September

British Accounting Review (1992) **24**, 235–267

ACCOUNTING CHOICE THEORY AND MARKET-BASED RESEARCH IN ACCOUNTING

ROSS L. WATTS
University of Rochester

This paper summarizes the theory and evidence on accounting choice for capital markets researchers. It also explains why knowledge of that theory and evidence is important to capital markets researchers. Many capital market studies such as those of the relationship between earnings and rates of return assume that accounting choice does not vary with firm variables such as growth, gearing etc. Theory and evidence indicates such variation exists. Hence, accounting choice theory provides competing hypotheses for observed relationships in the capital markets literature such as the relation between earnings response coefficients and gearing.

INTRODUCTION

This paper discusses the theory of accounting choice. Accounting choice includes the firm manager's choice of one accounting method over another. An example is the manager's choice of straight-line depreciation rather than accelerated depreciation. Accounting choice also includes the FASB's choice of accounting standards. I consider accounting choice theory to be central to the study of accounting. If we cannot explain and predict variations in accounting, we cannot provide our students with much understanding of accounting.

This paper also considers the implications of the accounting choice literature for studies of the relationship between accounting numbers and stock prices. Many studies of this relationship ignore accounting choice theory. Such neglect causes critical problems in interpreting the studies' results. Capital markets researchers should be aware of those problems and be able to address them. Addressing the problems requires a knowledge

Financial support was provided by the Bradley Policy Research Center of the University of Rochester and the John M. Olin Foundation.

This paper was originally given as part of a longer presentation to the Summer School in market-based accounting research methods held at Strathclyde University, Glasgow, Scotland in October 1989.

I am grateful to Andrew Christie, S. P. Kothari, Peter Pope, Martin Walker and Jerold Zimmerman for helpful comments on this paper. The financial support of the ESRC, the ACCA, and the ICAS for the Strathclyde Summer School is also gratefully acknowledged.

Correspondence should be addressed to: Ross L. Watts, William E. Simon Graduate School of Business Administration, University of Rochester, Rochester, NY 14627, USA.

0890–8389/92/030235 + 33 $08.00/0

of accounting choice theory and evidence. This paper's objectives are to provide an outline of that theory and evidence and an understanding of their relevance to capital market research.

I begin by explaining in more detail why accounting choice is important to capital-market-based research. Then I describe the economic theory of the firm. This theory underlies much of the empirical work on accounting choice. Next the implications of the theory of the firm for accounting choice are given. Those implications include explanations for and predictions about accounting phenomena. Some description of the evidence on those predictions is also supplied. Given space constraints, this paper does not include the critical assessment of the methodology in the accounting choice empirical studies that was presented in Glasgow. Finally, some additional implications of the theory of accounting choice for capital markets research and my conclusions are given.

IMPORTANCE OF ACCOUNTING CHOICE TO MARKET-BASED RESEARCH

Accounting choice is important to market-based studies because without a theory of accounting choice one cannot:

(1) correctly specify tests of the relationships between accounting numbers and stock prices; and
(2) specify powerful tests to discriminate between competing models of capital markets.

The current models underlying investigations of the relationships between accounting numbers and stock prices (e.g., the underlying valuation models) have few implications for accounting choice. They provide little insight into, or predictions of, accounting choice and its stock price effects. For this reason there has been little attempt to control for accounting choice in investigating relations between accounting numbers and stock prices. And, the lack of explanation and prediction has made it difficult to specify powerful tests to discriminate between the models underlying the accounting number/stock price studies and other models such as the mechanistic hypothesis (see Watts & Zimmerman, 1986, chapter 4).

Lack of implications in underlying models

The literature investigating the relationship between accounting numbers such as earnings and stock prices typically assumes, explicitly or implicitly, that accounting numbers convey information to the capital markets. For example, it is usually assumed that accounting earnings provide information on current and/or future cash flows. A simple valuation model such as the multi-period Capital Asset Pricing Model (CAPM) that values

current and future cash flows is also typically assumed.[1] The two assumptions lead to the prediction that earnings increases imply increases in current and/or future cash flows which in turn imply increases in value.

