debt. All of the variables reflect the change in that variable from the last period. Variable definitions are as in Table 1.The estimated coefficients reported on all tables for all models are the sum of three lags for each variable with *z* statistics computed from tests for a linear combination of coefficients of these lags (not reported for cleaner display, though available). All models have Size, Region, Time, Affiliation and Interest control variables. Significant levels***, ** are at the 1 and 5% levels.

Explanatory Variables$_{t-1}$	Capital Ratio$_t$	ROA$_t$	Past Due Ratio$_t$	Non-Accruing Ratio$_t$	Residential Real Estate Ratio$_t$	Other Real Estate Ratio$_t$	Commercial and Industrial Loan Ratio$_t$	Individual Loans Ratio$_t$	Inefficiency Ratio$_t$	Liquidity Ratio$_t$	Loan-to-Core Deposits Ratio$_t$
Panel A:											
UD	**0.019*****	-0.001	**0.002****	**0.005****	-0.007	-0.007	-0.006	0.009	-0.001	0.008	**-1.102*****
AR1	-11.14	-19.92	-11.43	-6.94	-12.72	-16.36	-10.65	-6.82	-2.85	-25.46	-17.82
AR2	-1.13	0.01	-0.74	-1.11	1.59	1.62	0.11	-1.61	1.36	0.09	0.58
Wald test	187.29	1408.40	192.52	43.49	94.49	153.12	84.18	65.77	181.29	984.20	741.56
Panel B:											
Price of UD	0.304	0.059	0.013	-0.045	0.170	**0.260*****	0.054	0.100	0.130	-0.002	**3.499*****
AR1	-11.04	-19.93	-11.43	-6.94	-12.78	-16.36	-10.64	-6.82	-2.94	-25.51	-19.00
AR2	-1.21	0.03	-0.74	-1.09	1.62	1.65	0.08	-1.60	1.44	0.07	0.08
Wald test	180.44	1424.89	195.90	48.05	94.09	154.90	80.75	70.19	162.08	963.18	337.59
Observations	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064
Panel C:											
SND	-0.168	0.006	-0.023	-0.089	0.317	**-0.290****	-0.101	**-0.844*****	0.028	0.504	**-1.744****
AR1	-2.83	-6.52	-3.24	-1.37	-4.22	-6.61	-5.92	-3.86	-2.28	-6.94	-4.93
AR2	0.38	-0.87	-1.13	-0.48	-0.68	-0.10	0.33	-1.60	-1.62	0.23	-0.50
Wald test	111.37	293.99	116.01	787.26	7.81	18.43	23.74	21.84	916.18	67.29	64.27
Panel D:											
Price of SND	-0.001	0.002	-0.001	-0.001	-0.006	-0.004	**-0.015*****	-0.003	-0.0001	**0.030*****	0.001
AR1	-2.82	-6.51	-3.24	-1.37	-4.19	-6.61	-5.84	-3.40	-2.23	-6.93	-4.98
AR2	0.43	-0.87	-1.21	-0.46	-0.65	-0.08	0.37	-1.24	-1.73	0.33	-0.51
Wald test	110.37	230.01	114.76	776.71	11.02	13.99	77.07	15.97	299.40	87.68	40.93
Observations	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843

Panel A and B report our results related to uninsured depositors and to the prices they charge on their funds. We find that the changes in uninsured deposits are followed with the changes of past due ratio and non-accruing ratio in the same direction. For example, as the uninsured depositors ration credit in prior periods, the BHCs respond with a decrease in their non-performing assets in the current period. The relationship between the change in depositors' behavior and the change in loan-to-core deposits ratio is in the opposite direction implying that high levels of loans relative to deposits are desirable by the depositors. This is an unexpected result for a liquidity measure but as we suggested earlier too much liquidity may be considered to be too costly hence undesirable by uninsured depositors. As expected, responses by BHCs to the changes in interest rates are the opposite of the responses to the quantity changes for variables with significant relationships. For example, higher interest charges by uninsured depositors in the last period(s) are followed by higher loan-to-core deposits ratio again reinforcing the argument that too much liquidity is not a very desirable bank attribute by depositors.

Panels C and D report the results of the same relationships for SNDs. Here the responses of banks to changes in SNDs levels and prices mainly come from different loan types such as commercial real estate, commercial, industrial and individual loans in the expected direction. Additionally, liquidity measures seem to be significantly changing in the current period following changes in SND holders' quantity and price decisions.

As discussed earlier, it is difficult to make inferences from the results of these models since they assume that both positive and negative market responses are evaluated similarly by bank managers. Since the goal is to investigate if there is any market disciplining by the

uninsured depositors and SND holders through credit rationing or higher price demand, we are interested specifically how banks react to those directional market responses. The (partial) results of our models 3a through 3d testing the additional powers of these disciplining variables are reported on Table 4.

Table 4

(Partial) Results of Directional Influence of Uninsured Depositors and Subordinated Debt holders

UD and SND are uninsured deposits and subordinated debt. All of the variables reflect the change in that variable from the last period. Variable definitions are as in Table 1.

The estimated coefficients reported on all tables for all models are the sum of three lags for each variable with *z* statistics computed from tests for a linear combination of coefficients of these lags (not reported for cleaner display, though available). All models have Size, Region, Time, Affiliation and Interest control variables. Significant levels***, ** are at the 1 and 5% levels.

Explanatory $Variables_{t-1}$	Capital $Ratio_t$	ROA_t	Past Due $Ratio_t$	Non-Accruing $Ratio_t$	Residential Real Estate $Ratio_t$	Other Real Estate $Ratio_t$	Commercial and Industrial Loan $Ratio_t$	Individual Loans $Ratio_t$	Inefficiency $Ratio_t$	Liquidity $Ratio_t$	Loan-to-Core Deposits $Ratio_t$
Panel A:											
Decrease in UD	**-0.033*****	0.004	0.0009	0.006	0.011	**-0.070*****	**-0.041*****	**-0.015****	-0.0003	**0.167*****	-0.242
AR1	-11.19	-19.92	-11.43	-6.94	-12.75	-16.35	-10.64	-6.83	-2.86	-25.48	-17.83
AR2	-1.14	0.05	-0.74	-1.11	1.59	1.68	0.11	-1.61	1.38	0.24	0.67
Wald test	196.81	1414.72	196.84	48.96	97.41	185.46	104.78	71.12	265.98	1057.25	890.20
Panel B:											
Increase in Price of UD	-0.117	-0.010	0.008	-0.002	-0.066	0.053	-0.024	-0.014	-0.021	-0.073	0.563
AR1	-11.02	-19.92	-11.43	-6.94	-12.78	-16.38	-10.65	-6.82	-3.14	-25.51	-18.98
AR2	-1.27	0.09	-0.74	-1.09	1.66	1.66	0.11	-1.60	1.53	0.16	0.05
Wald test	180.86	1461.70	203.67	61.32	103.54	162.71	86.42	107.30	120.39	988.50	446.76
Observations	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064	23,064
Panel C:											
Decrease in SND	0.153	0.040	0.103	-0.179	**0.406****	-0.147	-0.151	0.098	0.0008	0.155	1.210
AR1	-2.83	-6.52	-3.46	-1.37	-4.27	-6.60	-5.91	-3.27	-2.25	-6.93	-4.84
AR2	0.34	-0.80	-1.07	-0.49	-0.81	-0.11	0.32	-1.26	-1.50	0.23	-0.63
Wald test	141.20	352.36	293.86	1003.03	16.48	30.80	31.25	30.84	1065.85	69.38	111.92
Panel D:											
Increase in Price of SND	0.020	-0.007	-0.003	0.015	-0.054	**0.111*****	0.023	0.009	0.004	-0.008	0.213
AR1	-2.82	-6.50	-3.25	-1.37	-4.19	-6.62	-5.84	-3.14	-2.28	-6.94	-4.96
AR2	0.50	-0.88	-1.21	-0.46	-0.65	-0.01	0.30	-1.26	1.69	0.32	-0.47
Wald test	115.19	251.49	165.93	822.66	24.45	81.07	229.84	25.06	402.17	109.25	113.94
Observations	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843

These results give us some interesting comparisons to the general influencing results of Table 3. The most striking overall result is that the effect of behavioral change in uninsured depositors (for price changes) and SNDs on bank behavior almost completely disappears when we consider only the directional influence. That is more pronounced for SNDs: in terms of both level changes and changes in prices, there is no significant disciplining effect showing up from SND holders. A possible explanation for this may lie in the different nature of these two types of claims. The SNDs have longer-term relationships with banks, and their financial agreements are structured in a contract that may provide them some protection from risky behavior of the bank through debt covenants in these contracts. As a result, there may not be a short-term response by banks to SNDs behavior since they may respond through other means to satisfy SNDs demands than improving their financial situation. For UD, we still see some influence but only from rationing credit. Upon UD holders' departure, the banks seem to be adjusting their capital ratio as expected by increasing it in the later period. Most of the loan portfolios (three out of four) significantly change in the current period following a reduction in UD quantities implying that loan portfolio levels may be used to attract depositors by banks. But loan portfolio risks as captured by the past due ratio and non-

accruing ratio showing significant relationship to UD quantity decisions (as reported on Table 3) are surprisingly lost with specific directional testing. Finally, the results on the liquidity measure again reinforce the argument that the depositors don't value too much cash holdings.

In summary, we find some evidence of support for market monitoring with our sample during 2001-2005 period, but mostly from the uninsured depositors both in terms of credit rationing and charging higher prices. Similar to the recent evidence in existing literature (e.g. Krishnan et al., 2003), we don't find any impact of banks' risk-taking behavior on SNDs in terms of credit levels or the interest they charge on those funds. For market influence, we also get some sporadic evidence of support. Again, some bank reactions come in response to the uninsured depositors and SNDs, but occasionally not even in the expected way. Especially when we consider the expected responses by banks to undesirable movements in levels and prices of these funds, we don't get any meaningful conclusions for price effects for UDs and for price and quantity effects for SNDs. Considering the recent proposals of enlisting at-risk claimants in disciplining the banks, the results provide limited support to their ultimate benefit: not only the banks may not respond to these disciplining market actions, but they may react in unintended ways.

5. Conclusions

In this paper, we investigate the two potential sources of market discipline, uninsured deposits and subordinated debt, following the conventional wisdom that these at-risk claimants have strong incentives to discipline the banks through rationing and/or pricing their credit using a sample of BHCs from 2001 to 2005, a period of stability and growth. We first test to see if the documented monitoring function holds for the more recent period in the banking industry for both uninsured deposits and subordinated debt. We then proceed to investigate the influencing effect of these disciplinary actions by depositors/creditors on bank behavior in the following year, by simply switching the traditional monitoring model. We further test the model by focusing on more specific type of reaction by depositors/creditors, namely a negative reaction such as rationing their credit (decrease in their holdings) or charging higher interest (increase in prices).

The results are not very encouraging: although we find some evidence of monitoring, especially by uninsured depositors, we don't find any evidence of any bank responses to these monitoring activities, especially those by subordinated debt holders. The only bank responses are to the changes in uninsured depositors fund levels or some to the changes in their prices but responses to price changes disappear completely when we focus specifically on the traditionally defined monitoring activities: punishing the risky, non-performing banks by rationing the credit or charging higher interest.

We conclude that high expectations from market discipline for banking system stability may be premature. There appear to be some useful signals coming from the market participants, but not strongly enough to substitute for regulatory vigilance and prompt corrective actions. The results have potentially significant and cautionary implications for the new BASEL regulations that desire a high emphasis on market discipline, as well as the potential new regulations and laws that are expected in the aftermath of the current crisis.

References

Aharony, J., Swary, I., 1996. Additional evidence on the information-based contagion effects of bank failures. *Journal of Banking and Finance* 20, 57-69.

Arellano, M., Bond, S.,1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58, 277-297.

Avery, R. B., Belton T. M., Goldberg M. A., 1988. Market discipline in regulating bank risk: new evidence from the capital markets. *Journal of Money, Credit and Banking* 20, 597-610.

Basel Committee on Banking Supervision, 2001. The New Basel Capital Accord, Basel.

Basel Committee on Banking Supervision, 2003. Markets for bank subordinated debt and equity in Basel committee member countries. August, working paper no. 12.

Benston, G., Eisenbeis, R., Horvitz, P., Kane, E., Kaufman, G., 1986. Perspectives on safe and sound banking: past, present and future. MIT Press, Cambridge, Massachusetts.

Berger, A. N., 1995. The relationship between capital and earnings in banking. *Journal of Money, Credit, and Banking* 27, May, 432-456.

Berger, A. N., Davies, S. M., Flannery, M. J., 2000. Comparing market and supervisory assessments of bank performance: who knows what when? *Journal of Money Credit, and Banking* 32, 641-667.

Billett, M., Garfinkel, J. A., O'Neal, E. S., 1998. The cost of market versus regulatory discipline in banking. *Journal of Financial Economics* 48, 333-358.

Bliss, R. R., Flannery M. J., 2001. Market discipline in the governance of U.S. bank holding companies: monitoring vs. influencing. In: Mishkin, F. S. (Ed.), *Prudential Supervision: What Works and What Doesn't.* University of Chicago Press, Chicago, pp. 107-146.

Calomiris, C. W., 1997. The postmodern safety net: lessons from developed and developing economies. Washington, American Enterprise Institute series.

Calomiris, C. W., 1999. Building an incentive-compatible safety net. *Journal of Banking and Finance* 23 (10), 1499-1519.

Cooper, K., Fraser, D. R., 1988. The rising cost of bank failures: a proposed solution. *Journal of Retail Banking* 10, Fall, 5-12.

Covitz, D. M., Hancock, D., Kwast, M. L., 2000. Mandatory subordinated debt: would banks face more market discipline? Board of Governors of the Federal Reserve System, June. Mimeo.

Davenport, A. M., McDill K.M., 2006. The depositor behind the discipline: a micro-level case study of Hamilton bank. *Journal of Financial Services Research* 30, 93-109.

Davies, S. M., 1993. The importance of market information in predicting bank performance. Board of Governors of the Federal Reserve System, April. Unpublished working paper.

DeYoung, R., Flannery, M. J., Lang, W. W., Sorescu, S. M., 2001. The information content of bank exam ratings and subordinated debt prices. *Journal Money, Credit, and Banking* 33, 900-925.

Evanoff, D. D., 1993. Preferred sources of market discipline. *Yale Journal of Regulation* 10, 344-367.

Evanoff, D. D., Wall, L. D., 2001. Sub-debt yield spreads as bank risk measures. *Journal of Financial Services Research* 20, October/December, 121-146.

Flannery, M. J., Sorescu, S. M., 1996. Evidence of bank market discipline in subordinated debenture yields: 1983-1991. *Journal of Finance*, September, 1347-1377.

Flannery, M. J., 2001. The faces of 'market discipline.' *Journal of Financial Services Research* 20:2/3, 107-119.

Goldberg, L. G., Hudgins, S. C., 2002. Depositor discipline and changing strategies for regulating thrift institutions. *Journal of Financial Economics* 63, 263-274.

Goldberg, L. G., Hudgins, S. C., 1996. Response of uninsured depositors to impending S&L failures: evidence of depositor discipline. *The Quarterly Review of Economics and Finance* 36, 311-325.

Gorton, G., Santomero, A., 1990. Market discipline and bank subordinated debt. *Journal of Money, Credit and Banking* 22, 119-128.

Gropp, R., Richards, A., 2001. Rating agency actions and the pricing of debt and equity of European banks: what can we infer about private sector monitoring of bank soundness? *Economics Notes* 30 (3), 373-398.

Gropp, R., Vesala, J., 2002. Deposit insurance, moral hazard and market monitoring. Federal Reserve Bank of Chicago Bank Structure Conference Proceedings, May.

Gunther, J. W., Levonian, M. E., Moore, R. R., 2001. Can the stock market tell bank supervisors anything they don't already know? *Economic and Financial Review*, Federal Reserve Bank of Dallas, 2nd Quarter, 2-9.

Hall, J. R., King, T.B., Meyer, A. P., Vaughan, M. D., 2003. Do jumbo-CD holders care about anything? In: Kaufman, G.G. (Ed.), *Market Discipline in Banking: Theory and Evidence*. Elsevier Ltd., 359-384.

Hamalainen, P., 2006. Market discipline and regulatory authority oversight of banks: complements not substitutes. *The Service Industries Journal* 26, 97-117.

Jagtiani, J., Kaufman, G., Lemieux, C., 1999. Is the safety net extended to bank and bank holding company debt? Evidence from debt pricing. Federal Reserve Bank of Chicago. Unpublished working paper.

Jagtiani, J., Kaufman, G., Lemieux, C., 2000. Do markets discipline banks and bank holding companies? Evidence from debt pricing. Federal Reserve Bank of Chicago. Unpublished working paper.

James, C. M., 1988. The use of loan sales and standby letters of credit by commercial banks. *Journal of Monetary Economics* 22, 395-422.

Jordan, J. J., 2000. Depositor discipline at failing banks. *New England Economic Review*, March/April, 15-28.

Keehn, S., 1989. Banking on the Balance; Powers and the Safety Net. Federal Reserve Bank of Chicago, Chicago.

Keely, M. C., 1990. Deposit insurance, risk, and market power in banking. *American Economic Review* 80, 1183-1200.

Krishnan, C.N.V., Ritchken, P. H. and Thomson, J. B., 2003.Monitoring and controlling bank risk: does risky debt help?" (October 7, 2003). AFA 2004 San Diego Meetings; FRB of Cleveland Working Paper No. 0301. Available at SSRN: http://ssrn.com/abstract=465181

Litan, R. H., Rauch, J., 1997. American Finance for the 21st Century. U. S. Government Printing Office, Washington, D.C.

Morgan, D., Stiroh, K., 1999. Bond market discipline of banks: is the market tough enough? Staff report, December, Federal Bank of New York.

McDill, K. M., Maechler, A. M., 2003. Do uninsured depositors vote with their feet? In: Kaufman, G.G. (Ed.), *Market Discipline in Banking: Theory and Evidence*. Elsevier Ltd., 211-248.

Park, S., Peristiani, S., 1998. Market discipline by thrift depositors. *Journal of Money, Credit and Banking* 30, 347-364.

Peria, M. S. M., Schmukler S., 2001. Do depositors punish banks for bad behavior? market discipline, deposit insurance, and banking crises. *The Journal of Finance* 56, 1029-1051.

Pettway, R. H., 1976. The effects of large bank failures upon investors' risk cognizance in the commercial banking industry. *The Journal of Financial and Quantitative Analysis* 11, September, 465-477.

Pettway, R. H., 1980. Potential insolvency, market efficiency, and bank regulation of large commercial banks. *The Journal of Financial and Quantitative Analysis*, 15, March, 219-236.

Sironi, A., 2003. Testing for market discipline in the European banking industry: evidence from subordinated debt issues. *Journal of Money, Credit and Banking* 35 (3), 443-472.

The acknowledge of the authors:

Sinan Cebenoyan received support from a Summer Research Grant from the Frank G. Zarb School of Business at Hofstra University. Fatma Cebenoyan acknowledges support from a CUNY Research Grant for part of the data used in this study. We thank Anthony Saunders, Thomas Philippon, Linda Allen, Elizabeth Cooperman, and participants at numerous conferences, for valuable comments. We especially would like to thank the referees for improving the paper.

International Review of Accounting, Banking and Finance
Vol. 1, No. 2, July 2009

IRABF

© 2009

Institutional Behavior of Trading Acquirer Stocks around Mergers and Acquisitions

Kai Chen[a] , Yong-Cheol Kim[b] , Richard D. Marcus[b]

a. Tilman School of Business Mount Olive College Mount Olive, North Carolina
b. Sheldon B. Lubar School of Business University of Wisconsin-Milwaukee

---

Abstract: This essay investigates the behavior, motivation, and effects of institutional trading of acquirer stocks around mergers and acquisitions. It is documented that institutional investors generally increase their holdings of an acquirer's shares in announcement quarters and decrease their holdings in resolution quarters, and that the number of institutional owners of an acquiring firm keeps increasing all along. The increase in institutional holdings indicates that institutional investors buy acquirer stocks around announcements, whereas the decrease in their holdings does not necessarily mean that they sell acquirer stocks around resolutions because of the issue of equity integration. Further, it is found that institutional trading of acquirer stock facilitates the success of M&A transactions. However, the evidence does not support the argument that institutional investors trade acquirer stocks because they are better informed in recognizing potential winners among acquiring firms.

JEL Classification: G34
Keywords: Institutional investors; Institutional ownership; Mergers and acquisitions

---

1. Introduction

Merger and acquisitions (M&A) activity is thought of as an external corporate control mechanism that enforces effective corporate governance. Ownership, transfer of ownership, and interaction between owners and managers of firms are a central part in this mechanism. Institutional ownership of U.S. common stocks has increased dramatically over the past 50 years. The Federal Reserve Board *Flow of Funds* reports 47 percent institutional ownership of U.S. common stock by the end of 2001 versus only about 7% in 1950. If M&A acts as a market for corporate control and provides external corporate governance, institutional owners, as a major force in the U.S. corporate equities, play an important part in this mechanism. Thus, understanding the role that institutional investors play in M&A activities helps us to understand how the market for corporate control operates as a corporate governance mechanism in the U.S.