While the preceding model provides predictions that are useful for investigating whether accounting earnings provide information to capital markets, it does not provide predictions about accounting choice. No theory is presented as to how accounting choice influences value (other than via taxes) and the assumed valuation models have no implications for accounting choice. Those valuation models have information costlessly available to everyone, so there is no means by which different accounting methods can supply different amounts of information. Hence there is no basis for management to choose between the different methods. Accounting is irrelevant. Consequently, in the absence of taxes, the model has no predictions about accounting choice. When taxes are introduced the objective of accounting choice becomes minimization of taxes, and predictions about accounting choice can be generated to the extent that calculation of taxable income is tied to the calculation of reported income.

Specification of relationship between accounting numbers and stock prices

The underlying models' lack of implications for accounting choice has led capital market researchers to ignore accounting choice in investigating relationships between many accounting numbers and stock prices. If accounting choice is not a matter of indifference, but is correlated with the determinants of value, this is likely to lead to incorrect inference about the relationships investigated.

As an example consider the currently popular topic of earnings response coefficients. The earnings response coefficient is the slope coefficient in the regression of abnormal returns on unexpected earnings (see for example, Collins & Kothari, 1989, and Easton & Zmijewski, 1989). Those regressions implicitly or explicitly rely on the type of valuation model discussed above. The valuation models predict the earnings response coefficient should vary with various variables and the studies test those predictions.

Consider a restrictive valuation model in which earnings equal cash flows and follow a random walk, all earnings are paid out as dividends and the market's required expected rate of return on the stock is constant across time. Assume the market learns of the change in earnings at the end of the period for which they are calculated.[2] Then the price of the stock at time t(P_t) is

$$P_t = \frac{X_t}{r} \qquad (1)$$

where X_t = earnings for period t, and
r = market's required rate of return on the stock.

The unexpected rate of return on the stock for period t$(r_t - r)$ is

$$r_t - r = \left(1 + \frac{1}{r}\right)\frac{\Delta X_t}{P_{t-1}} \qquad (2)$$

where ΔX_t is the earnings change in period t.[3] If unexpected returns are regressed on earnings changes deflated by opening price, the earnings response coefficient under this model would be an estimate of $[1+(1/r)]$ and would vary with the expected or required rate of return on the stock (r). Studies (e.g., Collins & Kothari, 1989) find that estimated earnings response coefficients do vary with the determinants of r (the level of interest rates and β) as predicted.

The studies investigating the association between estimated response coefficients and variables such as the required rate of return and its determinants typically do not control for differences in accounting earnings' ability to proxy for current and future cash flows and differences in accounting methods.[4] This raises the distinct possibility of a correlated omitted variables problem. The association between the estimated coefficients and the variables could be due, at least in part, to these differences. There is reason to believe that the ability of accounting earnings to proxy for cash flows varies across firms with determinants of the required rate of return (see Section 4 later—theory of accounting choice). There is more noise in the relationship between accounting earnings and future cash flows. Further, there is evidence of that variation (e.g., with risk—see Lambert & Larcker, 1987 and Rao, 1989). There is also theory and evidence that indicates accounting choice is correlated with the determinants of the required rate of return. Accounting choice is correlated with firm size, gearing and risk (see Christie, 1990).

First, consider the implications of the accounting methods of riskier firms generating earnings that are poorer measures of cash flows. If we assume the measurement errors are distributed independently of one another and of cash flows, then estimates of the earnings response coefficients from equation (2) will be biased down more for riskier firms. The observed negative relationship between earnings response coefficients and risk could be due to differences in the ability of accounting methods to proxy for cash flows instead of differences in the required rate of return.

Second, consider, for example, the implications of an association between accounting choice and gearing. Accounting choice theory and evidence suggests a positive relationship between gearing and firms' use of income-increasing accounting methods (later). If the increase in reported earnings is greater, the greater the earnings absent from those methods, then the earnings response coefficient is less for firms with higher gearing.