Prior studies focus on institutional trading behavior in response to various events. By examining the changes in institutional ownership prior to forced CEO succession, Parrino *et al.* (2003) find that there is a decrease in stock holdings of institutional investors who are more concerned with holding prudent securities, who are better informed, or who are engaged in momentum trading, and that the changes in institutional holdings are negatively related to the likelihood of forced CEO turnover. Dor (2003) demonstrates that the level of institutional holdings changes shortly after an IPO, as well as in response to subsequent changes in

forecasts of future performance up to three years after the issue date. Gibson *et al.* (2004) document that seasoned equity issuers, that experience the greatest increase in institutional investment around the offer date versus those experiencing the greatest decrease, outperform their benchmark portfolios in the following year. This result suggests that institutions are able to identify above-average firms when they are purchasing seasoned equities and increase their holdings in potential winners.

Among the related literature, some studies are carried out under the background of M&A. Two papers study institutional behavior of trading target stocks and the effect of their trading on mergers and acquisitions. Using a sample of 139 hostile takeover attempts from 1985-1994, Pinkowitz (2000) finds that firms with higher aggregate institutional ownership are significantly more likely to face a hostile takeover attempt. Hsieh and Walkling (2004) investigate the institutional arbitrageurs' trading of target stocks around M&As and find that changes in arbitrage holdings are related to the probability of success, bid premiums, and arbitrage returns. Two other papers study institutional behavior in trading acquirer stock. Ashraf and Jayaraman (2005) investigate institutional trading of acquirer stock from 1999 to 2001. They document that active institutions significantly increase their holdings after M&A announcements in transactions with higher wealth implications, and that passive institutions rebalance their portfolios at final resolutions after updating the information released in transactions. Chen *et al.* (2006) find that only concentrated holdings by independent long-term institutions are related to post-M&A performance and that the presence of these institutions makes withdrawal of a bad bid more likely. Chen et. al. find that these independent institutions make long-term portfolio adjustments, rather than trading for short-term gains, and that they only sell in advance of very bad outcomes. The authors conclude that these institutions actively monitor their portfolio of firms, and these firms benefit from institutional investor monitoring efforts.

This essay investigates institutional behavior focusing on institutional trading of acquirer stock surrounding mergers and acquisitions. The focus is on acquirer stock trading, since this trading and holding of acquirer stock is more important than their holding and trading of target stock. In the game of M&A, acquirers are the active players, launching the transactions and exerting effort to make transactions successful. More importantly, acquiring firms can provide corporate governance benefits if deals are successful. Thus, if the ownership of institutional investors has an impact on the corporate governance of acquiring firms, institutional investor trading of acquirer stocks and the ensuing ownership will influence the corporate governance of surviving firms. However, we do not know much about the behavior of institutional investors in trading acquirer stocks, their motivation to trade, and the impact of their trading on M&A transactions.

The study documents that the institutional holdings of acquirer stock increases in the announcement quarter, which indicates that institutional investors are buying acquiring firm shares around announcements. Also, we find that institutional holdings of acquirer stock decrease in the resolution quarter (with the completion of the transaction or withdrawal of the bid). Because of the issue of integration between acquirer and target equities in the successful deals, however, the decrease in the institutional holdings does not necessarily mean that institutional investors are selling their shares around the completion if a deal is successful. In addition, the number of institutional owners of an acquiring firm keeps growing over the course of M&As. As far as the motivation for institutional investors to trade is concerned, the study tests the hypothesis that institutional investors are better informed in their investments. We do this by investigating the association between the changes in institutional ownership of acquiring firms during the M&As and the post-transaction performance of acquirers. The empirical evidence, however, does not support this informed institutional investor hypothesis.

Further exploration shows that the changes in institutional ownership in response to an M&A bid have a strong impact on the consequence of the deal. This result indicates that institutional trading behavior influences the process of M&A and therefore the market for corporate control.

The study is presented in as follows: (1) Section 2 includes a description of the data and sample description. (2) Section 3 documents the general behavioral pattern of institutional investors in an M&A transaction. (3) Section 4 breaks down the M&A sample in several ways to examine the differentials in institutional behavior for sub-samples. (4) Section 5 shows the results for testing the hypothesis that institutional investors are better informed while they are involved in the trading of acquirer stocks; and (5) Section 6 examines whether or not institutional trading behavior affects the process of M&As, and Section 7 provides a conclusion.

2. Data and Sample Description

The M&A sample used in this empirical study covers a period from 1980 to 2003. The sample period begins with 1980 because this is the first year when institutional ownership records from CDA/Spectrum database are available. The M&A transactions are extracted from the Mergers and Acquisitions database of the Securities Data Company. To be included in the sample, an observation must meet the following criteria: (1) The bidders and targets are publicly-traded firms that are covered on CRSP and Compustat, so that their market returns and accounting data be available; (2) The institutional ownership information is available from CDA/Spectrum database; (3) The acquiring firm is the first bidder. For simplicity, the competitive bidders following the first bidder are excluded from the sample; (4) The size of an acquiring firm is above the 20th percentile in NYSE at the end of the quarter immediately before the M&A announcements, and the ratio of acquirer size to target size is greater than 30%; (5) The deals offered by the same firm that have the overlapping observation windows are ruled out from the sample to avoid the mixed effects of multiple events. In addition, if a firm announced more than one M&A bids in a quarter, the sample includes only the target that has the largest size. The final M&A sample has 1,233 observations from 1980 through 2003.

In this empirical study, the announcement date is the day when an M&A offer is announced, and the resolution date is defined as a day either when a success or a withdrawal is announced, or when more than 365 days have passed without results since the announcement date.[1] For simplicity, the announcement quarter denotes the quarter in which the announcement occurs, the resolution quarter denotes the quarter in which the resolution date falls, and the period from the announcement to the resolution quarter, inclusive, is termed A-R Period. The changes in institutional ownership are estimated over an event window that starts from the second quarter prior to the announcement quarter and ends in the second quarter past the resolution quarter, which is named the observation window.

The data of institutional ownership for each firm in the M&A sample are extracted from the CDA/Spectrum 13F filings. According to the 1978 amendment to the Securities and Exchange Act of 1934, the institutional investors, who have more than \$100 million under their management, are required to file 13F forms on a quarterly basis that disclose all common stock positions greater than \$200,000 or 10,000 shares, except for being exempted under "confidential treatment" rules.[2] Based on this database, the institutional ownership of each acquiring firm is measured by two variables: *H*—the fraction of shares outstanding held by

[1] The definition of resolution follows Schwert (2000).

[2] More detailed information can be found at http://www.sec.gov/divisions/investment/13ffaq.htm.

institutional investors—and *N*—the number of institutional investors holding the firm's stock—at the end of each quarter. In addition, *N* is the number of unrelated institutions who invest in a security because 13F reporting is aggregated across different units within an institution. For example, all funds in a fund family are aggregated in one 13F report. For convenience, *institutional holdings* and *institutional owners* are used to refer to *H* and *N*, respectively. Accordingly, the raw changes in institutional ownership, ΔH and ΔN, are defined as the difference of *H* and *N* between the current quarter and the last quarter, and *institutional holdings change* and *institutional owners change* are used to refer to ΔH and ΔN, respectively.

Table 1 summarizes the sample structure, the deal characteristics, and the institutional ownership at the end of the quarter immediately before the announcement quarter. *Cash* indicates a deal in which the consideration is paid all by cash, *Equity* denotes a pure stock-exchange deal, and *Mix* is the case in which the cash-equity-combined payment is made. *Success* is a deal in which the first bidder is the winning bidder. Otherwise the deal is denoted as *Failure*. As defined above, *A-R* is a period from the announcement quarter to the resolution quarter inclusive. *CAR* is the three-day cumulative abnormal return around the announcement date earned by acquirer shareholders. The cumulative abnormal return is adjusted by 25 size-book-to-market portfolios, which follows Fama and French (1993). *Size* is the capitalization of an acquiring firm based on the market price at the end of the quarter immediately before the announcement quarter.

Panel A reports the yearly distribution of the M&A deals from 1980 through 2003. The 1980s witnesses the first wave of M&A activities in the United States, with 1985 reaching the highest of 47 transactions. In the second wave of 1990s, the M&A activities reach the highest of 122 transactions in 1999. Of 1,233 deals in the sample, more than 75 percent (971) were successfully completed by first bidders. The size of acquiring firms averages $4.162 billion dollars, with a small fluctuation along the years. The average CAR of the sample is –2.36 percent, which is consistent with evidence from the literature on acquirer returns.[3] It appears that most of the deals prior to 1994 are resolved within one quarter, but thereafter the length of A-R Period is longer. Finally, both institutional holdings and owners, *H* and *N*, have been growing over time, reflecting the general trend of institutional ownership on the U.S. stock market. The average institutional holdings of the acquiring firms exceed 50 percent for the first time in 1993, reaching 60.23 percent in 2003.

Panel B, C, D, and E describe sub-samples broken down in four ways: (1) Cash vs. Equity Deals; (2) Success vs. Failure Deals; (3) High CAR vs. Middle and Low CAR Deals; and (4) Large Acquirer vs. Small Acquirer Deals. High CAR Deals include the deals whose CARs are among the top 30% of the sample; Low CAR Deals include the deals whose CARs are among the bottom 30% of the sample; and the rest fall into Middle CAR Deals. Large Acquirer Deals are such that the average size of an acquiring firm is in the top 20% of the NYSE firms at the end of the quarter immediately prior to the M&A announcements, with the ratio of acquirer size to target size greater than 30%. The rest in the sample belong to Small Acquirer Deals. In terms of Small Acquirer Deals, respectively. More interesting is the comparison between High CAR and Low CAR Deals, where the acquiring firms with a little bit higher institutional holdings, but much smaller institutional owners, achieve a much higher CAR. This indicates that the concentration of institutional ownership in the acquiring firms could influence the quality of M&A offers.

[3] See Jensen and Ruback (1983) for a summary on the market for corporate control.

Table 1

Summary of the M&A Sample

This table summarizes the structure of the M&A sample, deal characteristics, and institutional ownership at the end of the quarter immediately before the announcement quarter. *A-R* is the quarters over which a deal lasts from the announcement quarter to the resolution quarter, inclusively. The announcement quarter is the quarter in which an M&A announcement is made. The resolution quarter is the quarter either when the first acquirer successfully acquires a target firm or announces the withdrawal, or when more than 365 days have passed without results since the announcement date. *CAR* is the three-day cumulative abnormal return earned by shareholders of an acquiring firm around the announcement date, adjusted by Fama-French 25 size-book-to-market portfolios. *Size* is the capitalization of acquiring firm based on the market price at the end of the quarter immediately before the announcement quarter. *H* is the fraction of an acquiring firm's shares held by institutions, and *N* is the number of institutions holding an acquiring firm's shares, at the end of the quarter immediately prior to the announcement quarter. Cash Deal indicates a deal that is paid all by cash, Equity Deal denotes a pure stock-swap deal, and the remaining deals in the sample are Mix Deals. Success Deal is a deal in which the first acquirer is a winner, and Failure Deal is the otherwise. High CAR Deals include the deals whose CARs are among the top 30% of the sample, Low CAR Deals include the deals whose CARs are among the bottom 30% of the sample, and the rest of the sample are Middle CAR Deals. Large Acquirer Deals are such deals that the acquirer sizes be in the top 20% of the NYSE firms at the end of the quarter immediately prior to the M&A announcements and the ratios of acquirer size to target size be greater than 30%. The deals in the sample other than Large Acquirer Deals are Small Acquirer Deals.

Panel A: Distribution of Summary Statistics by Announcement Year: 1980-2003

Year	# of	# of	# of	# of	A-R (qtr)		CAR (%)		Size (million)		*H* (%)		*N* (#)	
	Deal	Cash	Equity	Success	mean	median	mean	median	mean	median	mean	median	mean	median
1980	36	7	16	22	1.17	1	-0.98	-2.16	993.97	498.8	29.86	27.84	83.45	58
1981	31	11	10	19	1.26	1	-2.84	-1.72	2274.66	608.94	35.82	37.69	111.48	79
1982	32	11	10	26	1	1	-2.51	-2.05	1085.71	502.37	31.05	31.59	93.06	63.5
1983	29	8	15	23	1.07	1	-4.49	-3.95	1015.83	737.85	33.55	36.66	88.69	79
1984	30	14	8	21	1.13	1	-2.36	-1.81	2241.57	883.7	33.96	34.11	105.6	72
1985	47	24	15	40	1.04	1	-1.75	-2.41	2334.26	1171.74	40.04	40.37	138.64	107
1986	44	25	10	34	1.09	1	0.24	-0.81	1511.31	856.16	45.39	46.53	110.7	76
1987	28	13	9	19	1.39	1	2.06	2.05	1846.8	933.14	37.51	38.35	103.27	65.5
1988	27	16	5	14	1.56	1	-2.01	-1.06	1612.93	341.77	38.49	36.36	103.12	52.5
1989	24	12	9	10	1.46	1	-1.24	-1.55	2541.12	1848.53	48.36	53.4	161.25	153
1990	15	5	8	13	1.2	1	-6.5	-7.82	5458.71	940.2	33.67	39.14	167	86
1991	13	3	8	10	1.15	1	0.09	-0.18	1550.14	822.13	45.69	43.46	128.62	125
1992	15	6	7	9	1.2	1	-2.72	-2.26	1719.9	913.46	47.44	41.33	117.21	85
1993	22	5	15	16	1.18	1	-3.17	-3.29	2445.86	1558.14	52.9	54.07	143.5	114.5
1994	28	11	13	22	1.25	1	-0.89	-0.38	2863.19	1136.75	55.85	57.62	150.04	104
1995	92	20	54	75	2.41	2	-1.19	-1.33	2372.12	726.18	48.64	47.78	123.44	85
1996	106	15	55	86	2.28	2	-1.02	-0.76	3173.56	984.16	51.07	52.31	127.38	86
1997	120	16	63	104	2.21	2	-1	-0.79	2137.64	1026.26	54.48	57.57	111.93	86
1998	111	18	61	96	2.33	2	-3.17	-2.79	4451.99	1159.18	51.87	55.34	131.41	92
1999	122	21	51	97	2.63	2	-3.44	-2.73	7097.11	1253.6	55.26	61.69	159.83	116
2000	112	19	65	87	2.44	2	-6.05	-5.46	10863.7	1297.28	49.75	50.85	172.88	105.5
2001	62	7	26	49	2.37	2	-3.56	-2.01	5882.13	1276.41	55.43	54.4	190.21	147.5
2002	33	6	11	29	2.55	2	-1.74	-1.47	9264.73	877.5	62.58	65.41	176.18	122
2003	54	15	14	50	2.76	3	-2.68	-2.48	4734.66	1184.85	60.23	60.49	202.93	151
Total	1233	308	558	971	2	2	-2.36	-1.96	4162.24	983.95	48.83	49.24	137.84	98

Panel B: Summary Statistics by Sub-samples: Cash vs. Equity Deals

Type of	# of	A-R (qtr)		CAR (%)		Size (million)		*H* (%)		*N* (#)	
Payment	Deal	mean	median	mean	median	mean	median	mean	median	mean	median
Cash	308	1.69	1	-0.02	-0.35	2126.12	759.59	45.25	46.46	114.22	80
Equity	558	2.03	2	-3.6	-3.32	5410.02	983.95	48.2	48.24	137.71	95

Panel C: Summary Statistics by Sub-samples: Success vs. Failure Deals

Type of	# of	A-R (qtr)		CAR (%)		Size (million)		*H* (%)		*N* (#)	
Outcome	Deal	mean	median	mean	median	mean	median	mean	median	mean	median
Success	971	2.04	2	-2.15	-1.79	3853.17	1056.75	49.52	50.7	141.96	102
Failure	262	1.84	1	-3.14	-2.52	5311.38	780.47	46.22	43.43	122.39	84

Panel D: Summary Statistics by Sub-samples: High CAR vs. Middle, and Low CAR Deals

Type of	# of	A-R (qtr)		CAR (%)		Size (million)		*H* (%)		*N* (#)	
CAR	Deal	mean	median	mean	median	mean	median	mean	median	mean	median
High	347	1.93	2	5.84	4.21	2642.88	908.63	51.16	52.19	128.14	98.5
Middle	463	1.99	2	-1.97	-1.96	3739.95	1000.85	47.57	46.77	135.78	98
Low	347	2.07	2	-11.09	-9.23	6658.88	1110.17	50.98	51	160.04	110

Panel E: Summary Statistics by Sub-samples: Large Acquirer vs. Small Acquirer Deals

Size of	# of	A-R (qtr)		CAR (%)		Size (million)		*H* (%)		*N* (#)	
Acquirer	Deal	mean	median	mean	median	mean	median	mean	median	mean	median
Large	131	2.06	2	-2.58	-3.09	10878.86	4961.17	53.26	51.94	279.36	236
Small	1102	1.99	2	-2.33	-1.77	3355.75	845.93	48.29	48.71	120.76	86

3. General Pattern of Institutional Ownership Changes over the Observation Window

This section examines the general pattern of changes in institutional ownership in the acquiring firms over the observation window. The observation widow begins with qtr(-2), the second quarter backward from the announcement quarter (qtr0), goes over A-R Period, and

ends in qtr2, the second quarter forward from the resolution quarter (qtrN). Two variables, ΔH and ΔN, are used to measure the quarterly changes in institutional holdings and institutional owners, respectively. Since the length of A-R Period varies from deal to deal, the change over A-R Period is normalized by quarterly average change over this period.

Three approaches are employed to estimate the changes in institutional ownership. Apart for the raw changes, ΔH and ΔN, the portfolio-adjusted and history-adjusted changes are used to disentangle the event effects on institutional ownership from its general growing trend, which is well documented in the literature. The history-adjusted changes are estimated in this way: For each acquiring firm, the changes in institutional ownership over a four-quarter interval immediately prior to the observation window are averaged as a benchmark. Then, for each quarter in the observation window, the benchmark is subtracted from the raw change to get the history-adjusted change. The portfolio-adjusted approach is similar to Lyon *et al.* (1999) and Chen *et al.* (2006), who use three-way (size, book-to-market, and one-year long past return) adjusted control portfolios to study the relation between institutional ownership and a firm's long- term performance. For simplicity, this study uses only two factors, size and momentum, to form the benchmark portfolios, because the book-to-market ratio is relatively weak in influencing changes in institutional ownership.[4] The procedure of constructing 25 Size-Momentum portfolios is as follows: (1) For each quarter in the sample period, the NYSE firms' capitalizations (the product of common stock price and shares outstanding at the end of the last quarter) are used to make quintile breakpoints for size, and their BHRs (buy-and-hold return of the past one year ending in the last quarter) are used to make quintile breakpoints for momentum. (2) Based on their capitalizations and BHRs, all common stocks in NYSE, Amex, and NASDAQ who have institutional ownership are assigned into one of the 25 size-momentum portfolios. (3) For each portfolio, the equal-weighted mean changes, i.e., mean ΔH and mean ΔN are calculated for each quarter in an observation widow. (4) Each acquiring firm is assigned into one of 25 portfolios based on its capitalization and BHR as calculated in the same way. Subtracting the corresponding portfolio mean ΔH (ΔN) in corresponding quarter from an acquiring firm's raw ΔH (ΔN) yields the portfolio-adjusted changes in institutional ownership for each quarter in the observation window. Then the average adjusted changes (by history or portfolio) over qtr(-2, -1), A-R Period, and qtr(1, 2) are calculated based on the corresponding quarterly adjusted changes. These two adjusting approaches will capture the changes in institutional ownership in acquiring firms brought about by M&A activities.

The changes in institutional ownership documented using the three approaches are shown in Panel A, B, and C, Table 2, respectively. It is remarkable that both ΔH and ΔN in qtr0 estimated by all three methods are positive at the 1% significance level except for history-adjusted ΔH that is significant only at the 10% level. In qtrN, even though institutional owners, in all the three approaches, keep increasing, institutional holdings exhibit a decline to varying extents, at the 5% significance level in raw measure, and at the level of 1% in both portfolio- and history-adjusted measures. And this declining trend of institutional holdings continues even into qtr(1, 2), in which the average ΔH by all three measures are all negative, but significant only for portfolio- and history-adjusted approaches at the levels of 5% and 1%, respectively. Over A-R Period, it is not surprising that ΔN is positive and significant for all three measures. But the changes in institutional holdings are mixed. In spite of a positive and significant (at the level of 1%) ΔH by raw measure, the history-adjusted ΔH is negative at the 5% significance level, while the portfolio-adjusted ΔH is not significantly different from zero. It appears that these mixed average changes over A-R Period are occasioned by the opposite movements of institutional holdings in qtr0 and qtrN.

[4]See Gompers and Metrick (2001) for detailed discussion.

Table 2

Changes in Institutional Ownership: the Whole Sample

This table reports mean and median changes in institutional ownership on the whole sample, measured by three approaches: raw, portfolio-, and history-adjusted. Qtr0 is the announcement quarter and qtrN is the resolution quarter. The observation window starts with qtr(-2), the second quarter prior to qtr0, and ends in qtr2, the second quarter post qtrN. A-R is the period from qtr0 to qtrN, inclusive. The two-sided *t*-test is used to test the null hypothesis that the sample mean is indifferent from zero. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Qtr(-2, -1) (average)	qtr0	A-R (average)	qtrN	qtr(1, 2) (average)
Panel A: Raw Changes				
1: change in institutional holdings (%)				
1212	1211	1218	1203	1192
0.72***	1.29***	0.49***	-0.54**	-0.12
(3.41)	(6.53)	(3.17)	(-2.16)	(-0.83)
0.63	0.86	0.39	0.01	0.30
2: change in institutional owners				
1213	1211	1218	1203	1193
4.13***	5.18***	5.94***	7.85***	1.98***
(5.24)	(11.45)	(14.8)	(11.89)	(4.21)
2.50	3.00	4.00	4.00	1.50
Panel B: Portfolio-Adjusted Changes				
1: change in institutional holdings (%)				
1212	1211	1212	1197	1186
-0.09	0.84***	0.11	-0.80***	-0.28**
(-0.42)	(4.36)	(0.72)	(-3.25)	(-1.94)
-0.01	0.39	0.02	-0.46	0.14
2: change in institutional owners				
1213	1211	1212	1197	1187
0.25	1.78***	3.05***	5.52***	-0.07
(0.33)	(4.82)	(8.76)	(9.03)	(-0.15)
-0.07	0.69	1.42	2.13	-0.32
Panel C: History-Adjusted Changes				
1: change in institutional holdings (%)				
1187	1211	1218	1201	1192
0.02	0.38*	-0.41**	-1.43***	-1.05***
(0.10)	(1.74)	(-2.27)	(-5.31)	(-6.08)
-0.04	0.39	-0.14	-0.68	-0.44
2: change in institutional owners				
1188	1211	1218	1201	1193
0.23	1.52***	2.30***	4.20***	-1.66***
(0.64)	(3.16)	(5.18)	(6.32)	(-3.13)
0.25	1.00	1.83	2.00	-0.50

The result that there is an increase in institutional holdings in qtr0 indicates that institutional investors are buying acquiring firms around announcements. However, the result that there is a decrease in institutional holdings in qtrN does not necessarily mean that institutional investors are selling the acquirer shares around resolution because of the issue of integration between acquirer and target equities in Success Deals. This issue arises when a stock-swap involved transaction is consummated. Generally, acquiring firms are larger and have a higher level of institutional holdings while target firms are smaller and have a lower level of institutional holdings. Thus, the integration of acquirer and target equities would result in a lower level of institutional holdings in the acquiring firm upon the completion, even if institutional investors have actually not sold the acquirer shares. The extent to which the level of institutional holdings in the acquiring firm declines depends on the original sizes of both the acquirer and target firms, the original percentage of institutional holdings in both the acquirer and target stocks, and the terms of stock-swap. This reduction in institutional holdings resulting from the equity integration would be reported in the institutions' 13F forms in the quarter of resolution, which, obviously, do not reflect institutional trading activities around the resolution. In addition, if there are arbitrage activities during the transactions, this bias would be worse because institutional investors usually, if they do not arbitrage, sell their shares of target firms to arbitrageurs after announcements so that their holdings in target firms would go historically low at the time of equity integration. Success Deals account for more than three fourths of the M&A sample. Thus, the issue of equity integration might be the main reason for the decline in institutional holdings in the quarter of resolution.

Table 3

Changes in Institutional Ownership: the Multiple-Quarter Sample

This table reports mean and median changes in institutional ownership on the multiple-quarter sample, measured by three approaches: raw, portfolio-, and history-adjusted. Qtr0 is the announcement quarter and qtrN is the resolution quarter. The observation window starts with qtr(-2), the second quarter prior to qtr0, and ends in qtr2, the second quarter post qtrN. A-R is the period from qtr0 to qtrN, inclusive. The two-sided *t*-test is used to test the null hypothesis that the sample mean is indifferent from zero. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	qtr(-2, -1) (average)	qtr0	A-R (average)	qtrN	qtr(1, 2) (average)
Panel A: Raw Changes					
1: change in institutional holdings (%)					
Obs.	737	734	741	726	724
Mean	0.52*	1.66***	0.34*	-1.37***	-0.23
t-value	(1.74)	(5.98)	(1.8)	(-3.63)	(-1.15)
Median	0.69	1.12	0.33	-0.72	0.26
2: change in institutional owners					
Obs.	737	734	741	726	724
Mean	4.52***	6.45***	7.68***	10.88***	1.26**
t-value	(3.75)	(10.4)	(15.05)	(10.92)	(1.89)
Median	3.00	4.00	5.50	6.00	1.00
Panel B: Portfolio-Adjusted Changes					
1: change in institutional holdings (%)					
Obs.	737	734	735	720	718
Mean	-0.28	1.21***	0.01	-1.51***	-0.34*
t-value	(-0.97)	(4.49)	(0.05)	(-4.06)	(-1.73)
Median	-0.05	0.53	0.07	-0.98	0.17
2: change in institutional owners					
Obs.	737	734	735	720	718
Mean	0.19	2.35***	4.45***	8.59***	-0.75
t-value	(0.16)	(4.62)	(9.64)	(9.12)	(-1.2)
Median	-0.34	1.15	2.52	4.45	-0.86
Panel C: History-Adjusted Changes					
1: change in institutional holdings (%)					
Obs.	722	734	741	724	724
Mean	0.08	0.75**	-0.56*	-2.25***	-1.15***
t-value	(0.41)	(2.45)	(-2.38)	(-5.6)	(-5.05)
Median	-0.01	0.63	-0.22	-1.45	-0.44
2: change in institutional owners					
Obs.	722	734	741	724	724
Mean	0.57	2.34***	3.61***	6.79***	-2.82***
t-value	(1.14)	(3.53)	(6.2)	(6.8)	(-3.76)
Median	0.75	1.75	3.05	4.25	-1.25

The issue of equity integration does not occur in Cash Deals. Neither does it happen in Failure Deals. The further analysis on the sub-samples in the next section will show that the decline in institutional holdings in qtrN is partially driven by institutional investors' actually selling the stock of a bidder who fails in acquiring the target. The following examination will focus on the institutional ownership changes around the announcements and over A-R Periods, because what interests us is the institutional trading behavior.

However, the institutional trading around announcements might be underestimated. If a deal is announced and completed in the same quarter, then the reduction in institutional holdings resulting from the issue of equity integration would offset the increase in institutional holdings responding to the announcement. Obviously, including these single-quarter successful deals in the sample would underestimate the institutional buying activities in the announcement quarter. In order to overcome this bias, the single-quarter deals are excluded from the sample, and the analysis is repeated on a sample that consists of 747 deals with a multiple-quarter A-R Period. Represented in Table 3, the results show that, by all three measures, the changes in institutional holdings in qtr0 obtained from the multiple-quarter sample are larger, in terms of mean and median, than their counterparts from the whole sample. The average changes in institutional holdings over A-R Period are similar with those from the whole sample. Thus, the results from the analysis of the multiple-quarter sample present a clear-cut picture of the institutional trading pattern around M&A transactions.

4. Analysis of the Sub-Samples

Because of the differences in firm-specific and deal-specific characteristics, the institutional trading behavior might vary across the sub-samples that are characterized by these attributes. This section examines these sub-samples. Since the portfolio-adjusted approach provides similar results as the raw approach but the history-adjusted approach appears to be over-adjusted, only the results generated by the portfolio-adjusted approach are presented in the analysis of the sub-samples.

Table 4

Changes in Institutional Holdings: Cash, Equity, and Mix Deal Sub-Samples

This table reports mean and median changes in institutional holdings measured by the portfolio-adjusted approach on the three sub-samples: Cash, Equity, and Mix Deals. Cash Sub-Sample consists of 308 deals in which the payment of all cash is made; Equity Sub-Sample includes 558 pure stock-exchange deals; and the remaining 367 deals, in which the consideration is a combination of cash and equity, fall into Mix Sub-Sample. Qtr0 is the announcement quarter and qtrN is the resolution quarter. The observation window starts with qtr(-2), the second quarter prior to qtr0, and ends in qtr2, the second quarter post qtrN. A-R is the period from qtr0 to qtrN, inclusive. The two-sided *t*-test is used to test the null hypothesis that the sample mean is indifferent from zero. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	qtr(-2, -1) (average)	qtr0	A-R (average)	qtrN	qtr(1, 2) (average)
Panel A: Portfolio-adjusted Changes in Institutional Holdings (%): Cash Sub-Sample					
Obs.	301	302	302	299	295
Mean	-0.37	0.04	-0.06	-0.14	0.45***
t-value	(-0.79)	(0.12)	(-0.24)	(-0.42)	(2.47)
Median	0.05	-0.18	-0.10	-0.05	0.29
Panel B: Portfolio-adjusted Changes in Institutional Holdings (%): Equity Sub-Sample					
Obs.	550	548	549	540	532
Mean	-0.13	1.18***	0.38	-0.75*	-0.55**
t-value	(-0.47)	(3.78)	(1.52)	(-1.75)	(-2.29)
Median	-0.24	0.68	0.18	-0.64	0.14
Panel C: Portfolio-adjusted Changes in Institutional Holdings (%): Mix Sub-Sample					
Obs.	361	361	361	358	359
Mean	0.20	0.98***	-0.16	-1.45***	-0.49*
t-value	(0.50)	(2.90)	(-0.62)	(-3.31)	(-1.68)
Median	0.20	0.45	0.07	-0.76	0.02

First, the M&A sample is broken down into Cash, Equity, and Mix Deal Sub-Samples. Table 4 presents the mean and median changes in institutional holdings of these three sub-samples. The Cash Sub-Sample consists of 308 deals in which the payment of all cash is made; the Equity Sub-Sample includes 558 pure stock-exchange deals; and the remaining 367 deals, in which the consideration is a combination of cash and equity, fall into the Mix Sub-Sample. The results show that the changes in institutional holdings on Cash Sub-Sample do not make a difference from the portfolio benchmark—all adjusted means in qtr0, qtrN, and over A-R Period are insignificant. The general pattern that institutional holdings change is positive in qtr0 but negative in qtrN is driven by Equity and Mix Sub-Samples—the results obtained from these two sub-samples are generally consistent with the results from the whole sample.

Second, the analysis is repeated on the sub-samples of Success and Failure Deals, and the results are displayed on Table 5. The Success Sub-Sample includes 971 deals that are successfully completed by the first bidders, and the remaining 262 deals fall into Failure Sub-Sample. It appears that the general pattern of institutional holdings change documented on the whole sample repeats itself in Success Sub-Sample—the portfolio-adjusted change in institutional holdings in qtr0 is positive and significant at the 1% level, while the change in qtrN is negative at the 5% significance level. With respect to Failure Sub-Sample, in which there is no issue of equity integration as mentioned above, there is weak evidence that institutional investors are dumping the acquirer shares in qtr0—the change in institutional holdings is negative but insignificant—and strong evidence that institutional investors keep dumping in qtrN—the change in institutional holdings is negative and significant at the 1%

level. Thus, the Success Sub-Sample is the main force that drives the general institutional buying behavior around announcements, while institutional selling activities in Failure Sub-Sample contribute to the general decline in institutional holdings in qtrN.

Table 5

Changes in Institutional Holdings: Success and Failure Deal Sub-Samples

This table reports mean and median changes in institutional holdings measured by the portfolio-adjusted approach on the two sub-samples: Success and Failure Deals. Success Sub-Sample includes 971 deals that are successfully completed by the first bidders, and the remaining 262 deals fall into Failure Sub-Sample. Qtr0 is the announcement quarter and qtrN is the resolution quarter. The observation window starts with qtr(-2), the second quarter prior to qtr0, and ends in qtr2, the second quarter post qtrN. A-R is the period from qtr0 to qtrN, inclusive. The two-sided *t*-test is used to test the null hypothesis that the sample mean is indifferent from zero. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	qtr(-2, -1) (average)	qtr0	A-R (average)	qtrN	qtr(1, 2) (average)
Panel A: Portfolio-adjusted Changes in Institutional Holdings (%): Success Sub-Sample					
Obs.	956	955	956	943	933
Mean	0.05	1.16***	0.38**	-0.63**	-0.21
t-value	(0.25)	(5.37)	(2.24)	(-2.17)	(-1.27)
Median	-0.04	0.48	0.13	-0.49	0.26
Panel B: Portfolio-adjusted Changes in Institutional Holdings (%): Failure Sub-Sample					
Obs.	256	256	256	254	253
Mean	-0.61	-0.39	-0.90***	-1.47***	-0.54*
t-value	(-1.05)	(-0.96)	(-2.76)	(-3.16)	(-1.85)
Median	0.17	0.11	-0.12	-0.28	-0.13

Third, the M&A sample is divided into High, Middle, and Low CAR Deal Sub-Samples, and the results of analysis on these sub-samples are set forth on Table 6. The High CAR Sub-Sample has 347 deals in which an acquiring firm has obtained a CAR above the 70th percentile in the whole sample; the Low CAR Sub-Sample includes 347 observations that have an acquirer CAR below the 30th percentile; and the remaining 463 transactions fall into the Middle CAR Sub-Sample. It is observed that institutional holdings show an increase in qtr0 and a decrease in qtrN on all three sub-samples at the level of significance of at least 10%, except for the case of the High CAR Sub-Sample in qtrN. Thus, the institutional trading behavior documented in these three sub-samples is similar to that as documented in the whole sample.

Table 6

Changes in Institutional Holdings: High, Middle, and Low CAR Deal Sub-Samples

This table reports mean and median changes in institutional holdings measured by the portfolio-adjusted approach on the three sub-samples: High, Middle, and Low CAR. High CAR Sub-Sample has 347 deals in which an acquiring firm has obtained a CAR above the 70th percentile in the whole sample; Low CAR Sub-Sample includes 347 observations that have an acquirer CAR below the 30th percentile; and the remaining 463 transactions fall into Middle CAR Sub-Sample. Qtr0 is the announcement quarter and qtrN is the resolution quarter. The observation window starts with qtr(-2), the second quarter prior to qtr0, and ends in qtr2, the second quarter post qtrN. A-R is the period from qtr0 to qtrN, inclusive. The two-sided *t*-test is used to test the null hypothesis that the sample mean is indifferent from zero. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	qtr(-2, -1) (average)	qtr0	A-R (average)	qtrN	qtr(1, 2) (average)
Panel A: Portfolio-adjusted Changes in Institutional Holdings (%): High CAR Sub-Sample					
Obs.	344	344	344	338	330
Mean	-0.03	0.85***	0.19	-0.59	-0.70**
t-value	(-0.12)	(2.55)	(0.65)	(-1.25)	(-2.21)
Median	-0.28	0.32	0.15	-0.22	-0.09
Panel B: Portfolio-adjusted Changes in Institutional Holdings (%): Middle CAR Sub-Sample					
Obs.	461	461	461	456	453
Mean	0.25	0.64**	-0.01	-0.87***	-0.02
t-value	(0.83)	(2.11)	(-0.03)	(-2.84)	(-0.07)
Median	0.02	0.38	0.12	-0.19	0.26
Panel C: Portfolio-adjusted Changes in Institutional Holdings (%): Low CAR Sub-Sample					
Obs.	344	341	342	338	338
Mean	-0.07	0.95***	0.09	-1.02*	-0.34
t-value	(-0.21)	(2.59)	(0.30)	(-1.81)	(-1.23)
Median	0.13	0.43	-0.13	-0.92	0.32

Finally, Large and Small Acquirer Deal Sub-Samples are examined and the results are reported in Table 7. The Large Acquirer Sub-Sample has 131 deals in which the acquirer sizes are in the top 20% among the NYSE firms at the end of the quarter immediately prior to the announcements and the ratios of acquirer size to target size are greater than 30%. The remaining 1,102 observations in the whole sample fall into Small Acquirer Sub-Sample. Because the Small Acquirer Sub-Sample accounts for nearly 90 percent of the whole sample, the institutional ownership change in the Small Acquirer Sub-Sample exhibits a very similar pattern to what has been documented in the whole sample. The results from the Large Acquirer Sub-Sample show that the portfolio-adjusted change in institutional holdings is positive at the 1% significance level in qtr0, but negative and insignificant in qtrN.

Table 7

Changes in Institutional Holdings: Large and Small Acquirer Deal Sub-Samples

This table reports mean and median changes in institutional holdings measured by the portfolio-adjusted approach on the two sub-samples: Large Acquirer and Small Acquirer Deals. Large Acquirer Sub-Sample has 131 deals in which the acquirer sizes are in top 20% of the NYSE firms at the end of the year immediately prior to the announcements and the ratios of acquirer size to target size are greater than 30%. The remaining 1102 observations in the whole sample fall into Small Acquirer Sub-Sample. Qtr0 is the announcement quarter and qtrN is the resolution quarter. The observation window starts with qtr(-2), the second quarter prior to qtr0, and ends in qtr2, the second quarter post qtrN. A-R is the period from qtr0 to qtrN, inclusive. The two-sided *t*-test is used to test the null hypothesis that the sample mean is indifferent from zero. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	qtr(-2, -1) (average)	qtr0	A-R (average)	qtrN	qtr(1, 2) (average)
Panel A: Portfolio-adjusted Changes in Institutional Holdings (%): Large Acquirer Sub-Sample					
Obs.	131	131	131	127	120
Mean	-0.09	1.17**	0.38	-0.24	-0.66
t-value	(-0.16)	(2.07)	(0.76)	(-0.26)	(-1.20)
Median	-0.24	0.68	0.34	-0.34	-0.18
Panel B: Portfolio-adjusted Changes in Institutional Holdings (%): Small Acquirer Sub-Sample					
Obs.	1081	1080	1081	1070	1066
Mean	-0.09	0.80***	0.08	-0.87***	-0.24
t-value	(-0.39)	(3.90)	(0.48)	(-3.41)	(-1.60)
Median	0.02	0.33	0.00	-0.47	0.18

5. Are Institutional Investors Better Informed?

After documenting that institutional investors are buying acquirer stocks when an M&A occurs, a question arises: why do they do so? Current literature suggests that institutional investors are better informed than individual investors based on the notion that the institutions have advantages of lower average costs and higher efficiency when they acquire and process information. This section tests the hypothesis that institutional investors trade acquirer shares around M&As because they are better informed about the future performance of acquiring firms. If this hypothesis were true, then institutional investors would buy potential winners when they are choosing the acquirer stocks. Thus, we expect that the long-term performance of a post-transaction firm would be positively associated with the changes in institutional ownership around an M&A.

BHAR1, *BHAR2*, and *BHAR3*, the buy and hold abnormal returns over one, two, three years, respectively, adjusted by Fama-French (1993) 25 size-book-to-market portfolios, are calculated to measure the long-term performance of an acquiring firm. Each BHAR is regressed in OLS against one measure of change in institutional ownership, controlling for the firm-specific and deal-specific characteristics. The change in institutional ownership is measured by ΔH and ΔN in qtr0 and their average changes over A-R Period, raw or portfolio-adjusted. The OLS regressions are applied on Success Sub-Sample to examine whether institutional investors are able to identify an acquiring firm who will outperform their counterpart portfolio after the M&A completion.