The market sees through the increase in reported earnings and so the increase is not reflected in the rate of return. The amount of earnings that is not reflected in price is greater the greater the earnings. Ignoring accounting choice, Collins & Kothari (1989, p. 179) suggest earnings response coefficients should be negatively associated with gearing. However, if we observe that negative relationship, it could be due to accounting choice, not to underlying determinants of value.

In the past the correlated omitted variable story has been used to question cross-sectional studies regressing stock price changes on earnings and variables meant to reflect accounting choice (e.g., Easton & Zmijewski, 1989, p. 137). It is suggested that the accounting choice variables pick up cross-sectional variation in earnings response coefficients and not the effects of accounting choice. The analysis here suggests that charge is a two-way street. The studies finding an association between earnings response coefficients and economic variables may obtain those results *solely* because they have omitted controls for accounting choice.

It is likely that earnings response coefficients are affected by both the underlying variables (such as growth rates, risk, etc.) and accounting methods. However, the basic point is that if accounting methods are associated with economic determinants of value (and as we shall see, the evidence for such an association is strong), accounting choice cannot be ignored when investigating relationships between accounting numbers and stock prices.

Discrimination between competing capital market models

The lack of accounting choice predictions generated by valuation models underlying capital markets research in accounting became painfully obvious when researchers tried to discriminate between those models and the ill-specified models previously existing in the accounting literature. The mechanistic hypothesis is a characterization of some of the previously existing models (see Watts & Zimmerman, 1986). The mechanistic hypothesis posits that stock prices react mechanically to the reported earnings number, regardless of how the number is calculated. That mechanical relationship is posited to exist even if accountants and analysts are able to make adjustments for differences in calculation using publicly available information. An hypothesis underlying early capital market research, the efficient markets hypothesis (EMH), has contrary implications to those of the mechanistic hypothesis. The essence of the EMH is that there is competition for information. Given that competition, we wouldn't expect to earn rents on simple trading rules based on public information that is available at low cost to many people. Competition to eliminate those rents would prevent a mechanical reaction to reported

earnings numbers (see Watts & Zimmerman, 1986, for more detailed explanation).

When we have two competing theories such as the EMH and the mechanistic hypothesis, we expect researchers to try to discriminate between the two by identifying circumstances where the two give different predictions. Those circumstances can then be used to test which hypothesis is more consistent with the evidence. Accounting researchers followed this conventional route, but they encountered difficulty testing the models underlying the capital market research.

Early papers (e.g. Kaplan & Roll, 1972) identified changes in accounting procedures that increased earnings but did not affect taxes as circumstances where the two hypotheses produced different predictions. The mechanistic hypothesis predicts that *ceteris paribus*, stock prices increase. The EMH combined with a valuation model such as the CAPM implies no stock price change because, under the valuation model, cash flows are not affected by the change. The null hypothesis in Kaplan & Roll (1972) is that stock price changes around accounting method changes are zero. Thus they test the alternative hypothesis that stock prices change (the mechanistic hypothesis). When they are unable to reject the null hypothesis, Kaplan and Roll assume the results confirm the EMH/CAPM or no-effects hypothesis.

It is extremely difficult to get a powerful test of the no-effects hypothesis. The null hypothesis is that stock prices change with the accounting method change. However, when do prices change and for which accounting changes are they the largest? The theory is silent on this, hence you cannot design a powerful test of the no-effects hypothesis. The test will only be as good as the null hypothesis you set up. One of my students once likened tests of the no-effects hypothesis to trying to test the prediction that the sun does not rise with no information as to where to look for the sun. In that situation one might end up looking in a closed closet.

Accounting researchers quickly discovered that to generate powerful tests to discriminate between the mechanistic and the joint EMH/CAPM hypotheses, they had to find a situation that produced a predicted stock price change under both hypotheses. This restricted them to accounting method changes that produced cash flow effects under the CAPM-type valuation models. The only such changes are those that affect taxes. The LIFO/FIFO change was chosen because the prediction under the mechanistic hypothesis is that the change would decrease stock prices while under the EMH/CAPM hypotheses it would increase cash flows and so increase stock prices.

The attempts to discriminate between the two models of capital markets using the LIFO/FIFO change have been largely unsuccessful. The reason is the difficulty in controlling variables (such as cash flow changes) that

affect the decision to change inventory methods. A theory of accounting choice that provided predictions of accounting changes that both do and do not affect taxes would provide a wider range of opportunities to test the different views of capital markets. However, it would do much more than that. It would provide a much richer view of accounting. Accounting numbers would not be arbitrary numbers that are mechanically applied in valuation and they would not be numbers that are relevant only to the computation of taxes.

The importance of competing hypotheses

The lack of accounting choice predictions generated by the models underlying capital market research in accounting is not the only reason I took you on the well-travelled road of trying to discriminate between models of capital markets. The discussion also illustrates the importance of competing hypotheses; an importance not well understood by many accounting researchers.

The empirical credibility of the no-effects hypothesis rested on the plausibility of the competing hypotheses actually tested (e.g., the mechanistic hypothesis). That is also true of hypotheses that predict effects. The more empirical tests designed to discriminate between a given hypothesis and plausible competing hypotheses that are found to be consistent with the given hypothesis, the more credence given to that hypothesis.

Competing hypotheses perform another function as well. Continuous generation of competing hypotheses leads to more and more attempts to discriminate and a much more detailed understanding of the empirical phenomena of interest. Competing hypotheses tell the researcher what to control in his empirical tests. In this context it is important that the competing hypothesis be based on some analysis and not just be an ad hoc or arbitrarily specified association.

Foster (1980) suggests that accounting choice studies should include profile analysis and, if the analysis shows accounting choice varies systematically by industry, that systematic variation should be controlled in testing the accounting choice predictions. The implication is that there is a competing hypothesis; that accounting choice varies by industry. The problem with this argument is that the economic variables determining the choice of accounting procedures are similar within an industry. Hence, the accounting choice models predict accounting choice varies by industry and, *in addition*, explain why that variation occurs. If the researcher compensates for industry effects because they are typically observed, he is likely to eliminate the predicted associations between choice and the underlying economic variables. This will lead to the incorrect inference that the evidence is inconsistent with the model. In this case the industry effects hypothesis is not really a competing hypothesis since no reason is given

for the industry effects and the observed effects could be due to the accounting choice hypothesis. If the proponents of industry control identify a factor that induces an industry effect not included in the accounting choice models, they have a case for control. But, the control is for that factor not for industry choice *per se*.

An example of appropriate use of a competing hypothesis occurs in Sweeney (1991). Sweeney investigates accounting choice by firms that eventually defaulted to test whether those firms changed accounting methods to attempt to avoid default. Since optimal inventory methods for tax purposes change when a firm becomes less profitable an obvious competing hypothesis for changes in inventory methods is a tax hypothesis. Sweeney compensates for that competing hypothesis by investigating changes in accounting methods that do not affect taxes.

Now that I have given some insight into the importance of accounting choice theory for capital markets research in accounting let me outline the theory of the firm. That outline begins with the underlying economics, because I have found that researchers who do not have this foundation tend to make important errors in empirical studies of accounting choice.

THEORY OF THE FIRM

The theory of accounting choice outlined in Watts & Zimmerman (1986; 1990) is part of a more general theory of the firm that can be traced back to Coase (1937). Hence, I first describe that theory of the firm and then provide its implications for accounting choice.