Table 8

Analysis of Long-Term Performance of Acquiring Firms by OLS Regression

This table shows the results from the OLS regressions. The dependent variables are the buy and hold abnormal returns over one, two, three years, respectively, adjusted by Fama-French (1993) 25 size-book-to-market portfolios. *ΔH* and *ΔN* are the changes in the institutional holdings and owners in qtr0, respectively. Average *ΔH* and *ΔN* are the corresponding average changes over A-R Period. These variables are included in the regressions, separately, as independent variables. Both of *ΔH* and *ΔN* are measured by the raw and portfolio-adjusted approaches. Panel A and B present the results of analyses using the raw and portfolio-adjusted approaches, respectively. Control variables are as follows. *Holdings(-1)* is the aggregate institutional holdings of an acquirer stock at the end of qtr(-1). *Size* is the capitalization defined as a product of a firm stock market price and its shares outstanding at the end of the quarter immediately prior to the announcement. *BEME* is the book-to-market equity ratio defined as Fama and French (1993). *ROA* is defined as EBIT of a firm divided by its total assets. *CAR* is the three-day cumulative abnormal return of an acquiring firm around the bid announcement date adjusted by Fama-French 25 size-book-to-market portfolios. The dummy *Cash* equals one if a deal is paid all by cash and zero otherwise, and the dummy *Equity* equals one if a deal is a pure stock swap deal and zeor otherwise. *Hostile* is also a dummy that equals one if the acquirer is labeled as hostile in the SDC dataset and zeor otherwise. *Ratio* is target size over acquirer size measured at the end of qtr(-1). In addition, the year dummies are used to control for the year effect. In order to avoid the multicollinearity, each regression is repeated with CAR excluded from the model. Because of space constraint, the table presents only the coefficient estimates of the changes in institutional ownership, their *p*-values, the adjusted R^2, and the numbers of observations used in the regressions. *p*-value is reported in parentheses beneath the coefficient estimates. Since the concern of this analysis is in a positive association between the long-term performance of an acquiring firm and the changes in institutional ownership, ***, **, and * indicate positive significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Changes in Institutional Ownership Measured by Raw Approach

	BHAR1	*BHAR2*	*BHAR3*
Model 1: *ΔH* in qtr0 as independent variable, CAR included			
Coefficient Estimate	0.033	0.029	0.066
p-value	(0.58)	(0.54)	(0.09)
Adj-R^2	0.037	0.030	0.029
Obs.	853	821	790
Model 2: *ΔH* in qtr0 as independent variable, CAR excluded			
Coefficient Estimate	0.025	0.022	0.057
p-value	(0.67)	(0.64)	(0.14)
Adj-R^2	0.041	0.033	0.030
Obs.	866	834	801
Model 3: Average *ΔH* over A-R as independent variable, CAR included			
Coefficient Estimate	0.039	0.017	0.003
p-value	(0.61)	(0.78)	(0.95)
Adj-R^2	0.037	0.030	0.025
Obs.	853	821	790
Model 4: Average *ΔH* over A-R as independent variable, CAR excluded			
Coefficient Estimate	0.043	0.014	0.004
p-value	(0.58)	(0.82)	(0.94)
Adj-R^2	0.041	0.033	0.028
Obs.	866	834	801
Model 5: *ΔN* in qtr0 as independent variable, CAR included			
Coefficient Estimate	-0.001	-0.000	-0.000
p-value	(0.04)	(0.04)	(0.07)
Adj-R^2	0.042	0.035	0.029
Obs.	853	821	790
Model 6: *ΔN* in qtr0 as independent variable, CAR excluded			
Coefficient Estimate	-0.001	-0.000	-0.000
p-value	(0.03)	(0.02)	(0.03)
Adj-R^2	0.047	0.040	0.034
Obs.	866	834	801
Model 7: Average *ΔN* over A-R as independent variable, CAR included			
Coefficient Estimate	-0.000	-0.000	-0.000
p-value	(0.14)	(0.05)	(0.15)
Adj-R^2	0.039	0.034	0.027
Obs.	853	821	790
Model 8: Average *ΔN* over A-R as independent variable, CAR excluded			
Coefficient Estimate	-0.001	-0.001	-0.000
p-value	(0.08)	(0.01)	(0.07)
Adj-R^2	0.045	0.040	0.032
Obs.	866	834	801

The regressions include the following firm-specific and deal-specific characteristics as control variables. *Holdings(-1)* is the aggregate institutional holdings of an acquirer stock at the end of qtr(-1). Gompers and Metrick (2001) argue that it is the level of institutional holdings, rather than the change in holdings, that forecasts returns. *Size* is the capitalization defined as a product of the stock market price and the shares outstanding at the end of the quarter immediately prior to the announcement, and *BEME* is the book-to-market equity ratio defined as Fama and French (1993), of an acquiring firm, and they are to control for a firm

Table 8 - Continued

Analysis of Long-Term Performance of Acquiring Firms by OLS Regression

This table shows the results from the OLS regressions. The dependent variables are the buy and hold abnormal returns over one, two, three years, respectively, adjusted by Fama-French (1993) 25 size-book-to-market portfolios. ΔH and ΔN are the changes in the institutional holdings and owners in qtr0, respectively. Average ΔH and ΔN are the corresponding average changes over A-R Period. These variables are included in the regressions, separately, as independent variables. Both of ΔH and ΔN are measured by the raw and portfolio-adjusted approaches. Panel A and B present the results of analyses using the raw and portfolio-adjusted approaches, respectively. Control variables are as follows. Holdings(-1) is the aggregate institutional holdings of an acquirer stock at the end of qtr(-1). Size is the capitalization defined as a product of a firm stock market price and its shares outstanding at the end of the quarter immediately prior to the announcement. BEME is the book-to-market equity ratio defined as Fama and French (1993). ROA is defined as EBIT of a firm divided by its total assets. CAR is the three-day cumulative abnormal return of an acquiring firm around the bid announcement date adjusted by Fama-French 25 size-book-to-market portfolios. The dummy Cash equals one if a deal is paid all by cash and zero otherwise, and the dummy Equity equals one if a deal is a pure stock swap deal and zeor otherwise. Hostile is also a dummy that equals one if the acquirer is labeled as hostile in the SDC dataset and zeor otherwise. Ratio is target size over acquirer size measured at the end of qtr(-1). In addition, the year dummies are used to control for the year effect. In order to avoid the multicollinearity, each regression is repeated with CAR excluded from the model. Because of space constraint, the table presents only the coefficient estimates of the changes in institutional ownership, their p-values, the adjusted R2, and the numbers of observations used in the regressions. p-value is reported in parentheses beneath the coefficient estimates. Since the concern of this analysis is in a positive association between the long-term performance of an acquiring firm and the changes in institutional ownership, ***, **, and * indicate positive significance at the 1%, 5%, and 10% levels, respectively.

Panel B: Changes in Institutional Ownership Measured by Portfolio-Adjusted Approach			
	BHAR1	*BHAR2*	*BHAR3*
Model 1: *ΔH* in qtr0 as independent variable, CAR included			
Coefficient Estimate	0.060	0.044	0.068
p-value	(0.33)	(0.36)	(0.09)
Adj-R^2	0.038	0.031	0.029
Obs.	853	821	790
Model 2: *ΔH* in qtr0 as independent variable, CAR excluded			
Coefficient Estimate	0.050	0.034	0.058
p-value	(0.41)	(0.47)	(0.14)
Adj-R^2	0.042	0.034	0.030
Obs.	866	834	801
Model 3: Average *ΔH* over A-R as independent variable, CAR included			
Coefficient Estimate	0.057	0.018	-0.003
p-value	(0.47)	(0.77)	(0.95)
Adj-R^2	0.037	0.030	0.025
Obs.	853	821	790
Model 4: Average *ΔH* over A-R as independent variable, CAR excluded			
Coefficient Estimate	0.058	0.013	-0.004
p-value	(0.46)	(0.83)	(0.93)
Adj-R^2	0.042	0.033	0.028
Obs.	866	834	801
Model 5: *ΔN* in qtr0 as independent variable, CAR included			
Coefficient Estimate	-0.000	-0.000	-0.000
p-value	(0.37)	(0.07)	(0.07)
Adj-R^2	0.038	0.034	0.029
Obs.	853	821	790
Model 6: *ΔN* in qtr0 as independent variable, CAR excluded			
Coefficient Estimate	-0.000	-0.001	-0.000
p-value	(0.31)	(0.02)	(0.03)
Adj-R^2	0.042	0.039	0.033
Obs.	866	834	801
Model 7: Average *ΔN* over A-R as independent variable, CAR included			
Coefficient Estimate	-0.000	-0.000	-0.000
p-value	(0.33)	(0.09)	(0.22)
Adj-R^2	0.038	0.033	0.027
Obs.	853	821	790
Model 8: Average *ΔN* over A-R as independent variable, CAR excluded			
Coefficient Estimate	-0.000	-0.001	-0.000
p-value	(0.20)	(0.02)	(0.09)
Adj-R^2	0.043	0.039	0.031
Obs.	866	834	801

risk factors.[5] *ROA*, defined as a firm operating income (EBIT) divided by its total assets, is included to control for a firm profitability. *CAR* is the three-day cumulative abnormal return of an acquiring firm around the bid announcement date, adjusted by Fama-French 25 size-book-to-market portfolios. Some institutions are momentum investors and it is found that CAR is highly correlated with the changes in institutional ownership around M&As. It is possible that institutional investors trade acquirer stocks chasing the market response to M&A

[5] See Moeller *et al.* (2004) on the effect of size on the gains from acquisitions.

announcements. CAR is included in the regressions to control for this effect. The dummy *Cash* equals one or zero, with one indicating Cash Deals. And the dummy *Equity* equals one or zero, with one indicating Equity Deals. *Hostile* is also a dummy that equals one if an acquirer is labeled as hostile in the SDC dataset, and zero otherwise. *Ratio* is a target size over its acquirer size measured at the end of qtr(-1). Hostile, Ratio, and two dummies of Cash and Equity are to control for the deal-specific characteristics. In addition, the year dummies are used to control for the year effects.

The results are set forth in Table 8, with Panel A and B using the raw and portfolio-adjusted approaches, respectively. Because of the documented high correlation coefficients between CAR and the changes in institutional ownership, each regression is repeated with CAR excluded from the model to avoid the multicollinearity. Only the coefficient estimates of the changes in institutional ownership, their *p*-values, the adjusted R^2, and the numbers of observations used in the regressions are presented in the table because of the space constraints.

Table 8 shows that none of the coefficient estimates of the changes in institutional ownership is significantly positive and even some of them are significantly negative. Because we expect that there is a positive association between the post-transaction performance and the changes in institutional ownership during M&As, the result does not support the hypothesis that institutional investors trade acquirer stocks because they are better informed about M&A transactions. Yet, why institutional investors buy acquirer stocks around an M&A announcement is still a puzzle.

6. Does Institutional Trading Behavior Affect an M&A Process?

The literature has shown a lot of evidence that the presence of institutional ownership improves the corporate governance by monitoring management through an inside mechanism. For example, institutional investors come up with their own proposal in shareholder meetings, vote against the proposals that would hurt their interests, and express their comments, suggestions, and even requirements on the management of a firm in their portfolio. Would institutional investors affect the corporate governance through an outside mechanism such as the market for corporate control? To answer this question, this section tests the hypothesis that institutional behavior of trading acquirer stocks would affect the outcome of an M&A bid. The logit regression is used to examine the relationship between the changes in institutional ownerships during an M&A transaction and the probability that the deal succeeds. If institutional trading behavior affects the process of M&A, then we expect that the changes in institutional ownership would be closely associated with the probability of success.

The logit regression is estimated on the M&A sample. A dummy variable, equal to one if a deal is successful and zero otherwise, is used as a dependent variable. The changes in institutional ownerships, ΔH and ΔN, in qtr0 and their average changes over A-R Period, raw or portfolio-adjusted, are independent variables in the regressions, separately. It is possible that institutional investors are buying acquirer stocks because they predict a high probability that the deal will succeed. To control for this effect, CAR is included in the regressions to proxy for the market expectation about the success of a deal. As in the OLS regressions, Holdings(-1), Size, BEME, ROA, Cash, Equity, Hostile, and Ratio are included to control for the firm- and deal-specific characteristics, and the year dummies are used to control for the year effect. Also, the regressions are repeated without CAR to avoid the multicollinearity between CAR and the changes in institutional ownership.

Table 9

Analysis of Probability of Success by Logit Regression

This table shows the results from the logit regressions. The dependent variable is a dummy, equal to one if a deal is successful, and zero otherwise. *ΔH* and *ΔN* are the changes in the institutional holdings and owners in qtr0, respectively. Average *ΔH* and *ΔN* are the corresponding average changes over A-R Period. These variables are included in the regressions, separately, as independent variables. Both of *ΔH* and *ΔN* are measured by the raw and portfolio-adjusted approaches. Panel A and B present the results of analyses using the raw and portfolio-adjusted approaches, respectively. Control variables are as follows. *Holdings(-1)* is the aggregate institutional holdings of an acquirer stock at the end of qtr(-1). *Size* is the capitalization defined as a product of a firm stock market price and its shares outstanding at the end of the quarter immediately prior to the announcement. *BEME* is the book-to-market equity ratio defined as Fama and French (1993). *ROA* is defined as EBIT of a firm divided by its total assets. *CAR* is the three-day cumulative abnormal return of an acquiring firm around the bid announcement date adjusted by Fama-French 25 size-book-to-market portfolios. The dummy *Cash* equals one if a deal is paid all by cash and zero otherwise, and the dummy *Equity* equals one if a deal is a pure stock swap deal and zeor otherwise. *Hostile* is also a dummy that equals one if the acquirer is labeled as hostile in the SDC dataset and zeor otherwise. *Ratio* is target size over acquirer size measured at the end of qtr(-1). In addition, the year dummies are used to control for the year effect. In the regressions (5)-(8), CAR is excluded from the models to avoid the multicollinearity with the changes in institutional ownership. *p*-value is reported in parentheses beneath the coefficient estimates. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Changes in Institutional Ownership Measured by Raw Approach

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔH in qtr0	4.271***				4.273***			
	(<0.01)				(<0.01)			
Average *ΔH* over A-R		5.156***				5.088***		
		(<0.01)				(<0.01)		
ΔN in qtr0			0.015***				0.016***	
			(0.01)				(<0.01)	
Average *ΔN* over A-R				0.039***				0.040***
				(<0.01)				(<0.01)
CAR	1.858*	1.769*	1.667*	1.795*				
	(0.07)	(0.08)	(0.10)	(0.08)				
Holdings(-1)	0.145	0.286	-0.069	-0.051	0.115	0.245	-0.105	-0.096
	(0.72)	(0.49)	(0.87)	(0.90)	(0.77)	(0.55)	(0.79)	(0.81)
Log(Size)	0.093	0.082	0.082	0.067	0.106	0.096	0.093	0.077
	(0.15)	(0.21)	(0.21)	(0.32)	(0.10)	(0.13)	(0.15)	(0.24)
BEME	0.357	0.355	0.321	0.344	0.387*	0.383*	0.354	0.378
	(0.13)	(0.13)	(0.17)	(0.15)	(0.10)	(0.10)	(0.12)	(0.11)
ROA	-0.063	-0.056	0.028	-0.018	-0.002	-0.027	0.057	0.003
	(0.94)	(0.94)	(0.97)	(0.98)	(1.00)	(0.97)	(0.94)	(1.00)
Cash	-0.113	-0.146	-0.145	-0.073	-0.085	-0.118	-0.115	-0.043
	(0.61)	(0.51)	(0.51)	(0.74)	(0.69)	(0.58)	(0.59)	(0.84)
Equity	0.567***	0.548***	0.502***	0.056***	0.578***	0.563***	0.511***	0.526***
	(<0.01)	(<0.01)	(0.01)	(0.01)	(<0.01)	(<0.01)	(0.01)	(0.01)
Hostile	0.062	0.075	0.044	0.056	0.169	0.183	0.146	0.166
	(0.82)	(0.78)	(0.87)	(0.84)	(0.53)	(0.49)	(0.58)	(0.54)
Ratio	-0.777***	-0.753***	-0.760***	-0.752***	-0.811***	-0.790***	-0.798***	-0.795***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Intercept	0.491	0.524	0.694	0.677	0.301	0.331	0.517	0.512
	(0.35)	(0.32)	(0.19)	(0.21)	(0.56)	(0.52)	(0.32)	(0.33)
Year Dummies Included	yes	yes	yes	yes	yes	yes	yes	yes
pseudo- R^2	0.155	0.154	0.149	0.186	0.161	0.159	0.157	0.190
Obs.	1146	1146	1146	1146	1167	1167	1167	1167

Panel B: Changes in Institutional Ownership Measured by Portfolio-Adjusted Approach

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔH in qtr0	4.279***				4.220***			
	(<0.01)				(<0.01)			
Average *ΔH* over A-R		5.029***				4.938***		
		(<0.01)				(<0.01)		
ΔN in qtr0			0.021***				0.022***	
			(<0.01)				(<0.01)	
Average *ΔN* over A-R				0.046***				0.047***
				(<0.01)				(<0.01)
CAR	1.879*	1.781*	1.604	1.775*				
	(0.06)	(0.08)	(0.12)	(0.09)				
Holdings(-1)	0.131	0.271	-0.068	-0.032	0.100	0.231	-0.102	-0.075
	(0.75)	(0.51)	(0.87)	(0.94)	(0.80)	(0.57)	(0.80)	(0.8)
Log(Size)	0.087	0.074	0.094	0.090	0.100	0.089	0.108	0.103
	(0.18)	(0.25)	(0.15)	(0.18)	(0.12)	(0.17)	(0.10)	(0.12)
BEME	0.355	0.353	0.315	0.326	0.384	0.382	0.339	0.356
	(0.13)	(0.14)	(0.18)	(0.18)	(0.10)	(0.10)	(0.14)	(0.13)
ROA	-0.080	-0.076	-0.013	-0.108	-0.015	-0.041	0.014	-0.086
	(0.92)	(0.93)	(0.99)	(0.90)	(0.98)	(0.96)	(0.99)	(0.92)
Cash	-0.109	-0.140	-0.123	-0.028	-0.082	-0.112	-0.100	0.000
	(0.62)	(0.52)	(0.57)	(0.90)	(0.70)	(0.60)	(0.64)	(1.00)
Equity	0.561***	0.544***	0.506***	0.539***	0.572***	0.559***	0.516***	0.546***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(0.01)	(0.01)
Hostile	0.062	0.076	0.054	0.054	0.172	0.185	0.164	0.164
	(0.82)	(0.78)	(0.84)	(0.84)	(0.52)	(0.49)	(0.54)	(0.54)
Ratio	-0.783***	-0.761***	-0.771***	-0.780***	-0.817***	-0.797***	-0.805***	-0.814***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
Intercept	0.564	0.609	0.638	0.594	0.373	0.410	0.457	0.410
	(0.28)	(0.24)	(0.23)	(0.27)	(0.47)	(0.43)	(0.38)	(0.44)
Year Dummies Included	yes	yes	yes	yes	yes	yes	yes	yes
pseudo- R^2	0.154	0.153	0.152	0.187	0.160	0.158	0.159	0.195
Obs.	1142	1146	1146	1146	1167	1167	1167	1167

The results, displayed in Table 9, show that the coefficient estimates of ΔH and ΔN in qtr0 and the average ΔH and ΔN over A-R Period are all positive at the 1% level of significance in all regressions, whether the change in institutional ownership is measured by

the raw or portfolio-adjusted approach. CAR, with positive estimated coefficients at the significance level of 1% in the most cases, does not affect the relationship between the probability of success and the changes in institutional ownership. This is very strong evidence that institutional behavior of trading acquirer stocks could influence the outcome of an M&A offer. The implication of this finding is important. Institutional investors are a force in the market for corporate control, and their trading behavior could promote the success of an M&A transaction and improve the running of the market for corporate control. Thus, institutional investors have an impact on the corporate governance, not only from the inside, but also from the outside through the market for corporate control.

7. Conclusion

This essay studies the institutional trading behavior by investigating the changes in institutional ownership of acquiring firms over the process of M&A transactions. Institutional ownership is measured by institutional holdings—the percentage of an acquirer stock owned by institutions—and institutional owners—the number of institutional investors of an acquiring firm. It is found that the institutional investors increase their holdings of acquirer shares in the announcement quarter, which indicates that institutional investors are buying acquirer stocks. This general buying behavior is mainly driven by Equity and Mix Deals, or Success Deals. It is also found that the institutional holdings decrease in the resolution quarter. However, this decrease is mainly driven by the reduction in institutional holdings resulting from the issue of equity integration and is partially driven by the institutional behavior of selling acquirer stock when an M&A bid fails. Also, it is found that the number of institutional investors of an acquiring firm keeps increasing along the process of M&A.

The evidence based on the documented institutional behavior supports the argument that institutional trading of an acquirer stock enhances the probability that an M&A bid succeeds. It indicates that institutional trading behavior would make the market for corporate control more effective and, in turn, have an impact from the outside on corporate governance. Nevertheless, the evidence does not support the argument that institutional investors trade acquire stocks over an M&A process because they are better informed in choosing potential winners among acquiring firms. Considering that the cumulative abnormal returns of acquiring firms are usually zero or slightly negative, institutional buying of acquirer stocks around an M&A is still an anomaly.

References

Ashraf, Rasha, and Narayanan Jayaraman, 2007, Institutional investors' trading behavior in mergers and acquisitions, AFA 2007 Chicago Meetings Paper, available at SSRN at http://ssrn.com/abstract=890575.

Chen, Xia, Jarrad Harford, and Kai Li, 2007, Monitoring: Which institutions matter? *Journal of Financial Economics* 86, 279-305.

Dor, Arik B., 2003, The performance of initial public offerings and the cross section of institutional ownership, Northwestern University Finance Working Paper, available at SSRN at http://ssrn.com/abstract=459160.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.

Gibson, Scott, Assem Safieddine, and Ramana Sonti, 2004, Smart investments by smart Money: evidence from seasoned equity offerings, *Journal of Financial Economics* 72(3), 581-604.

Gompers, Paul A., and Andrew Metrick, 2001, Institutional investors and equity price, The *Quarterly Journal of Economics*, February, 229-259.

Hsieh, Jim, and Ralph A. Walkling, 2005, Determinants and implications of arbitrage holdings in acquisitions, *Journal of Financial Economics* 77, 605-648.

Jensen, Michael C., and Richard S. Ruback, 1983, The market for corporate control, *Journal of Financial Economics* 11, 5-50.

Lyon, John D. Brad M. Barber, and Chih-ling Tsar, 1999, Improved methods for tests of Long-run abnormal stock returns, *Journal of Finance* 54, 165-201.

Moeller, Sara B., Frederick P. Schlingemann, Rene M. Stulz, 2004, Firm size and the gains from acquisitions, *Journal of Financial Economics* 73, 201-228.

Parrino, Robert, Richard W. Sias, Laura T. Starks, 2003, Voting with their feet: institutional ownership changes around forced CEO turnover, *Journal of FinancialEconomics* 68, 3-46.

Pinkowitz, Lee, (2000), Monitoring by transient investors? Institutions and corporate control, Working Paper, Georgetown University, Department of Finance, availableat SSRN: http://ssrn.com/abstract=247004.

Schwert, G. William, 2000, Hostility in takeover: in the eyes of the beholder? The *Journal of Finance* 6, 2599-2640.