Nature of the firm

The definition of a firm varies according to the point a given writer wishes to make. Further, it is very difficult to draw the boundaries of the firm (see Cheung, 1983). However, for pedagogical purposes it helps to contrast organization of production in firms with organization of production through markets. Let us define a firm as existing when two individuals co-operate in production other than via the market (see Alchian & Demsetz, 1972). When a lumberman employs a cabinetmaker to produce cabinets, there is co-operation via a firm. When the cabinetmaker purchases the lumber to make the cabinets, there is co-operation via the market. In a firm there is co-operation without a specific transaction in a market. One person has a long-term employment contract with another. One of the two becomes the residual claimant on the firm's cash flows. This definition of the firm includes governments. And, in fact, questions about government control of production led to the initial Coase (1937) paper on the theory of the firm.

Reasons for the existence of firms

Coase (1937) and others (e.g., Williamson, 1975) ask why firms exist? Coase's answer is simply that firms exist when the costs of contracting in the firm are lower than the costs of contracting in the market. It is not costless to contract in the market. The cabinetmaker has to find the price of lumber, find a seller, write a contract, etc. A firm reduces these contracting costs.

Various hypotheses have been advanced as to the nature of the contracting costs that are lower in a firm:

Economies of scale in contracting. Given the costs of negotiating, writing and enforcing a whole series of contracts with a factor of production, it is often less costly to have one single employment contract (Coase, 1937). Ball (1989) suggests that there are also economies in writing *repetitive* contracts. For this to generate firms one also has to assume that those economies can only be reaped by the firm itself. There has to be some jointness between the contracting economies and the firm's other activities. Otherwise, a specialist contract consultant would be able to provide the economies via the market without a firm being formed.

Team production. Alchian & Demsetz (1972) argue that the firm is a way to capture the benefits of team production while minimizing the costs of shirking. One person cannot move a grand piano, but a team of people can. There are gains from team production. However, team production also generates costs. There is a non-separable production function so that individual output cannot be determined. Given imperfect proxies for effort, there are incentives for individual members to shirk and let the other members of the team do more of the work. All the team members have this incentive and it leads to the team members putting out less effort than they would prefer if the shirking problem could be solved. Alchian and Demsetz suggest a firm is a cost effective way to solve this problem.

We can imagine team members hiring someone to monitor their input. For example, according to Cheung (1983, p. 8) teams of coolies in China would hire a person to whip team members observed not pulling their weight. The question then is: "who monitors the monitor?" According to Alchian and Demsetz, this incentive problem is resolved by making the monitor the residual claimant in the firm.

The Alchian and Demsetz argument can be extended to the modern corporation. Managers can be provided with incentives via incentive compensation (e.g., see Smith & Watts, 1982) and the market for corporate control (e.g., see Jarrell, Brickley & Netter, 1988). And holders of large blocks of shares can serve as monitors of top management's efforts (see Morck, Shleiffer & Vishny, 1988).

Essentially, the Alchian and Demsetz argument is that contracting costs are less in the firm. It is less costly to measure and reward performance in the firm than in the market. Costs include the effects of dysfunctional actions induced by the contracts (e.g. agency costs).

Alchian and Demsetz use the emergence of weaving firms in England following the introduction of power looms and other machinery to support their arguments. Prior to the use of power the putting-out system was used for weavers. Individual weavers were self-employed in their own homes. When power was introduced, weavers moved to the source of the power. The consequent concentration of weavers lowered the cost of contracting in the market and that should have discouraged the formation of firms. Instead, weaving firms emerged. Alchian and Demsetz suggest the power led to team production and it was team production with its consequent measurement problems that caused the formation of the firms.

Post-contractual opportunism. Klein, Crawford & Alchian (1978) demonstrate another way in which firms lower contracting costs. Specialized assets generate quasi-rents. Parties contracting over the use of specialized assets have incentives to take dysfunctional actions to expropriate those quasi-rents thus reducing the total output available to the parties. As in the shirking case, attempts to gain a large share of the pie reduce the total pie available. The formation of a firm reduces those dysfunctional actions and their consequent costs.

Suppose that I build a machine that is very specialized and lease it out. The machine costs £10,000 to build and to make a normal rate of return I have to charge £2,000 a year. The machine has zero salvage value. The quasi-rents are the economic profits I earn each year after I make the investment *if* the sunk cost of the machine (£10,000) is ignored. So the quasi-rents are £2,000 a year. The customer may be able to appropriate some of those quasi-rents. Assume the next best use of the machine would yield £1,000 a year. Then, after I have built the machine and leased it out, the customer may threaten to stop leasing the machine unless I cut the rental fee to £1,001 per year. The customer has an incentive to try to appropriate the quasi-rents on the machine. Note, though, that two can play this game. The reason the customer wanted the specialized machine is that it earns him a higher return than a less specialized machine. The customer can also earn quasi-rents on the machine. If I withdraw the machine the customer will lose. The customer will either have to buy a less profitable, less specialized machine or bear the cost (including delay) of having someone else build another specialized machine. Hence, after the fact I may threaten to withhold the machine unless the customer pays more than the agreed rental. In essence, the situation is a bilateral monopoly and the outcome is difficult to predict.

Wealth transfers generated by attempts of both parties to expropriate quasi-rents are not the problem. If those transfers aren't zero, their expected value will be reflected in the contracted price. The problem is dead-weight losses generated by the attempts at expropriation. I may try to extract quasi-rents by not maintaining the machine optimally, or the customer may maintain standby facilities, both of which reduce the total cash flow available to both of us.

The preceding problem can be addressed by using the courts to enforce long-term contracts or by using future business to bond behavior. The first alternative method is costly: it is difficult to contract for every eventuality *ex ante* and court actions are costly. The second alternative is also costly. Reputation usually plays an important role here and reputations are costly to build. The most efficient solution can be to vertically integrate the two businesses. Again, this explanation of the existence of firms is a contracting cost argument.

Knowledge costs. Chandler (1962, 1977) and Jensen & Meckling (1991) provide another contracting explanation for the existence of firms. Knowledge can be generated by the creation of firms. Consider a single grocery store. Fluctuations in demand at the single store level contain a random element so that it is difficult to determine changes in the level and nature of demand for different products. Across the individual stores in a chain of grocery stores this random element tends to cancel out and changes in demand are more observable. Again, this gain by itself is not sufficient for the existence of a firm. An individual could sell a service aggregating sales numbers across numerous independent stores. For the emergence of a single chain of stores, there has to be additional efficiency. Costs of collecting payment from all users of the knowledge (free rider problems) are one potential explanation for the emergence of one firm.

Like the preceding arguments, the knowledge costs explanation is a contracting costs explanation for the existence of firms. Firms exist because alternative contracts for the production of knowledge are more costly.

Notice that the definition of contracting costs has become broad. Contracting costs include not only direct contracting costs such as the costs of writing and enforcing contracts, but also costs of producing information and agency costs generated by the contractual arrangement. Examples of these latter costs include dysfunctional consequences of contracts and of the firm's organizational arrangements. The costs incurred by attempted appropriation of quasi-rents is one example of such costs generated by formal contracts. The organization of the firm can also generate such costs. For example, the U.S. Forestry Service pays loggers by the number of logs they deliver. As a result, the loggers give little concern to the condition of the logs in deciding how to deliver the logs. If a firm uses such an

arrangement for its employees, the consequent reduction in the value of the logs is a contracting cost of the firm.

Evolution of firms

As Fama & Jensen (1983) point out, in the competition between firms, those that deliver products demanded by customers at the lowest price while covering costs are the firms that survive. In essence we have Economic Darwinism (see Alchian, 1950). Since contracting costs are part of the firm's costs and contracting costs include the kind of agency costs described above (departure from optimal arrangements), the firms that survive are the firms that minimize contracting costs. Firms adopt new, more effective contractual arrangements without necessarily having a complete theory of the firm. For example, one firm in an industry might try a new compensation contract for its management. If that firm is successful, other firms will copy that firm and adopt the new contractual arrangement.