International Review of
Accounting, Banking and Finance
Vol. 1, No. 2, July 2009

IRABF
© 2009

Co-authorship Patterns in Accounting Research

Kam C. Chan[a] , Carl R. Chen[b] , Louis T.W. Cheng[c]

a. Department of Finance Western Kentucky University
b. Department of Economics and Finance University of Dayton
c. School of Accounting and Finance Hong Kong Polytechnic University

---

Abstract: Using data from 24 accounting journals during 1991 to 2005, we examine the determinants for coauthorship ordering. While there is a significant increase in the percentage of co-authored papers throughout the period, about 75 percent of all co-authored papers have the authors' names listed alphabetically in most years. Our logit regression results show that an alphabetically ordered co-authorship listing is related to fewer authors, higher article quality, and non-Asian/European coauthors.

JEL Classification: G00, J40, J62
Keywords: Accounting research; Institutional ranking; Co-authorship

---

1. Introduction

The objective of this article is to study the co-authorship patterns in accounting research. In particular, we examine the relation between patterns related to the order in which authors' names appear and various characteristics of authors, articles, and institutions for articles published in a set of 24 leading accounting journals during 1991 to 2005. As studies on the co-authorship patterns in accounting research are scant, and an understanding of this pattern is important in deciding how credit is shared among co-authors, our findings will shed some light on the relationship between research contribution and the order used for listing authors. Specifically, we seek answers to the following questions: Do different accounting journals exhibit different co-authorship patterns? What are the relationships between author ordering and characteristics such as, journal quality, number of authors, types of institutions, and cultural factors?

Our results indicate that there is an increasing trend for co-authored articles in accounting research during the period under study. The percentage of co-authored articles gradually rises from 58.5 percent in 1991 to 72.3 percent in 2005. Among the co-authored articles in accounting, it is interesting to note that the number of articles where authors are listed in alphabetical order is disproportionately higher than for the non-alphabetically ordered co-authored papers. About 75 percent of all coauthored articles list the authors in alphabetical order, and this percentage has been steady each year during 1991-to-2005. Our findings suggest that there are some significant factors in determining the order for listing co-authors. The likelihood of alphabetically listing co-authors is positively associated with fewer co-authors, higher quality of the article, and co-authors of non-Asian/European origins. Academic institutions should factor in this alphabetical-order finding in accounting research when making personnel evaluations regarding promotion, tenure, and hiring.

2. Literature review

There are two branches of literature in the subject area of research collaboration. The first branch focuses on the opinions of authors with respect to their experience in co-authorship. These studies use qualitative research methods and survey authors' opinions on the research credit allocation among coauthors. Tompkins, Nathan, Hermanson, and Hermanson (1997), Schinski, Kugler, and Wick (1998), and Holder, Langrehr, and Schroeder (2000) offer their survey findings in finance.

As indicated by Tompkins et al. (1997), both administrators and professors perceive that the share of an individual author's intellectual contribution in an N-authored article is more than 1/N. This is especially interesting as some institutions give their faculty full credit for each coauthored article. In addition, survey respondents from Tompkins et al. also perceive that lead authors receive disproportionately more credit than their coauthors. Schinski, Kugler, and Wick (1998) provide a similar finding that finance professors give more than 1/N credit to the lead authors. Holder, Langrehr, and Schroeder (2000) also examine author sequencing and suggest that finance professors in universities with doctoral programs prefer to use alphabetical ordering.

In marketing, Schroeder, Langrehr, and Floyd (1995) survey marketing professors regarding various issues in coauthoring. Specifically, Schroeder et al. ask the respondents to identify the factors determining co-author sequencing. The reported factors, in order of importance, are: having an original idea, managing the manuscript, and collecting the data. Furthermore, the marketing respondents regard the relative contribution rule as the most appropriate in determining the sequence in listing coauthors.[1]

The second branch of the literature focuses on the quantitative aspects of co-authorship issues. These studies report various co-authorship patterns and the reasons behind a particular author-ordering rule. There are two strands in this literature. The first strand provides theoretical models to explain the author-ordering rule. Engers, Gans, Grant, and King (1999) apply a bargaining behavioral model to explain the reasons behind the dominance of the alphabetical-ordering rule among authors in economics publications. They argue that, as articles with alphabetically ordered authors mute the contribution signal to outsiders, every coauthor "does not lose" in terms of outside perception to relative contribution. They conclude that the alphabetical-ordering rule is a bargaining equilibrium outcome among coauthors. In addition, they also suggest that the larger the team size (the number of coauthors), the less likely that the coauthors will use an alphabetical ordering rule.

Joseph, Laband, and Patil (2005) offer a stochastic model of author behavior to relate the quality of an article to co-author ordering. They show that the higher the quality of the article, the more likely the authors will use an alphabetical-ordering rule. It is because every co-author would contribute significantly to a high quality article, leaving no room for a slacker. Thus it is more difficult to distinguish which author makes the most contribution. Both Engers et al. and Joseph et al. are theoretical in nature and offer no empirical evidence, however.

The second strand of the quantitative-oriented literature examines how well the theoretical models apply to the actual data. Brown, Chan, and Chen (2004) study finance authors, and Brown, Chan, and Lai (2006) examine marketing authors. Both Brown et al. (2004) and Brown et al. (2006) find evidence to support the theoretical models described in Enger et al. and Joseph et al. In addition to team size and quality factors, they suggest that

[1] On a five-point scale with 5 as the highest, the respondents give the average of 4.8 for a relative contribution rule in Schroeder et al. (1995). The averages are 3.5, 2.4, and 2.4 for alphabetical, reverse alphabetical, and random order rules, respectively.

cultural factors (i.e., Asian and European authors) also play a role in determining whether articles use alphabetical order.

In summary, while accounting research exhibits an increasing trend in coauthorship and alphabetical ordering is common, there are no published studies on this subject. We integrate the theoretical models in Enger et al. and Joseph et al. and apply the research design in Brown et al. (2006) to articles from a set of 24 leading accounting journals during the period of 1991 to 2005 to study the co-authorship patterns and author-ordering sequences in accounting research.

3. Research method

According to Enger et al. (1999), Joseph et al. (2005), and Brown et al. (2006), there are three underlying factors in determining author ordering among co-authors. They are: team size, quality of article, and cultural practices. We construct a set of variables to represent the three determinants similar to Brown et al. (2006) for analysis in a logit model. The model can be written as (with expected signs of estimated coefficients on top of the equation):

$$Order_i = \beta_0 + \underset{(-)}{\beta_1 Size_i} + \underset{(-)}{\beta_2 Rank_i} + \underset{(+)}{\beta_3 Year_i} + \underset{(+)}{\beta_4 Top_i} + \underset{?}{\beta_5 Asia_i} + \underset{?}{\beta_6 Europe_i} + \varepsilon_i \qquad (1)$$

Where $Order_i$ = the author ordering in i^{th} multi-authored paper; 1 for alphabetical order and 0 for non-alphabetical order;

$Size_i$ = Team size, measured by the number of co-authors in the ith article;

$Rank_i$ = the average rank of all co-authors' academic institutions in the ith article; it takes a value of 1 to 5, with 5 as the highest ranked;

$Year_i$ = the publication year of ith article measured from 1 to 15 with 1 for 1991, 2 for 1992, ... and 15 for 2005;

Top_i = Top journal dummy variable for the ith article; it takes a value of 1 for articles in the top five accounting journals, i.e., *Accounting Review, Journal of Accounting Research, Journal of Accounting and Economics, Contemporary Accounting Research, and Accounting, Organizations*, and Society; all else = 0;

$Asia_i$ = Asia-Pacific dummy variable for the ith article; it takes value of 1 if at least one co-author is from an Asian-Pacific institution; all else = 0;

$Europe_i$ = European dummy variable for the ith article; it takes value of 1 if at least one co-author is from a European institution; all else = 0.

The first factor is the team size (number of coauthors). According to Enger et al. (1999), the larger the team size, the more complicated the bargaining process among the coauthors will be. Therefore, it is logical to expect that the co-authors are less likely to agree on alphabetical ordering when team size increases. In addition, as elaborated in Brown et al. (2006), when team size is larger, there is less credit to share among many coauthors. Thus, the leading contributor has more incentive to signal his/her contribution by asking for the lead authorship in a multi-authored article. Therefore, we anticipate a negative coefficient of team size in Equation (1).

The second factor is the quality of the article. According to Joseph et al. (2005), quality of an article is strongly related to the possibility of alphabetical ordering. Since it is cost prohibitive to examine the quality of individual articles in a diverse set of journals over a fifteen-year period, we use three different measures to represent article quality. First, we use articles published in the top-five accounting journals (*Accounting Review, Journal of Accounting Research, Journal of Accounting and Economics, Contemporary Accounting Research,* and *Accounting, Organizations, and Society*) to indicate article quality. It is well recognized that top accounting journals require substantial rigor and effort for authors to publish articles. Therefore, publishing an article in one of the top accounting journals is a good measure of article quality as described in Joseph et al. 's model.

Second, we also use a time trend variable to provide a crude measure of the overall quality of an article. Ellison (2002a, 2002b) argues that, *ceteris paribus*, recent articles in the same journal have a higher quality than more distant articles. As knowledge accumulates and competition for publishing intensifies, referees expect higher quality articles from more recent submissions than from distant articles. Thus, the coefficient associated with the time trend variable is expected to be positive in Equation (1).

The third quality measure for articles is the characteristics of the co-authors. Since highly ranked institutions expect their researchers to produce higher quality articles, all things being equal, authors affiliated with highly ranked institutions are expected to produce higher quality articles. Our global ranking in accounting programs is based upon Chan, Chen, and Cheng (2007). Operationally, we choose only academic institutions, and we classify institutions into five levels according to the cumulative weighted number of articles produced in the 24 accounting journals. The top level (Level 5) institutions, as a group, produce 20% of the total articles. Level 4 institutions produce the next 20% of weighted number of articles and so forth. Accordingly, Level 5, 4, 3, 2, and 1 institutions consist of top 22 (1st to 22nd ranked), next 36 (23rd to 58th ranked), next 60 (59th to 118th ranked), next 121 (119th to 239th ranked), and the last 848 (240th to 1,087 ranked) institutions, respectively.

Once an author's institution is ranked, we take the average of all the ranks for co-authors' affiliated institutions.[2] Similar to other two quality measures, we expect the average rank of all co-authors to be positively correlated with the tendency of using an alphabetically ordered listing.

Finally, similar to Brown et al. (2006), we also consider cultural factors in the co-author ordering rule. Anecdotal evidence suggests that Asian and European academic environments may operate differently from that of U.S. For instance, if an institution specifically requires their faculty to have *x* number of leading-author articles for tenure and promotion decisions, then leading-contributing authors have an incentive to be the leading authors within such an academic environment. Without some strong prior empirical evidence, the signs of these cultural factor coefficients are unclear and, therefore, will be empirically determined in our analysis.

4. Data

For the purpose of this study, we use the same data as in Chan et al. (2007). The 24 journals are: *Abacus; Accounting, Auditing, and Accountability Journal; Accounting and Business Research; Accounting and Finance; Accounting Review; Accounting, Organizations and Society; Auditing: A Journal of Practice and Theory; Behavior Research in Accounting;*

[2] We do not count non-academic coauthors. If an academic author co-write with a non-academic author, we only use the academic author's institution rank in the calculation.

British Accounting Review; Contemporary Accounting Research; European Accounting Review; Issues in Accounting Education; Journal of Accounting and Economics; Journal of Accounting and Public Policy; Journal of Accounting Literature; Journal of Accounting Research; Journal of Accounting, Auditing, and Finance; Journal of Management Accounting Research; Journal of the American Taxation Association; Journal of Business Finance and Accounting; Management Accounting Research; National Tax Journal; Review of Accounting Studies; and *Review of Quantitative Finance and Accounting*. The data include authors' names and their affiliations during a 15-year period from 1991 to 2005. These 24 accounting journals published 8,327 articles, among which 5,509 are coauthored articles. Of the 5,509 multi-authored articles, 5,406 have at least one author with an academic affiliation.

5. Results

5.1. Descriptive Statistics

Table 1 depicts the trend of multi-authored articles in accounting research. While the percentage of co-authored article by two persons remains steady at around 41 percent during the 15-year period, the percentage of articles co-authored by three or more academics has increased. As a result, the overall percentage of co-authored articles increased from 58.5 percent in 1991 to over 70 percent in recent years. Interestingly, the percentage of articles with alphabetically-listed authors among the multi-authored articles is quite steady and remains at around 75% during the period.

Table 1.

Trends in multi-authored papers in 24 leading accounting journals (1991-2005)

This table presents co-authorship trends in 24 leading accounting journals during the 1991 to 2005 period.

Year	Total number of articles	% of 2-authored articles	% of 3-authored articles	% of 4 or more authored articles	% of multi-authored articles	% of articles listing authors in alphabetical order among multi-authored articles
1991	487	41.5%	16.0%	1.0%	58.5%	74.0%
1992	513	42.9%	15.6%	3.3%	61.8%	74.5%
1993	554	42.2%	18.6%	1.4%	62.3%	71.3%
1994	567	41.1%	19.9%	2.3%	63.3%	76.6%
1995	546	38.1%	20.9%	2.6%	61.5%	75.3%
1996	587	40.5%	20.8%	2.4%	63.7%	71.7%
1997	558	42.5%	20.6%	2.2%	65.2%	73.1%
1998	567	40.6%	19.6%	3.5%	63.7%	73.4%
1999	555	41.3%	20.4%	3.6%	65.2%	74.3%
2000	573	40.7%	23.9%	3.8%	68.4%	78.1%
2001	528	41.3%	22.9%	3.6%	67.8%	72.9%
2002	562	40.0%	23.7%	5.5%	69.2%	73.3%
2003	587	37.3%	30.3%	3.1%	70.7%	77.6%
2004	584	44.3%	27.4%	5.0%	76.7%	76.1%
2005	559	38.3%	29.0%	5.0%	72.3%	77.2%
All years	8,327	40.8%	22.1%	3.2%	66.2%	74.7%

In Table 2, Panel A, the same trend is shown for each individual journal. As expected, different accounting journals exhibit different co-authorship patterns. In terms of percentage of multi-authored articles, *European Accounting Review* has the lowest percentage (around 48%) while *Review of Quantitative Finance and Accounting* has the highest percentage (around 80%). The percentage of articles using alphabetical ordering for listing authors is also different across journals. On one end, almost 95 percent of the *Review of Accounting Studies* articles list authors in alphabetical order; on the other end, *Accounting, Auditing, and Accountability Journal* shows only 52 percent for the same ordering rule.

Table 2.

Author ordering patterns in accounting journals (1991-2005)

This table presents the percentage of multi-authored papers for 24 leading accounting journals from 1991 to 2005 in Panel A. The last column shows the percentage of papers with authors' names listed in alphabetical order. The results suggest that authors in different journals use different name-order patterns. Panels B tests the difference between the ex ante alphabetical ordering probability and the realized probability.

Panel A: Co-author order patterns

Journals	Total number of articles	% of 2-authored articles	% of 3-authored articles	% of 4 or more authored articles	% of multi-authored articles	% of articles listing authors in alphabetical order among multi-authored articles
Accounting, Auditing, and Accountability Journal	386	34.5%	17.1%	3.6%	55.2%	52.1%
Abacus	228	39.0%	14.5%	1.8%	55.3%	66.7%
Accounting and Business Research	322	41.0%	20.8%	2.5%	64.3%	74.4%
Accounting and Finance	221	45.7%	20.4%	3.2%	69.2%	75.2%
Accounting, Organizations and Society	469	38.4%	15.6%	1.7%	55.7%	66.7%
Accounting Review	529	41.0%	24.0%	3.4%	68.4%	89.2%
Auditing: A Journal of Practice and Theory	276	41.3%	33.0%	5.1%	79.3%	70.3%
British Accounting Review	269	37.9%	16.7%	3.3%	58.0%	68.0%
Behavior Research in Accounting	177	44.1%	24.9%	4.5%	73.4%	63.9%
Contemporary Accounting Research	368	39.4%	28.0%	4.3%	71.7%	84.1%
European Accounting Review	465	31.4%	13.3%	3.4%	48.2%	65.6%
Issues in Accounting Education	434	38.2%	24.7%	3.2%	66.1%	62.7%
Journal of Accounting, Auditing, and Finance	335	43.6%	25.4%	2.7%	71.6%	80.8%
Journal of Accounting and Economics	360	38.6%	31.4%	3.3%	73.3%	92.1%
Journal of Accounting Literature	74	40.5%	21.6%	6.8%	68.9%	66.7%
Journal of Accounting and Public Policy	238	45.4%	23.1%	4.6%	73.1%	74.7%
Journal of Accounting Research	379	43.0%	32.7%	3.2%	78.9%	88.3%
Journal of the American Taxation Association	202	41.6%	22.8%	3.5%	67.8%	75.2%
Journal of Business Finance and Accounting	893	43.8%	25.1%	2.7%	71.6%	72.3%
Journal of Management Accounting Research	141	42.6%	25.5%	4.3%	72.3%	75.5%
Management Accounting Research	287	41.5%	13.9%	4.9%	60.3%	60.7%

Journals	Total number of articles	% of 2-authored articles	% of 3-authored articles	% of 4 or more authored articles	% of multi-authored articles	% of articles listing authors in alphabetical order among multi-authored articles
National Tax Journal	640	37.3%	10.6%	2.2%	50.2%	86.0%
Review of Accounting Studies	143	42.7%	31.5%	4.2%	78.3%	94.6%
Review of Quantitative Finance and Accounting	491	52.1%	25.5%	2.9%	80.4%	67.9%
TOTAL	8,327	40.8%	22.1%	3.2%	66.2%	74.7%

Panel B: Z-statistics for author ordering in multi-authored articles in the sample

Number of co-authors	Alphabetical ordering probability (%) for non alphabetical ordering of coauthors (1)	Realized alphabetical ordering in the sample (%) (2)	Total number of articles	Z-statistics for null hypothesis that (2) - (1) = 0
Two	50.0	79.8%	3,325	34.4***
Three	16.7	67.6%	1,819	58.2***
Four	4.17	57.3%	239	41.1***

Note: *** denotes significance at the 1% level.

A relevant question to ask is whether the reported statistics are due to random chance. To address this issue, we examine the realized probability of the actual number of articles using the alphabetical-ordering rule for listing authors, relative to the probability of articles having alphabetically listed authors when the co-authors actually use different co-author ordering rules. The results are reported in Panel B of Table 2. The Z-statistics are all rejected at the 1% level, suggesting that the reported statistics for alphabetical-author listing is not “a random chance of occurrence.” For instance, for articles with three co-authors, if the accounting authors favor a non-alphabetically rule other than an alphabetical listing, only 16.7 percent of the articles in the data should have coauthors listed in alphabetical order. Instead, almost 68 percent of tri-authored articles have the authors listed in alphabetical order. We can interpret the figures for 2-author and 4-author articles similarly. Obviously, accounting authors favor using the alphabetical order over other ordering rules. This preliminary evidence lends some support to Engers et al.’s and Joseph et al.’s theoretical models.

5.2. Univariate Analyses

In this section, we report results from some univariate analyses on the relation between ordering rule and author, article, and/or institutional characteristics. Table 3 Panel A shows the relationship between journal quality and ordering rules. Among 1,450 articles published in the top five journals, 1,226 (84.55%) list coauthors in alphabetical order. On the other hand, among the 3,956 articles in the remaining 19 other journals, 2,805 (70.9%) follow the alphabetical ordering rule. The χ^2 statistics rejects the null hypothesis that the alphabetical-ordering rule and journal quality are independent of each other; hence, there is evidence that listing authors in alphabetical order is more prevalent in top-quality journals.

Panel B presents the relation between team size and ordering rule. For the two-author articles, 79.8 percent of the articles list the authors alphabetically. The percentage of articles listing authors alphabetically steadily declines as the team size increases. Only 47.83 percent of all coauthored articles with five or more authors use the alphabetical-ordering rule. The χ^2 test rejects the null hypothesis that team size and alphabetical ordering are independent. This relation can be further seen in Panel C, which tests the null hypothesis that the mean and variance of the number of authors in articles using an alphabetically ordered and non-

alphabetically ordered listing are identical. Both the F- and the t-tests suggest that team size is positively related to the tendency of using non-alphabetical listing.

Table 3.

Univariate Analyses of multi-authored accounting articles from authors in academic institutions

This table presents univariate analyses for the relation between the author-ordering rule and the characteristics of the authors, articles, and institutions. We classify five ranks among academic institutions based on the cumulative percentage of weighted number of articles appearing in 24 accounting journals from 1991 to 2005. The top-5 accounting journals are: *Accounting Review*, *Journal of Accounting Research*, *Journal of Accounting and Economics*, *Contemporary Accounting Research*, and *Accounting, Organization, and Society*. The top-ranked institutions (rank = 5), as a group, published 20% of the weighted number of articles and other ranks are calculated accordingly. Among the 5,509 multi-authored articles, there are 5,406 articles authored by at least one author with an academic affiliation. In cases where some of the co-authors are from non-academic institutions, we count the average rank of all co-authors without these non-academic co-authors.