The conclusion from the above is that costly contractual and organizational arrangements that have persisted for a considerable length of time are likely to be cost effective. This has important implications for accounting, because accounting has existed within the firm as long as firms have existed. In Watts & Zimmerman (1983), we trace accounting and auditing in English companies back to the formation of guilds after the Norman invasion in the 11th century. Others (e.g., Yamey, 1962, p. 15) trace the existence of accounting to the 'need for a check on the honesty and reliability of subordinates' that existed in Greek and Roman times. The term 'subordinates' suggests the existence of a firm.

THEORY OF ACCOUNTING CHOICE

It is not enough to say that accounting is part of the firm's cost-effective contractual and organizational arrangements to develop a theory of accounting choice. One also has to identify the role accounting plays in those contractual and organizational arrangements and how arrangements vary across firms. Accounting researchers have investigated both the firm's organizational arrangements and identifiable contracts with other parties to ascertain and explain accounting's role. And they have generated explanations and predictions about variations in accounting.

Accounting's role

Organizational arrangements. It is hypothesized that accounting is part of the firm's organizational arrangements that replaces the market mechanism when firms are formed (e.g., see Jensen & Meckling, 1991). With the market mechanism, the market allocates decision rights, provides a performance measure and rewards and punishment for performance. When

a market transaction is replaced by a firm, the firm has to develop organizational arrangements that allocate decision rights, measure performance and reward or punish performance.

Consider the lumberman and cabinetmaker example. In a market system, the cabinetmaker purchases the lumber from the lumberman in the market at a market price. Decision rights are allocated by the market mechanism. Suppose that during the manufacturing process, the cabinetmaker acquires knowledge on what combinations of wood are most cost-effective to use; knowledge that is costly to communicate. Then, the market allocates the decision rights on wood components to the cabinetmaker (see Hayek, 1945). Since the cabinetmaker earns higher cash flows if he has those decision rights, he is prepared to pay more in negotiations with customers or lumbermen to obtain those rights.

The market also provides the cabinetmaker with the incentive to use the efficient combination of wood. He captures the current cash flows from the use of the combination and, if the business is alienable, the present value of future cash flows as well. The market value of the business is both the performance measure and the performance reward.

Now suppose the lumberman employs the cabinetmaker to make the furniture and a firm replaces the market system. The lumberman now has to decide what decision rights to allocate to the cabinetmaker. Does he allocate the decision rights on the wood to be used in the furniture to the cabinetmaker? How does he measure the cabinetmaker's performance? If he calculates a profit for the cabinetwork operations, at what price does he transfer the lumber? And, how does he compensate the cabinetmaker? Does he pay a fixed wage, a piece rate, or a share of profits?

There are no simple answers to these questions. If the appropriate answer were to allocate the decision rights to the cabinetmaker, calculate a market value for the cabinetwork operations using the lumber's market price for the transfer price, and to reward the cabinetmaker on that market value, there would be no reason for the firm (see Ball, 1989). The firm survives only if it is more cost effective; it has to have some gain over the market system. In other words, there has to be some joint gains (or negative joint costs).

In practice a myriad of mechanisms are used to replace the market mechanisms. A single transfer price cannot by itself replace the market price of lumber. It cannot, not only because of joint costs, but also because the cabinetmaker's performance measure is no longer the market value of the cabinetwork operations; he is no longer the owner of the cabinetworks and so he can't sell the works to obtain that value.

Accounting plays a role in many of the mechanisms that allocate decision rights and provide incentives. It is used to define decision rights. The decision to divide the firm into profit centres or cost centres is a decision

on decision rights. Profit centres typically carry a different set of decision rights from cost centres (see Williamson, 1975, Vancil, 1978, and Jensen & Meckling, 1991). Profit centre managers typically have the right to make more decisions than cost centre managers. Budgets are also used to define decision rights. For example, budgets often give a manager the right to spend up to a given amount on a particular item. Also, budgets define whether the manager has the right to substitute across line items in the budget. In the cabinetmaker example, the budget could define the total amount the cabinetmaker can (without prior approval) spend on lumber and given the transfer prices this constrains the cabinetmaker's decisions on the mix of woods.