Panel A: Top-5 vs. other quality accounting journals among academic authors (N=5,406)

	Total number of articles	Articles with authors ordered alphabetically	Articles with authors ordered non-alphabetically
Top-5 accounting journals articles	1,450	1,226 (84.55%)	224 (15.45%)
Other accounting journal articles	3,956	2,805 (70.9%)	1,151 (29.1%)

Note: $\chi 2$ statistics for independence = 104.19*** (df = 1). The result is significant at the 1% level. The alphabetical order for names and the quality of a journal are not independent of each other.

Panel B: Team size and ordering rule among academic authors (N=5,406)

	Total number of articles	Authors ordered alphabetically in articles	Authors ordered non-alphabetically in articles
Two authored articles	3,325	2,654 (79.8%)	671 (20.2%)
Three authored articles	1,819	1,229 (67.56%)	590 (32.44%)
Four authored articles	239	137 (57.3%)	102 (42.7%)
Five or more authored articles	23	11 (47.83%)	12 (52.17%)

Note: $\chi 2$ statistics for independence = 141.55*** (df = 4). The result is significant at 1% level. The number of authors and alphabetical order are not independent of each other.

Panel C: F and t-tests for equal variances and means for the number of authors in articles with alphabetically ordered author lists vs. number of authors listed non-alphabetically

Variables	**Articles with authors ordered Alphabetically (N=4,031)**		Articles with authors ordered Non-alphabetically (N=1,375)		**F-test for equal variances**	**t-test for equal means [(1) – (3)]**
	Mean (1)	Std dev	Mean (3)	Std dev		
Number of co-authors	2.38	0.57	2.64	0.66	1.37***	-11.13***

Panel D: F and t-tests for equal variances and means for the average institutional ranks of articles with alphabetically ordered listings vs. articles with non-alphabetically ordered listings

Variables	**Articles with authors ordered Alphabetically (N=4,031)**		Articles with authors ordered Non-alphabetically (N=1,375)		**F-test for equal variances**	**t-test for equal means [(1) – (3)]**
	Mean (1)	Std dev	Mean (3)	Std dev		
Average rank of co-authors' academic institution (1 to 5 with 5 as the highest ranked)	3.11	1.19	2.66	1.15	1.07	12.23***

Note: *** denotes significance at the 1% level.

Panel D displays the relation between the author-ordering rule and institutional rank. The t-test shows that using the alphabetical sequence is associated with the rank of an author's academic institution. Since authors' institutional ranks serve as a proxy for article quality, there is evidence that higher quality articles favor the alphabetical-ordering rule.

5.3. Logit Model Results

We present the results for our logit model (Equation (1)) in Table 4. We model the dependent variable as 1 if the article uses an alphabetical list, zero otherwise. First, as expected, the coefficient of team size measured by the number of coauthors is negative and significant at the 1 percent level, suggesting that authors favor non-alphabetical ordering rule as team size increases. The negative sign of the team size variable suggests that the need to signal relative contribution to the article as team size increases. Second, the three proxies for article quality (i.e., being published in one of the top-five accounting journals, time trend, and average rank of coauthors' institutions) in the model all carry positive signs and are

significant at the 1 percent level, indicating that there is little room for slackers in a top-quality article—hence alphabetical ordering is appropriate.

Finally, the Asia-Pacific and European dummy variables for our equation are both negative and significant at the 1percent or percent levels. This indicates that authors from Asian-Pacific and European institutions are more likely to favor an ordering pattern that denotes their relative contribution or a sequencing rule, other than the alphabetical-ordering rule.

Table 4.

A logit model of author ordering in accounting publications

The results suggest: (1) higher quality articles (published in the top-5 accounting journals) are inclined to list the coauthors alphabetically, a results that is consistent with the literature; (2) as the number of coauthors increase, the probability of listing the authors alphabetically are less likely, these results are also consistent with the suggested theory; (3) articles written by higher-ranked coauthors are more likely to list names alphabetically ordered; and (4) European and Asian coauthors are less likely to be listed in alphabetical order.

	Dependent variable = co-author ordering (alphabetical order =1; non-alphabetical order =0) and the probability modeled is alphabetical order is 1		
	Expected sign	**Estimated coefficient**	**Chi-square statistics**
Intercept		1.6452	104.40***
Number of co-authors	-	-0.6427	152.77***
Top-5 Journal, dummy variable (AOS, AR, CAR, JAE, JAR = 1; else = 0)	+	0.5627	41.64***
Year trend (1991 = 1; … 2005 = 15)	+	0.0279	13.27***
Average ranking of all coauthors' academic institutions (1 to 5 with 5 as the highest ranked)	+	0.2781	90.56***
Asia-Pacific dummy variable (at least one co-author is from an Asian-Pacific institution =1; else = 0)	+ or -	-0.4766	35.50***
European dummy variable (at least one co-author is from a European institution =1; else = 0)	+ or -	-0.1525	3.85**
Log likelihood function value		6,131.06	
Likelihood ratio test for all coefficients are joint zero (Chi-square statistics)		392.31***	
Number of observations		5,406	
Model successful classification rate		66.9%	

6. Discussions and Summary

We present several interesting findings regarding the author-alphabetical-ordering rule in a set of 24 high quality accounting journals. First, during the 1991 to 2005 period, approximately 66 percent of all articles are multi-authored articles, and among which 75 percent list authors in alphabetical order. While the number of articles listing authors in alphabetical order is steady, there is an upward trend in the number of multi-authored articles during the 15-year period. Therefore, it would create an additional tenure and promotion hurdle if promotion and tenure committees place emphasis on publishing *y* number of single-authored accounting articles as a criterion or requirement for research, promotion, or tenure.

Second, we find a positive relation between the alphabetical-ordering rule and article quality. Thus, it would be discouraging for authors with last-name initials lower in the alphabet if they are required to prove the proportion of his/her contribution to the research, especially when their schools give additional merit to the lead author in their evaluation. This is because multi-authored accounting articles are more likely to have authors listed in alphabetical order, especially when an article is published in a top-quality journal.

Last, when accounting authors collaborate with Asian and/or European colleagues, it is less likely that these Asian or European partners use an alphabetical-ordering rule. Accounting educators may improve these collaborative experiences if they took into consideration the cultural practice of their colleagues from other regions of the world.

References

Brown, C., K.C. Chan, and C. Chen. 2004. First-author conditions: Evidence from finance journal coauthorship. Paper presented at the Financial Management Association, New Orleans, October.

Brown, C., K.C. Chan, and P. Lai. 2006. Marketing journal co-authorships: an empirical analysis of co-author behavior. *Journal of Marketing Education* 28: 17-25.

Ellison, Glenn. 2002a. The slowdown of the economics publishing process. *Journal of Political Economy* 110: 947-993.

Ellison, Glenn. 2002b. Evolving standards for academic publishing: A q-r theory. *Journal of Political Economy* 110: 994-1034.

Engers, Maxim, Joshua S. Gans, Simon Grant, and Stephen P. King. 1999. First-author conditions, *Journal of Political Economy*, 107 (4); 859-883.

Holder, Mark E., Frederick W. Langrehr, and Dean M. Schroeder. 2000. Finance journal co-authorship: how do co-authors in very select journals evaluate the experience? *Financial Practice and Education* 10 (2): 142-152.

Joseph, K., D.N. Laband, and V. Patil. 2005. Author order and research quality. *Southern Economic Journal,* 71: 545-555.

Schinski, Michael, Anne Kugler, and Wendy Wick. 1998. Perceptions of the academic finance profession regarding publishing and the allocation of credit in co-authorship situations. *Financial Practice and Education* 8 (1): 60-67.

Schroeder, Dean M., Frederick W. Langrehr, and Steven M. Floyd. 1995. Marketing journal co-authorship: is it a hit or a miss with co-authors? *Journal of Marketing Education* 17 (2): 45-58.

Tompkins, James G., Siva Nathan, Roger H. Hermanson, and Dana R. Hermanson. 1997. Co-authoring in refereed journals: perceptions of finance faculty and department chairs, *Financial Practice and Education* 7 (2): 47-57.

International Review of Accounting, Banking and Finance
Vol. 1, No. 2, July 2009

IRABF
© 2009

An International Comparison of Equity Valuation Models: Hong Kong, Singapore, and Japan

Carol Callaway Dee [a], Meihua Koo [b]

a. University of Colorado Denver
b. California State Polytechnic University, Pomona

Abstract: This study assesses the ability of three valuation models—the Edwards-Bell-Ohlson (EBO) model, the discounted dividend (DD) model, and the discounted cash flow (DCF) model—to reveal a firm's intrinsic value in non-U.S. GAAP environments. Because clean surplus is a major assumption of the EBO model, we compare the valuation models across three Asian-Pacific countries whose accounting rules indicate differing levels of compliance with the clean surplus assumption—Hong Kong, Singapore, and Japan. Empirical results show that the EBO model outperforms the DD and DCF models in predictive ability in all three countries, irrespective of the differences between these countries in allowable equity adjustments. The EBO model has higher explanatory power than the other models as well; significantly so in almost all cases. We conclude that the performance of the EBO model does not seem to be hampered by differing accounting policies regarding clean surplus across the three countries.

Keywords: International accounting; Valuation; Asia-Pacific; Clean surplus; Edwards-Bell-Ohlson model

1. Introduction

In estimating the intrinsic value of the firm, the discounted dividend (DD) model and the discounted cash flow (DCF) model are the two dominant models. Studies by Ohlson (1995) and Feltham and Ohlson (1995) have stimulated interest in the Edwards-Bell-Ohlson (EBO) model, also known as the "residual income valuation" model or the "discounted abnormal earnings" model. Theoretically, the three models (DD, DCF and EBO) are mathematically equivalent. However, due to measurement errors in the models' parameters and differences in market expectations, these three valuation models may reflect different intrinsic values for a firm. Using U.S. data, Penman and Sougiannis (1998) and Francis et al. (2000) compare these three valuation models and find that the EBO model performs best. Frankel and Lee (1999) test the EBO model in a multi-national context, and show that the value estimate of the EBO model "consistently dominates earnings and book value in explaining variations in stock prices" across 20 countries.

Clean surplus is a major assumption of the EBO model. This assumption is that only net income (or loss), dividends, and net shareholders' investment affect equity. However, in the U.S. as well as other countries, there are accounting standards that violate the clean surplus assumption. In other words, certain items of gain or loss bypass the income statement and are recorded directly to shareholders' equity, resulting in "dirty surplus." We extend the work of Penman and Sougiannis (1998), Francis et al. (2000), and Frankel and Lee (1999) by

comparing the EBO, DD, and DCF models across three countries whose accounting rules result in differing levels of compliance with the clean surplus assumption—Hong Kong, Singapore, and Japan. Thus, unlike Frankel and Lee (1999), we directly compare the three models in three environments with different accounting rules related to clean surplus. This allows us to see whether the superiority of the EBO model maintains across environments with differing levels of dirty surplus.

For our sample, we find that the EBO model has the smallest prediction error (compared to the DD and DCF models) across all three countries. Further, with one exception, results from the Vuong (1989) test show that the EBO model has significantly higher explanatory power than the other models across our sample. We conclude that the EBO model performs better than the DD and DCF models in reflecting market value, irrespective of the differences between these countries in allowable equity adjustments. Thus, the performance of the EBO model does not seem to be hampered by differing accounting environments regarding clean surplus across the three countries.

The following section provides background information. Next, we discuss briefly the relevant accounting methods in Singapore, Hong Kong, and Japan. We then describe our research design and related hypotheses, present our results, and conclude.

2. Background

In general, accounting research supports the superiority of the EBO model in estimating a firm's intrinsic value, at least for U.S. firms. Frankel and Lee (1999) use the EBO model to estimate fundamental firm equity value (V), then evaluate the model's ability to explain stock prices (P) of U.S. sample firms. They show that the estimated value to price (V/P) ratio is a better predictor of cross-sectional returns than is the book value to price (B/P) ratio. Lee et al. (1999) find that the V/P ratio has statistically reliable power to predict market returns, whereas other traditional indicators of market value (i.e., B/P, earnings-to-price, and dividend yield-to-price ratios) do not. Penman and Sougiannis (1998) show that equity valuations using forecasted accrual earnings have lower valuation errors than do valuation methods that are based on forecasting dividends or cash flows. Francis et al. (2000) find that valuation errors from the EBO model are smaller than those from the DD and DCF models, and the EBO model is better able to explain variation in current prices than are the other two models. The authors point out that while in theory the EBO, DD, and DCF models yield identical valuation estimates, in practice their estimates may be affected by "inconsistent attributes" such as dirty surplus (Francis et al. 2000, fn 2).

Other studies have examined valuation models in an international context. Frankel and Lee (1999) show that foreign earnings forecasts are comparable (in terms of accuracy) to those for U.S. firms, and a hedge strategy based on the V/P ratio results in consistently positive returns. Graham and King (2000) find that for six Asian countries—Indonesia, Korea, Malaysia, the Philippines, Taiwan, and Thailand—book value and abnormal earnings are positively related to current stock price. They also show that the relation between accounting numbers and current stock prices is significantly different across the six countries. 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 results show that current earnings and lagged book values are positively and significantly related to stock prices.

Isidro et al. (2004) examine the compliance with the clean surplus relation for a sample of firms from four western countries—France, Germany, the U.S., and the U.K.—and find that the distribution of dirty surplus flows is often not centered on zero. Even so, they find no

evidence that dirty surplus leads to valuation errors when implementing the EBO model. Similarly, Isidro et al. (2006) find little relationship between dirty surplus and valuation errors in the EBO model for France, Germany and the U.K., and a weak relationship for firms in the US. However, they do not compare the performance of the EBO model with other valuation models.

In sum, research on U.S. firms supports the domination of the EBO model, while international evidence shows that the EBO model does work in non-U.S. GAAP environments. However, no study to date has *compared* the three valuation models—EBO, DD, and DCF—across countries with varying degrees of compliance with the clean surplus assumption. In our study, we build on the work of Francis et al. (2000), Isidro et al. (2004, 2006) and others by examining whether the superiority of the EBO model, in comparison to the DD and DCF models, will hold when implemented across three countries with different accounting rules related to clean surplus.

3. Accounting methods across countries

The clean surplus relation is violated when changes in equity come from sources other than income (or loss), net capital investment, and dividends. In this section, we discuss briefly the accounting standards across the three countries that may lead to differing compliance with the clean surplus relation.

In Singapore, during the period of our study, adjustments arising from error corrections, asset revaluations, and unrealized gains or losses on investments could be recorded directly to equity or reported on the income statement. Foreign currency translation adjustments were recorded directly to equity. Hong Kong's rules were similar to those of Singapore, with the following differences. First, error corrections were required to be made directly to equity. Second, asset revaluation (for real property) was optional in Singapore, but required in Hong Kong, with a corresponding adjustment to equity.

In general, Japanese accounting standards lack compatibility with those of other countries (Kaneko and Tarca 2007), and during the 1990s, the discrepancies between Japanese accounting rules and those of Singapore and Hong Kong were substantial. Because marketable securities in Japan were reported at lower of cost or market with corresponding adjustments to income, no unrealized gains on current investments were recorded, unlike the treatment in Singapore and Hong Kong. There was no practice of revaluing assets for accounting purposes in Japan, and gains or losses resulting from translation of foreign currency transactions were included in determining net income.[1]

At first glance, based on accounting principles, it would seem that Japanese surplus should be relatively clean compared to Singapore and Hong Kong. However, Japanese companies have a history of weak compliance with accounting rules (Hooper and Bradshaw 2000) which cautions against drawing conclusions on the basis of promulgated accounting standards. Moreover, other environmental and cultural factors affect external financial reporting in Japan. Parent-company, unconsolidated financial statements are the primary financial reporting mechanism in Japan (Lowe 1990; Darrough et al. 1998), and Thomas et al. (2004) provide evidence that Japanese parent-company earnings are managed via transactions with subsidiaries. Anecdotal evidence of this exists as well. Tak Wakasugi of Tokyo University states "Parent companies have long been the sideboards of Japanese corporate performance. To clean up the parent's figures, subsidiaries were often used to hide losses"

[1] Rules in Japan have changed, and now translation adjustments and unrealized gains and losses on marketable securities available-for-sale are recorded to equity. See Kubota et al. 2008.

(Hooper and Bradshaw 2000, 25). Disclosure of information to external shareholders is not a main concern of Japanese management, as they obtain funding largely through affiliated banks who can obtain company information privately (Darrough et al. 1998). Additionally, the cultural environment in Japan leads to a preference for confidentiality or even secrecy in financial reporting rather than openness and transparency (Guan et al. 2005; Hooper and Bradshaw 2000). This culture of secrecy provides ample opportunity for earnings management (Thomas et al. 2004; Darrough et al. 1998; Guan et al. 2005; Leuz et al. 2003).

Thus, while we make no predictions as to the relative size of dirty surplus across countries, we do expect variation in the levels of compliance with the clean surplus relation. This allows us to see if the superiority of the EBO model maintains in countries whose firms have differing levels of dirty surplus. However, due to the diversity in economic, cultural, and financial reporting environments in the three countries, we make no predictions as to the relative performance of the models across countries. For example, we do not test whether the EBO model performs better in Japan than it does in Singapore. All our comparisons are between models, by country.

4. Research design and hypotheses

4.1 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), these three valuation models are shown as follows.

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

DCF Model: $$V_t^{DCF} = FA_t + \sum_{\tau=1}^{\infty} \frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} \quad (2)$$

EBO Model: $$V_t^{EBO} = B_t + \sum_{\tau=1}^{\infty} \frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} \quad (3)$$

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

d_t = net dividends paid at time t;

FA_t = net financial assets at time t;

C_t = cash flows from operations at time t;

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

AE_t = Abnormal earnings of time t; and

R_F = one plus risk-free rate.

For an accurate value estimate, τ should be set to an infinite horizon for all three models. However, as a practical matter, a finite estimation horizon is used, requiring estimation of a terminal value. Based on Penman (1998), these original models need to be expanded to T terms, and perpetuity is assumed beyond T terms. Adding terminal value to the model can reduce the estimation error caused by truncating the estimation horizon. Models with estimations of terminal values are as follows:

DD*: $$V_t^{DD*} = \sum_{\tau=1}^{T} \frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{d}_{t+T+1}]}{R_F^{T}(R_F - 1)} \quad (4)$$

DCF*: $$V_t^{DCF*} = FA_t + \sum_{\tau=1}^{T} \frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{C}_{t+T+1}]}{R_F^{T}(R_F - 1)} \quad (5)$$

EBO*: $$V_t^{EBO*} = B_t + \sum_{\tau=1}^{T} \frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} + \frac{E[A\tilde{E}_{t+T+1}]}{R_F^{T}(R_F - 1)} \quad (6)$$

4.2 Hypotheses: Predictive Ability

In terms of predictive ability, a pairwise comparison of the absolute deflated stock price prediction error of all models is used 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; Francis et al., 2000), the predictive performance hypotheses are stated in alternative format as follows:

H_{1A}: For each country, the prediction error of the EBO model is smaller than the prediction error of the DD model.

H_{1B}: For each country, the prediction error of the EBO model is smaller than the prediction error of the DCF model.

The prediction error D_j^F is measured as

$$D_j^F = \left| P_j - V_j^F \right| / P_j$$

where

D_j^F = absolute value of difference between security price and valuation estimator of model F for firm j, deflated by price;

F = DD, DCF, and EBO;

P_j = security price of firm j; and

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

The smaller the value D_j^F, the more accurate is the model. We use pairwise comparisons of t statistics between the three models' prediction errors to evaluate the first two hypotheses.

4.3 Hypotheses: Explanatory Power

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

H_{2A}: For each country, the explanatory power of the EBO model is greater than the explanatory power of the DD model.

H_{2B}: For each country, the explanatory power of the EBO model is greater than the explanatory power of the DCF model.

To test these hypotheses, we separately regress the security price of each sample firm on each valuation estimate. We use the adjusted R^2 and the significance of the coefficients of the regressed models (below) as criteria to evaluate hypotheses H_{2A} and H_{2B}. We use the Vuong (1989) test to compare R^2 values across models.

$$P_j = \beta_0^{DD*} + \beta_1^{DD*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{d}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{d}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{DD*} \quad (7)$$

$$P_j = \beta_0^{DCF*} + \beta_1^{DCF*}FA_t + \beta_2^{DCF*}\{\sum_{\tau=1}^{T}\frac{E[\tilde{C}_{t+\tau}]}{R_F^{\tau}} + \frac{E[\tilde{C}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{DCF*} \quad (8)$$

$$P_j = \beta_0^{EBO*} + \beta_1^{EBO*}FA_t + \beta_2^{EBO*}OA_t + \beta_3^{EBO*}\{\sum_{\tau=1}^{T}\frac{E[A\tilde{E}_{t+\tau}]}{R_F^{\tau}} + \frac{E[A\tilde{E}_{t+T+1}]}{R_F^{T}(R_F-1)}\} + \varepsilon_j^{EBO*} \quad (9)$$

Note that in equation (9), book value is equal to the sum of net financial assets (FA_t) and net operating assets (OA_t).

4.4 Sample Design

We select firms listed in Singapore, Hong Kong, and Japan as the focus of our study for two reasons. First, all of these countries have mature capital markets and rigorous security regulations. Second, as discussed earlier, these three countries have accounting regulations with differing levels of compliance with the clean surplus relation. This provides a powerful test of whether the EBO model maintains superiority across countries with differing accounting principles and levels of clean surplus.

Due to a lack of ex ante numbers (i.e. analysts' forecasts) in these markets, we use ex post (actual) financial numbers, assuming perfect foresight. The use of historical numbers is appropriate, given our focus is to provide empirical evidence on the relative performances of the three equity valuation models rather than to establish a profitable trading strategy.

The sample consists of non-financial companies from Singapore, Hong Kong, and Japan that have the necessary data available from Research Insight Global Vantage from 1990 to 1997. Using this time period allows us to avoid both the Asian economic crisis and significant changes in GAAP for these countries that began in late 1997. To be included in the sample, firms must have available data on market value, the number of common shares outstanding, common equity, income before extraordinary items, dividends, and other required variables for calculating cash flow. The empirical analyses are conducted on a per-share basis to attenuate the size effect. Data from 1995 to 1997 are used to calculate a terminal value estimate for 1994.

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 the DD model, actual dividends paid to shareholders are used to calculate the DD estimate. For the DCF model, we define financial assets as the sum of total debt and preferred stock, as in Penman and Sougiannis (1998). We use the indirect method to compute cash flows from operations, because the statement of cash flows was not required consistently in the sample countries during the time period of our study. [2]

The cost of equity capital is the appropriate discount rate for the DD and EBO models, while a weighted average cost of capital is appropriate for the DCF model. As a practical

[2] Cash flow from operations is calculated as net income before extraordinary items, plus depreciation expense, plus equity income from unconsolidated subsidiaries, minus non-operating income, plus changes in deferred taxes, non-current accrued expenses, non-current deferred income, current assets and current liabilities.

matter, such rates are difficult to estimate, thus we adopt the approach used in Frankel and Lee (1999). They use a risk-free interest rate, plus an equity risk premium of 4.24% to estimate the normal earnings of a company's investment.[3] We use interest rates for deposit, rates for treasury bills, and the yield from government bonds as proxies for the risk-free rate in Singapore, Hong Kong, and Japan, respectively. These rates plus an equity risk premium of 4.24% are used as the discount rate in our three valuation models. Abnormal earnings for the EBO model are calculated by taking the difference between income before extraordinary items and the normal earnings of the company's beginning book value (that is, book value times the discount rate). Common shareholder's equity is used as a proxy for book value.

Based upon the criteria above, all available observations from each year are pooled into the sample for each country. Firm-year observations with any missing variables are deleted. Panel A of Table 1 presents the final sample: 327 firm-year observations for Singapore, 191 firm-year observations for Hong Kong, and 1,429 firm-year observations for Japan.

Table 1

Sample

Panel A: Number of firms

	Singapore	Hong Kong	Japan
1990	33	21	187
1991	48	33	178
1992	52	36	162
1993	84	47	223
1994	110	54	679
	327	191	1,429
Firm-years to estimate terminal value:			
1995	124	54	716
1996	128	55	812
1997	133	83	903
	385	192	2,431
Total firm-years	712	383	3,860

Panel B: Comparison of estimated dirty surplus ratios

	ABS(DS)/ABS(NI)
Singapore	5.248
Hong Kong	0.958
Japan	104.013

	t stat for difference in means
Singapore to Hong Kong	2.770**
Singapore to Japan	6.541***
Hong Kong to Japan	6.859***

, * indicates significance at α=0.006, α=0.001, respectively.

ABS(DS) equals our estimate of the absolute value of dirty surplus, calculated as follows. For each firm by year, we add net income (or subtract net loss) to beginning book value, and adjust for dividends and capital contributions during the year. We compare this total to ending book value as reported. The difference is the amount of dirty surplus. To compare across countries using different currencies, we calculate a ratio of the absolute value of this dirty surplus estimate to the absolute value of net income.

As an illustration of the differences in accounting policies across countries regarding clean surplus, we estimate the average level of dirty surplus by country (across all years). Disclosures of equity adjustments during our sample period were limited to non-existent, particularly for Japan; thus, we use a crude measure to estimate these amounts. For each firm by year, we add net income (or subtract net loss) to beginning book value, and adjust for dividends and capital contributions during the year. We compare this total to ending book value as reported. The difference is an estimate of dirty surplus. To compare across countries

[3] Results in Frankel and Lee (1999) were not sensitive to using a market risk premium that varied from 0.24 percent to 8.24 percent. As discussed in Frankel and Lee (1999), many international investment firms use a constant market risk premium.

using different currencies, we calculate a ratio of the absolute value of this dirty surplus estimate to the absolute value of net income.

Results in Panel B of Table 1 and associated t-statistics for tests of differences indicate that firms in the three countries do have differing levels of dirty surplus. The level of dirty surplus in Japan is very high. Further examination of the data indicates this is due to very low net income numbers during the sample period for Japan. After decades of growth following World War II, Japan entered a period of general economic decline during the 1990s, commonly referred to as "the lost decade" (Hayashi and Prescott 2002; Nishimura et al. 2005), which is reflected in our data. Also, as discussed earlier, Japanese financial statements lack transparency, meaning that our estimate of dirty surplus likely contains measurement error. However, we believe that this measure does illustrate the differing levels of dirty surplus for the three countries in our study.

Table 2

Summary Statistics for Pair-Wise Comparison of Prediction Error

Panel A: EBO Model vs. DD Model

Market	N	Mean	Std. Error	T	p-value
Singapore	**327**	**0.092**	**0.470**	**3.527**	**0.001**
Hong Kong	**189**	**0.718**	**1.607**	**6.139**	**0.001**
Japan	**1,429**	**0.253**	**1.297**	**7.382**	**0.001**

Panel B: EBO Model vs. DCF Model

Market	N	Mean	Std. Error	T	p-value
Singapore	**327**	**1.204**	**0.066**	**11.331**	**0.001**
Hong Kong	**189**	**0.500**	**1.450**	**4.709**	**0.001**
Japan	**1,429**	**0.293**	**2.919**	**3.791**	**0.001**

Panel C: DD Model vs. DCF Model

Market	N	Mean	Std. Error	T	p-value
Singapore	**327**	**-0.663**	**1.081**	**-11.085**	**0.001**
Hong Kong	**189**	**0.221**	**1.223**	**2.481**	**0.014**
Japan	**1,429**	**-0.040**	**3.094**	**-0.482**	**0.630**

This table presents pairwise comparisons of scaled prediction errors. EBO, DCF, and DD stand for Edwards-Bell-Ohlson, discounted cash flow, and discounted dividend, respectively. The models are presented in table 4. Statistics in this table were calculated by (1) regressing security price on the independent variable(s) of each model using 1990 to 1992 data; (2) estimating each model's value by applying the coefficients of regression obtained in step one to the 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) using t-statistics of pair-wise comparisons to evaluate the significance of the difference in prediction errors. The same steps are repeated for each sample market. A positive mean deviation indicates that the EBO model's prediction errors are smaller than the other two models, supporting the better predictive ability of the EBO model.

5. Results

5.1 Predictive Ability

The first set of hypotheses address 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) of each model; (2) estimating each model's value by applying the coefficients of regression obtained in step one to 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) using t-statistics of pair-wise comparisons to evaluate the significance of the difference in prediction errors. The same steps are repeated for each sample market. A positive mean deviation indicates that the EBO model's prediction errors are smaller than the other two models, supporting the better predictive ability of the EBO model.

Referring to Table 2, Panels A and B, the comparisons of prediction errors between the DD model and EBO model and between the DCF model and EBO model are all positive and significant at the one percent level across all three countries. This evidence provides support for the first set of hypotheses that the EBO model has better predictive ability than both the DD model and the DCF model in all three countries. Thus, irrespective of the differences between countries in allowable equity adjustments, the EBO model still performs better than the DD and DCF models in reflecting market value. These results are consistent with the notion that estimating the EBO model in countries with accounting rules that violate the clean surplus relation does not affect its predictive ability.

Table 3

Estimated Coefficients (T Statistics) of Regression of Security Price on Valuation 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	Adj R2
Singapore	**327**	**0.791** **(7.292)***	**2.381** **(29.072)***	**0.721**
Hong Kong	**191**	**0.558** **(5.144)***	**0.989** **(13.082)***	**0.472**
Japan	**1,429**	**-9.326** **(-1.068)**	**18.624** **(83.087)***	**0.829**

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	Adj-R^2
Singapore	**327**	**1.104** **(5.833)***	**2.135** **(8.059)***	**0.140** **(8.407)***	**0.299**
Hong Kong	**191**	**0.640** **(5.951)***	**1.226** **(9.121)***	**0.196** **(7.620)***	**0.457**
Japan	**1,429**	**-3.627** **(-0.411)**	**1.514** **(33.815)***	**0.372** **(25.008)***	**0.825**

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
Singapore	**327**	**0.288** **(2.246)****	**2.051** **(11.722)***	**0.976** **(13.393)***	**0.278** **(6.025)***	**0.723**
Hong Kong	**191**	**0.294** **(3.309)***	**0.955** **(8.841)***	**0.991** **(10.151)***	**0.123** **(7.830)***	**0.685**
Japan	**1,429**	**-1.843** **(-0.413)**	**2.917** **(95.705)***	**2.752** **(80.078)***	**-0.710** **(-5.199)***	**0.955**

*, ** indicate significance at the α = 1% and 3% levels, respectively (two-tailed). All F statistics of overall model significance are highly significant (at least α = 1%). EBO, DCF, and DD stand for Edwards-Bell-Ohlson, discounted cash flow, and discounted dividend, respectively. V_t^{Model} equals market value of firm at time t based on the model; d_t equals net dividends paid at time t; FA_t equals net financial assets at time t; C_t is cash flows from operations at time t; B_t equals book value of firm's equity value at time t; AE_t is Abnormal earnings of time t; and R_F is one plus the risk-free interest rate.

5.2 Explanatory Power

The second set of hypotheses examines the association between security prices and the value estimates of each model. To test these hypotheses, we regress the security price of each sample firm on the estimated valuation for each model (separately for each country). As shown in Table 3, parameter estimates are significant at three percent or higher in all three markets, and the adjusted R^2s of the EBO models (in all three markets) are larger than those of the DD model and the DCF model.

In Panel C of Table 3, the constants of all three Japanese models and the coefficient of the EBO estimate are negative. Since the sample periods used were during the collapse of Japanese bubble economy, the 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. Further examination of Japanese sample firm-years reveals that a good portion of Japanese firms have negative abnormal earnings. The lack of focus on earnings in Japanese firms is likely due to the heavy debt and significant government control. However, this does not appear to affect the EBO model's ability to explain market value in the Japanese market.

In Table 4 we present Z-statistics for comparisons of explanatory power across models by country. We use the Vuong (1989) test as further described in Dechow (1994). When comparing the EBO model to the DD model and the DCF model, we calculate the following for each observation *j* (by country) (Dechow 1994, eq. A.8)

$$m_j = \frac{1}{2}\ln\left[\frac{RSS_{DD} \text{ or } RSS_{DCF}}{RSS_{EBO}}\right] + \frac{n}{2}\left[\frac{(e_{DDj})^2 \text{ or } (e_{DCFj})^2}{RSS_{DD} \text{ or } RSS_{DCF}} - \frac{(e_{EBOj})^2}{RSS_{EBO}}\right] \tag{10}$$

where RSS_{DD}, RSS_{DCF}, and RSS_{EBO}, are the residual sum of squares from the DD, DCF and EBO models respectively, and $(e_{DDi})^2, (e_{DCFi})^2$ and $(e_{EBOi})^2$ are the squared differences between the security price (dependent variable) and predicted value for each model. To obtain the Z-statistic, we regress the m_j on unity. The coefficient of this regression equals $\frac{1}{2}\ln\left[\frac{RSS_{DD} \text{ or } RSS_{DCF}}{RSS_{EBO}}\right]$, and is a measure of the mean difference in explanatory power between the models DD or DCF and EBO. We multiply the t-statistic of the coefficient estimate by $[(n-1)/n]^{\frac{1}{2}}$ to obtain the Z-statistic. Positive and significant Z-statistics indicate superiority of the EBO model.

Table 4 indicates that the explanatory power of the EBO model is significantly greater than that of the DD model with the exception of Singapore. The EBO model outperforms the DCF model across all countries. These results show support for the second set of hypotheses—that is, the EBO model has better explanatory power than the other two models. Thus, despite the different extent of compliance with the clean surplus assumption of the sample markets, the EBO model outperforms the other two models in both predictive ability and explanatory power in all three markets. These results support the notion that the valuation accuracy of the EBO model does not depend on a particular set of "good" accounting procedures.

Table 4

Comparison of Explanatory Power Across Models by Country

Z-statistics (p-values)

Market	EBO Model vs. DD Model (one-tailed)	EBO Model vs. DCF Model (one-tailed)	DD Model vs. DCF Model (two-tailed)
Singapore	**-0.312**	**2.864**	**-4.174**
	(0.377)	**(0.002)**	**(0.001)**
Hong Kong	**1.846**	**3.514**	**-0.096**
	(0.032)	**(0.001)**	**(0.924)**
Japan	**1.714**	**1.556**	**-0.168**
	(0.043)	**(0.060)**	**(0.867)**

Z-statistics are calculated using the Vuong (1989) test as further described in Dechow (1994).
We calculate the following for each observation *j* (by country) (Dechow 1994, eq. A.8)

$$m_j = \frac{1}{2}\ln\left[\frac{RSS_{DD} \text{ or } RSS_{DCF}}{RSS_{EBO}}\right] + \frac{n}{2}\left[\frac{(e_{DDj})^2 \text{ or } (e_{DCFj})^2}{RSS_{DD} \text{ or } RSS_{DCF}} - \frac{(e_{EBOj})^2}{RSS_{EBO}}\right]$$

where RSS_{DD}, RSS_{DCF}, and RSS_{EBO}, are the residual sum of squares from the DD, DCF and EBO models respectively, and $(e_{DDi})^2, (e_{DCFi})^2$ and $(e_{EBOi})^2$ are the squared differences between the security price (dependent variable) and predicted value for each model. We regress the m_j on unity and multiply the t-statistic of the coefficient estimate by $[(n-1)/n]^{\frac{1}{2}}$ to obtain the Z-statistic.

6. Conclusion

Clean surplus is a major assumption of the EBO model. We compare the EBO model to the DD and DCF models across three countries with varying degrees of compliance with the clean surplus assumption—Singapore, Hong Kong, and Japan. We demonstrate how the EBO model performs in non-U.S. GAAP environments, and the possible linkage between clean surplus compliance and the EBO model's ability to reflect a firm's intrinsic value. We find that the EBO model outperforms the DD and DCF models in both predictive ability and explanatory power in all three countries. Our results provide evidence that the EBO model can serve as a cross-border value estimator, even across countries with differing levels of compliance with the clean surplus assumption.

References

Darrough, M., H. Pourjalali, and S. Saudagaran. 1998. Earnings management in Japanese companies. *The International Journal of Accounting* 33: 313-334.

Dechow, P. 1994. Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals. *Journal of Accounting and Economics* (18): 3-42

Feltham, G. and J. Ohlson. 1995. Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research* 11 (Spring): 689-731.

Francis, J., P. Olsson, and D. Oswald. 2000. Comparing the accuracy and explainability of dividend, free cash flow and abnormal earnings equity value estimates. *Journal of Accounting Research* 38 (Spring): 45-70.

Frankel, R. and C. Lee. 1999. Accounting diversity and international valuation. Working paper, Johnson Graduate School of Management, Cornell University.

Gornik-Tomaszewski, S. and E. Jermakowicz. 2001. Accounting-based valuation of Polish listed companies. *Journal of International Financial Management and Accounting* 12 (Spring): 50-74.

Graham, R. and R. King. 2000. Accounting practices and market valuations of accounting numbers: Evidence from Indonesia, Korea, Malaysia, the Philippines, Taiwan, and Thailand. *The International Journal of Accounting 35* (December): 445-470.

Guan, L., H. Pourjalali, P. Sengupta, and J. Teruya. 2005. Effect of cultural environment on earnings manipulation: A five Asia-Pacific country analysis. *The Multinational Business Review* 13: 23-41.

Hayashi, F., and E. Prescott. 2002. The 1990s in Japan: A lost decade. *Review of Economic Dynamics* 5: 206-235.

Hooper, K., and M. Bradshaw. 2000. Will they or won't they? Financial reporting reforms in Japan. *Chartered Accountants Journal* (June): 22-26.

Isidro, H., J. O'Hanlon, and S. Young. (2004). Dirty surplus accounting flows: International evidence. *Accounting and Business Research* 34: 383-411.

Isidro, H., J. O'Hanlon, and S. Young. (2006). Dirty surplus accounting flows and valuation errors. *Abacus* 42: 302-344.

Kaneko, S. and A. Tarca. 2007. "International convergence of accounting standards: Hot topics and constituents' views in Japan." Working paper, University of Western Australia.

Lee, C., J. Myers and B. Swaminathan. 1999. What is the intrinsic value of the Dow? *Journal of Finance* 54 (October): 1693-1741.

Leuz, C., D. Nada, and P. Wysocki. 2003. Earnings management and investor protection: An international comparison. *Journal of Financial Economics* 69: 505–527.

Lowe, H. 1990. Shortcomings of Japanese Consolidated Financial Statements. *Accounting Horizons* 4: 1-9.

Nishimura, K., T. Nakajima, and K. Kiyota. 2005. Does the natural selection mechanism still work in severe recessions? Examination of the Japanese economy in the 1990s. *Journal of Economic Behavior & Organization* 58: 53–78.

Ohlson, J. 1995. Earnings, book values, and dividends in security valuation. *Contemporary Accounting Research* 11 (Spring): 661-687.

Penman, S. 1998. A synthesis of equity valuation techniques and the terminal value calculation for the dividend discount model. *Review of Accounting Studies* 2: 303-323.

Penman, S. and T. Sougiannis. 1998. A comparison of dividend, cash flow, and earnings approaches to equity valuation. *Contemporary Accounting Research* 15 (Fall): 343-383.

Thomas, W., D. Herrmann, and T. Inoue. 2004. Earnings management through affiliated transactions. *Journal of International Accounting Research* 3: 1-25.

Vuong, Q. 1989. Likelihood ratio tests for model selection and non-nested hypotheses. *Econometrica* 57: 307-333.

International Review of
Accounting, Banking and Finance
Vol. 1, No. 2, July 2009

IRABF
© 2009

A Note on the Lump Sum Tax of the Rate-of-Return Regulated Monopoly Model

Chin Wei Yang [a], Ken Hung [b], John A. Fox [c]

a. Clarion University of Pennsylvania / National Chung Cheng University
b. Sanchez School of Business, Texas A&M International University
c. The Fox Consultant Incorporated, Klamath Falls,Oregon.

Abstract: A Lump Sum Tax has very different effects when imposed upon a rate-of-return regulated monopolist, such as an electric utility compared to the more commonly analyzed unregulated monopolist. We find that contrary to the case of an unregulated monopolist a lump-sum tax does reduce output if capital is not an inferior input in the production process. Hence, it will raise the price. In this paper, we have formally developed three propositions regarding the impact of such a tax on labor, capital, and output.

JEL Classification: H21, L43, L51.
Keywords: Lump-Sum Tax; Regulated Monopoly

1. Introduction

As is well-known in classic taxation literature, a lump sum tax on an unregulated monopolist has no impact on optimum levels of inputs, output and hence price. Also, the amount of tax does not depend on any variable in the system (Musgrave 1959). It has been lauded as one of the optimum and non-distortionary taxes that can be chosen as a candidate for achieving the Second Fundamental Theorem of Welfare Economics. However, the market structure of an unregulated monopolist is perhaps as rare as that of the perfect competition. Thus the result of the classical lump sum tax gives little guidance to the policy maker. In order to provide some assistance to the authorities, we extend the analysis to determine the effect of the tax on a rate-of-return regulated monopolist. This market structure dominated the U.S. electric and gas utility industry before the 1990s. It is also common in other markets such as water and telephone utilities.

Starting in the 1990s, the utility industry in the U.S. was gradually deregulated in the hope that the deregulation would, much like the airline industries, bring rates down. Customers under the deregulation plan can choose a power generator while regulations of the transmission lines remain intact. The condition attached is, for example, that California taxpayers must pay billions of dollars to the utility for the "stranded cost" on an obsolete nuclear power plants and other generating facilities. Starting late 1970s, nuclear power plants were viable alternative in generating utility. However leakage problems such as that at Three Miles Island rendered construction costs doubled or more. The cost of abandoned nuclear power plants or the stranded cost was passed on to consumers. The cost estimated at $28.5 billion amounts to 30% of customers' monthly payment. States with nuclear power plants such

as Illinois, Michigan and Massachusetts adopted similar deregulation schemes. The results are disappointing. Given rising energy costs, the average utility price rose 21% in regulated states from 2002 to 2006. By comparison, the rates leapt 36% in deregulated states where rate caps were lifted. Critics and experts largely blamed substantial monopoly power generators as for manipulative pricing. Others pointed out that electricity is not suitable to competition for it is highly demand inelastic and can't be stored as inventory. Many of the 17 deregulated states are asking for recapping rates and as such, the interest on the rate-of-return regulated monopoly model is rekindled.

Harvey Averch and Leland Johnson (1962) and Wellisz (1963) first examined the effects of rate of return regulation. The literature concerning the rate-of-return regulated firms has been extensive including several empirical tests which have yielded mixed results.[1] Despite the large number of papers concerning rate-of-return regulation, the taxation effects of this regulation are largely ignored despite the recent work by Yang and Fox (1994, 1995). In this paper, we find that the effects of the lump sum tax on a regulated firm are different than the results predicted by the classical analysis of the unregulated firm. Thus the classical analysis would misguide the policy maker with regard to the effects of the tax. In addition, the theoretical superiority of the lump-sum tax does not occur for the regulated firm. It is shown that such a tax indeed influences the firm's employment, output and pricing decisions. The result of this paper is to fill a void in the taxation literature. On the policy implementation front, deregulated electricity prices can be too high to maintain political stability as was witnessed recently in Malaysia and Indonesia. For instance, Malaysia's privatization program of public utilities since 1983 has met with a setback especially in the past few years when the price of oil skyrocketed. Furthermore, reductions in the subsidy on fuel and electricity prices in Indonesia led to political unrest in 2008. Notice that a reduction in subsidies on electricity prices translates into gradual deregulation of the utility industry. Recently, deregulation on public utilities has become a major issue that needs to be addressed (Bacon and Besant-Jones, 2001). The results of our paper may very well shed some light on the issue.

2. The lump sum tax model

As the classical taxation literature shows, a lump sum tax imposed on an unregulated monopolist will only reduce his profit. It will have no effect on output, price or factor employment. This is not the case for a regulated monopolist. If a lump sum tax X is imposed on a regulated monopolist whose objective is to maximize after-tax profit, we obtain the following model:

Maximize $\quad \pi = PQ - wL - rcK - X \quad (1)$

Subject to $\quad PQ - wL - scK - X \leq 0 \quad (2)$

$\quad P \geq 0, Q \geq 0, L \geq 0, \text{ and } K \geq 0 \quad (3)$

Where $\quad P$ is price per unit of output[2]

[1] The empirical tests of the A-J hypothesis in the electric utility industry is far from being settled. Gourville (1974), Petersen (1975), Hayashi and Trapani (1976) and Cowing (1978) have supported the hypothesis while Moore (1970), Boyes (1976) and Barron and Taggert (1977) have rejected the hypothesis. Recent applications were made by Silverman (1982 and 1985), Atkinson and Halvorsen (1984), and Hsu and Chen (1990). One of the best critiques of the A-J model can be found in Joskow (1974). A recent theoretical advance was made by Evans and Garber (1988) in which regulator's utility is incorporated. However, in the case of certainty, their model can be reduced to the A-J model.

[2] Which is determined by a monotonically decreasing, bounded, and at least twice differentiable inverse demand function or g: $R_+ \to R_+$ $with\ P' < 0$.

$Q = f(K, L)$[3]

$R = PQ$ = total revenue[4]

w = wage rate

r = financial cost of capital

c = physical cost of capital

s = allowed rate of return

This model is an extension of the work of Averch and Johnson (1962) and Bailey (1973). Note that the profit constraint or equation (2) can be rewritten as $\pi \leq (s - r)cK$: monopolist's profit is capped by the difference between allowed rate of return s (e.g., 12%) and financial cost of capital r dominated by long-term bond (e.g., 8%). As the cost of capital increases, a Public Utility Commission may approve the rate hike if justified. If the approval generally goes unchallenged, there seems little reason to minimize actual cost (rck) as the allowed rate of return can be readily adjusted to accommodate for the cost increase. This phenomenon in the A-J model leads to overcapitalization or "padding" the cost base for a lenient Public Utilities Commission if s is flexible. As a result, a rational monopolist tends to substitute capital for other inputs. In reality, the allowed rate of return is relatively stable as is the cost of capital in the utility industry. In addition, a lump sum tax is prevalent in the industry under the guise of "access fee": a fixed charge for each customer for connecting pipelines or wires to households. The fixed charge or lump sum tax is infrequently changed and is currently $8.50 per household in western Maryland. To determine the effects of this tax on factor employment and output we form the Lagrangian function:

$$\Psi = PQ - wL - rcK - X + \alpha(scK + X + wL - PQ) \quad (4)$$

The first-order conditions for a binding interior maximization solution are:

$$\Psi_L = (1-\alpha)(R_L - w) = 0 \quad (5)$$

$$\psi_K = R_K - rc + \alpha sc - \alpha R_K = 0 \quad (6)$$

or $$\alpha = \frac{rc - R_K}{sc - R_K} \quad (7)$$

$$\psi_\alpha = scK + X + wL - PQ = 0 \quad (8)$$

Where α is the Lagrangian multiplier; R_K and R_L are marginal revenue product of capital and labor, respectively.

---

[3] Where Q is a well-behaved and a least twice differentiable production function or f: $R_+^2 \to R_+$, with $Q_L > 0$, $Q_K > 0$, $Q_{LL} < 0$, $Q_{KK} < 0$, $Q(k,0) - Q(0,L) = 0$, and only the efficient portion of the isoquant is considered. In addition, to facilitate the use of the chain rule, we are concerned with only the output space where the domain of g intersects the range of f. Alternatively, we can assume that the functional mapping f is from R_+^2 onto R_+, such that each element of the output space is an image of an element in input space R_+^2.

[4] The total revenue function is assumed to be strictly concave and have continuous second-order partial derivatives such that $R_{LK} = R_{KL}$.

From equation (7), $\alpha \neq 1$, since s > r by assumption and hence $w - R_L = 0$ from equation (5). Differentiating equations (5), (6), and (8) with respect to *L*, *K*, α and treating *X* as an exogenous variable, we have

$$\begin{pmatrix} (1-\alpha)R_{LL} & (1-\alpha)R_{LK} & w-R_L \\ (1-\alpha)R_{KL} & (1-\alpha)R_{KK} & sc-R_K \\ w-R_L & sc-R_K & 0 \end{pmatrix}\begin{pmatrix} dL \\ dK \\ d\alpha \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ -dX \end{pmatrix} \tag{9}$$

If we call the first term of equation (9) H, from the second-order conditions and $w = R_L$, we have:

$$|H| = -(sc-R_K)^2(1-\alpha)R_{LL} > 0 \tag{10}$$

Which establishes $\alpha < 1$.[5] This in turn implies that $sc - R_K > 0$ from equation (7). From Cramer's rule, we obtain:

$$\frac{dL}{dX} = \frac{\begin{vmatrix} 0 & (1-\alpha)R_{LK} & 0 \\ 0 & (1-\alpha)R_{KK} & sc-R_K \\ -1 & sc-R_K & 0 \end{vmatrix}}{|H|} = \frac{R_{LK}}{(sc-R_K)R_{LL}} \neq 0 \tag{11}$$

$$\frac{dK}{dX} = \frac{-1}{sc-R_K} < 0 \tag{12}$$

$$\frac{d\alpha}{dX} = \frac{(1-\alpha)(R_{LL}R_{KK} - R_{LK}^2)}{(sc-R_K)^2 R_{LL}} < 0 \tag{13}$$

$$\begin{aligned} \frac{dQ}{dX} &= Q_L\frac{dL}{dX} + Q_K\frac{dK}{dX} \\ &= \frac{Q_L R_{LK} - Q_K R_{LL}}{(sc-R_K)R_{LL}} \neq 0 \end{aligned} \tag{14}$$

Equations (11), (12) and (14) show that unlike the case of an unregulated monopoly, a lump sum tax does affect the employment of labor, capital, the quantity and price of the product. Note the first column in the numerator of equation (11) has the elements of 0,0,-1 in the determinant.

3. Three theorems of lump sum tax of the regulated monopoly model

It is clear from equations (11), (12) and (14) that a unit change in the lump sum tax has a genuine impact on the firm's price, output and factor employment. In other words, unlike that in the unregulated case, the tax can indeed impact the decision variables. This is presented in the following propositions.

Propositions 1: The imposition of a lump-sum tax will reduce the use of capital by a regulated monopolist.

---

[5] See Takayama (1969), Baumol and Klevorick (1970) and Yang and Fox(1994). Also, the original lump sum tax needs not to be zero to start with.

Proof: The sign of comparative static from equation (12) is clearly negative without other qualifications. It is be noted that in the absence of a lump sum tax, a monopolist is not concerned about saving cost on capital because the allowed rate of returns is evaluated based on the real financial cost. Once *s* is set and a lump sum tax is imposed, at least in the short run, the monopolist has the incentive to cut capital usage in order to reduce the loss in profit due to taxation. This explains the outcome of Proposition 1, in which s remains unchanged.

Proposition 2: The effect on the employment of labor of the lump sum tax is negative if labor and capital are complements and positive if labor and capital are substitutes in generating revenues.

Proof: In equation (11), $sc - R_K$ is positive while $R_{LL} = R'Q_{LL} + R''Q_L^2$ is negative,[6] the sign of these derivatives is the opposite of the sign of R_{LK}. Thus if labor and capital are complements in the production of revenue, i.e., R_{LK} being positive, higher taxes will reduce the employment of labor. The converse holds if R_{LK} is negative.

Proposition 3: The imposition of a lump-sum tax will reduce the output of a regulated monopolist as long as capital is not an inferior input.

Proof: Since $R_{LL} < 0$ the signs of equation (14) is negative if $Q_L R_{LK} - Q_K R_{LL} > 0$. However, $Q_L R_{LK} - Q_K R_{LL} = R'(Q_L Q_{LK} - Q_K Q_{LL}) > 0$ if capital is not an inferior input.[7]

Since as Bailey points out in regulated industries "…output in these industries is essentially a time-shared rental of productive capacity…"[8] Therefore it is unlikely that capital would be an inferior input for the production of a regulated firm. Consequently, higher taxes would generally lead to a lower output and a higher price.

In order to verify the propositions developed above, we employ a homogeneous of degree one CES production function of $Q = A\left[\alpha L^{-\rho} + (1-\alpha)K^{-\rho}\right]^{1/-\rho}$ with a linear demand function ($P = 1 - 0.001\ Q$) with *A*=0.5, *s*=0.2, ρ =3, α =0.25, *w* = 0.025, *r* = 0.15, and *c* = 1. The optimum solutions are reported in Table 1. As the lump sum tax is gradually increased from 5 to 80 units, we witness as suggested in Proposition 1 that the capital usage is decreased continuously (Table 1). However, the labor employment is increased as the lump sum tax is increased until $X \approx 60$ since both labor and capital inputs decrease. The reverse of labor usage from increasing to decreasing is interesting to say the least. As the lump sum tax increases, we know from Proposition 3 that output must decrease as long as capital is not an inferior input. A reduction of output is expected to decrease the employment of both *K* and *L*, or the output effect. However, a lump sum tax from Proposition 1 exerts some negative impact on capital employment: a reinforcement with the output effect. On a given isoquant, the substitution effect takes place via replacing capital with labor. Such a substitution effect is weaker than the output effect as we increase the lump sum tax until *X*≈60 where the substitution effect dominates the output effect. The optimum capital-labor employment is also determined by the factor price ratio and the demand function from which marginal revenue (R') varies. Thus $R_{LK} = \partial(R'Q_L)/\partial K$ may well change on a given demand curve. In our

---

[6] Where *R'* equals marginal revenue and *R''* equals $\partial R'/\partial Q$.

[7] Capital being not inferior implies that $Q_L Q_{LK} - Q_K Q_{LL} > 0$. See Bailey (1973), P92. Note that

$$Q_L R_{LK} - Q_K R_{LL} = R'(Q_L Q_{LK} - Q_K Q_{LL}) + Q_L^2\, Q_K (2p' + Qp'') - Q_L^2\, Q_K (2p' + Qp'') = R'(Q_L Q_{LK} - Q_K Q_{LL})$$

[8] Bailey (1973), P. 93.

simulations we employ a CES production function with a constant elasticity of substitution of 1/(1+3)=0.25. The net effect determines the labor employment while a lump sum tax is expected to reduce output.

4. Concluding remarks

In this paper, we have developed three propositions regarding the lump sum tax on the rate-of-return regulated monopoly model. Contrary to the model of unregulated monopoly, the imposition of the tax does indeed change the factor usages and output levels. That is, it will reduce the capital employment. However the impact on the labor input depends on the role that labor and capital inputs play in revenue-generating process. Finally, unless the capital is inferior in the production function, the lump sum tax would give rise to a lower output and hence a higher price. The reduction in output becomes more profound if both input factors are complement in generating revenues, which may not translate into the complementarity in a production function. When the original profit $(s-r)ck$ is high, the lump sum tax could be imposed without adjusting the regulatory constraint by requiring that profits net of the lump sum tax be less than or equal to $(s-r)ck$ when capital expenses are valued based on the allowed rate of return. In this case, if the firm pays the tax and reduces the overcapitalization phenomenon, then classic taxation results are expected to disappear; if the original profit is low, firms exits and avoids the tax, then it is not a lump sum tax. This latter outcome is also the same as that of an unregulated monopolist. That is, an unregulated monopoly is only a special case of the A-J model.

Table 1

THE OPTIMUM SOLUTION UNDER THE LUMP SUM TAX*

LUMP SUM TAX *X*	LABOR *L*	CAPITAL *K*	OUTPUT *Q*
0	700.19	1157.67	469.00
5	707.12	1131.26	467.28
10	714.71	1104.62	465.25
15	722.99	1077.72	462.85
20	731.88	1050.49	459.98
25	741.64	1022.85	456.53
30	751.88	994.67	452.37
35	762.43	965.82	447.32
40	772.93	936.08	441.17
45	782.89	905.16	433.7
50	791.46	872.65	424.61
55	797.82	837.92	413.57
60	799.95	800.00	399.99
65	796.84	757.14	383.16
70	784.85	705.60	361.22
75	750.97	632.79	327.75
80	750.08	630.41	326.66

*The software package employed is from Liebman et al. (1986).
The demand function used in the simulation is based on $P=1-0.001Q$

If, instead, the regulatory constraint is adjusted (i.e., s can be raised) to require that profits net of the lump-sum tax be no greater than $(s-r)ck$, then there now exists a mechanism by which the firm can pass the lump-sum tax to customers. To see this, note that the firm could always pay the lump-sum tax, leave the burdens to consumers and still satisfy the regulatory constraint. This way, the firm can avoid paying (some of) the tax by changing their input choices. It seems then that the tax is more complicated if it is combined with a change in regulatory policies.

Lump sum tax is often imposed under the name of connection fee or waste prevention cost, which is independent of the volume of water or electricity used. For instance, the service charge independent of water volume used in Pennsylvania is $12.00 per month. Lump sum tax in utility industry is levied under the guise of access fee or customer charge or

administrative cost. It includes connecting pipelines to a locality or a town. The use of land and its surrounding environment involves costs of waste control and nature preservation. Currently, such fixed levy is $12.37 per month in western Pennsylvania and $8.50 per month in western Maryland.

In this paper, we have developed three propositions: each of them breaks away from long-established classic taxation results. That is, a lump sum tax separates efficiency from distributional effect in welfare economics. A lump sum tax can either increase or decrease labor employments but must decrease capital and output on very general assumptions. The results are verified even in a linear demand curve and a homogeneous of degree one CES production function. The paradox does not require a production function of increasing returns to scale or a very convex demand function.

References

Atkinson, S. E. and R. Halvorsen. "Parametric Efficiency Tests, Economies of Scale, and the Input Demand in U.S. Electric Power Generation," *International Economic Review* 25(3) (1984):647-661.

Averch, H. and L. L. Johnson. "Behavior of the Firm Under Regulatory Constraint," *The American Economic Review* 52 (December 1962):1052-1069.

Bacon, R. W. and J. Besant-Jones. "Global Electric Power Reform, Privatization, and Liberalization of the Electric Power Industry in Developing Countries," *Annual Review of Energy and the Environment* 26(1) (2001):331-359.

Bailey, E. E. *Economic Theory of Regulatory Constraint* (Lexington, MA: Lexington Books, 1973)

Barron, B. P. and R. A. Taggert. "A Model of Regulation under Uncertainty and a Test of Regulatory Bias," *Bell Journal of Economics* 8(1) (Spring 1977):151-167.

Baumol, William J. and Alan K. Klevorick. "Input Choices and Rate-of-Return Regulation: An Overviews of the Discussion," *The Bell Journal Economics and Management Science* 1 (Autumn 1970):162-190.

Boyes, W. "An Empirical Examination of the Averch-Johnson Effect," *Economic Inquiry* XIV (March 1976):25-35.

Courville, L. "Regulation and Efficiency in the Electric Utility Industry," *The Bell Journal Economics and Management Science* 5(1) (Spring 1974):53-74

Cowing, Thomas. "The Effectiveness of Rate-of-Return Regulation: An Empirical Test Using Profit Function," in *Production Economics: A Dual Approach to Theory and Applications*, M. Fuss and D. McFadden (eds.) (Amsterdam:North-Holland, 1978).

Evans, L. and S. Garber. "Public-Utility Regulators Are Only Human: A Positive Theory of Rational Constraints," *American Economic Review* 78(3) (June 1988):444-462.

Hayashi, P. and J. Trapani. "Rate of Return Regulation and the Regulated Firm's Choice of Capital-Labor Ratio: Further Empirical Evidence on the Averch-Johnson Model," *Southern Economic Journal* 42 (January 1976):384-398.

Hsu, G. J. Y. and T. Y. Chen. "An Empirical Test of an Electric Utility Under an Allowable Rate of Return," *The Energy Journal* 11(3) (1990):75-89.

Joskow, P. L. "Inflation and 'Environmental Concern: Structural Change in the Process of Public Utility Price Regulation," *Journal of Law and Economics* 17 (October 1974): 291-327.

Liebman, Lasdon, Schrage and Warren. *Modeling and Optimization with GINO* (Palo Alto, CA: The Scientific Press, 1986).

Moore, T. "The Effectiveness of Regulation of Electric Utility Prices," *Southern Economic Journal* 36(4) (April 1970):365-375.

Musgrave, R. *The Theory of Public Finance_* (McGraw Hill: New York, 1959).

Petersen, H. C. "An Empirical Test of Regulatory Effects," *The Bell Journal of Economics* 6(1) (Spring 1975):111-126.

Silverman, B.G. "Acid Rain and a Comparative Analysis of Two Large Scale Electric Utility Models," *Air Pollution Control Association Journal* 32(10) (October 1982): 1032-1052.

"Heuristics in an Air Pollution Control Cost Model: The "AIRCOST" Model of the Electric Utility Industry, "*Management Science* 31(8) (August 1985):1030-1052.

Spann, Robert M. "Rate of Return Regulation and Efficiency in Production: An Empirical Test of the Averch-Johnson Thesis,"*Bell Journal of Economics and Management Science* 1 (Spring 1974):38-52.

Takayama, A. "Behavior of the Firm Under Regulatory Constraint," *American Economic Review* 59 (June 1969):255-260.

Wellisz, Stanislaw H. "Regulation of Natural Gas Pipeline Companies: An Economic Analysis, " *Journal of Political Economy* 81 (February 1963):30-43.

Yang, Chin W. and John A. Fox. "A Welfare Anomaly in the Rate-of-Return Regulated Monopoly Model which Creates Opportunities for offsetting Taxation and Regulatory Policies," *Journal of Regulatory Economics* 6 (1994):59-66. "A Comparison of Valorem and Per Unit Taxes in Regulated Monopolies", *Atlantic Economic Journal* 22(4) (1994): 55-62.

IRABF *Editorial Policy*

The *International Review of Accounting, Banking and Finance*(IRABF) is interested in publishing papers that provide significant contributions to knowledge in all areas of applied finance, accounting, international finance and banking practices, with the exception of extremely narrow papers addressed to small specialist audiences. In addition, international perspectives on such topics are particularly welcome.

Date of publication:

April, July, September, January

Information for authors:

1. Manuscript submissions and all correspondence relating to the contents of the Journal should be sent to editors (see www.irabf.org for details on the submission process).

2. All submitted manuscripts must be original work and must not be under consideration for publication at another journal. All manuscripts must be typed one-sided in double space throughout with ample margins. The title page should contain the title of the manuscript, names of all authors and their affiliations, contact author and his/her correspondence address as well as e-mail address. An abstract of no more than 150 words should be included after the title page.

3. All sections should be numbered in Arabic numbers, and subsections should be numbered 1.1, 1.2, etc.

4. All tables and Figures should be able to stand-alone. Number tables and equations with Arabic numbers, and figures with Roman numerals. Each tables and figures should be presented on a separate page.

5. In manuscripts with mathematical proofs the authors should submit with manuscripts separate statements on the full mathematical workings that lead to the conclusions. These are required for the appraisal of the manuscripts. Any ancillary material available from the author on request should be enclosed for the referees.

6. References to other work should also be incorporated in a separate list of references typed double-spaced. Do not list any references not cited in the text. These references should be listed alphabetically with name of author, title, and date of publication, in the following forms as appropriate:

   References:

   Chan, Kam C., 2001. A citation-based ranking of journals in finance: some new results, Journal of Financial Education, 27, 36-52.

   Roll, Richard, 1978. Ambiguity when performance is measured by the securities market line, Journal of Finance 33, 1051-70.

   Items in the list of references should be referred to either in the text or in footnotes by naming the author and date. For example: Head and Shoup (1969).

7. All submissions should follow standard APA style (5th Edition).

Copyright and Photocopying @ 2009 IRABF. All rights reserved.

International Review of Accounting, Banking and Finance