The use of accounting (and auditing) to constrain manager's decisions is probably as old as firms and accounting. Audits were used in the English guilds to constrain the wardens' decisions. For example, in the 15th century we see the auditors of The Worshipful Company of Pewterers of the City of London disallowing money spent by the wardens and 'dyuers' at the ale house near the guild hall (Boyd, 1905, p. 79) .

Managers of profit centres are evaluated on the basis of the centre's profits so that their compensation, promotion or firing are affected by accounting numbers. Cost centre managers are often evaluated on the extent to which they meet their budget. This use of accounting numbers is also not a recent invention. In Watts (1977, p. 57) I give examples from 19th century England of manager's compensation depending on accounting profits.

To evaluate managers, firms often allocate joint costs. The allocation decision generates much debate among accountants (e.g., see Zimmerman, 1979). However, this common cost problem that plagues accountants is by its very nature endemic to accounting. The existence of firms creates a demand for accounting. But, firms exist because of market externalities or joint costs; it is more cost effective to combine operations than to operate separately in the market.

Note again that the accounting system does not operate alone in fulfilling the various mechanisms. For example, a manager's shirking is controlled by a number of mechanisms, including direct monitoring by supervisors, competition with colleagues and accounting-based incentive compensation.

Contractual arrangements. Accounting not only plays a role in the decision right allocation and incentive mechanisms that replace the market price in the firm, it also plays a role in the contractual arrangements accompanying transactions between the firm and parties outside the firm. Those contractual arrangements, like the organizational arrangements, evolve as ways of making the firm cost effective. And, like organization arrange-

ments, contractual use of accounting affects accounting itself. Accounting researchers have addressed the accounting effects of two types of contracts: debt and sales contracts.

Incentive mechanisms arise when a firm is created and a manager is given decision rights because the manager will make those decisions in his own interests and those interests are not necessarily aligned with making the firm more cost effective. Similar incentive problems arise with issuance of debt by the firm. If incentive mechanisms align the manager's incentives with the shareholders, then the manager has incentives to take actions that increase the value of shares at the expense of debt-holders. Such actions are a problem if they consume resources and reduce the total amount of resources available to the manager, the shareholders and the bondholders.

To illustrate one type of incentive problem associated with debt, suppose our lumberman has incorporated as a limited liability company and has borrowed £65,000 from a bank. For convenience, assume the market interest rate is zero. The loan is to be repaid in two installments, £20,000 at the end of the first year and £45,000 at the end of the second year. The cash flows from the lumber business will be £35,000 at the end of both the first and second years. However, the lumberman has the opportunity to invest an additional £10,000 in the business at the end of year one and if he does, he increases the cash flow at the end of the second year by £15,000. Will the lumberman take the attractive value-increasing £10,000 investment?

The answer is no. The lumberman has the option of paying himself a dividend at the end of year one. Suppose he doesn't take the additional investment at the end of year one and pays himself a dividend equal to the cash flows for the year minus the payment due the bank or £15,000 (£35,000 − £20,000). At the end of the second year the lumberman isn't able to pay a dividend because while the business generates £35,000 in cash flows, £45,000 has to be paid to the bank before a dividend can be paid. The company is bankrupt and the bank loses £10,000. If the lumberman takes the investment, he can pay himself only £5,000 the first year (£15,000 − £10,000) and £5,000 the second year (£35,000 + £15,000 − £45,000) for a total of £10,000. The lumberman makes more money by not taking the investment (£15,000 versus £10,000). The difference of £5,000 is the £10,000 gain from the bank minus the £5,000 foregone on the investment.

The problem in the preceding example is not the wealth transfer from the bank, the problem is the £5,000 gain foregone on the investment. In capital markets with rational expectations the bank would price the loan to incorporate the expected loss of £10,000 (they would just lend less for the same promised repayment). However, £5,000 gain from the investment is left on the table and both parties could be made better off if

a contract can be devised that removes the lumberman's incentive to pay too large a dividend in the first year.

Obviously, a value-increasing contract can be written which causes the manager to reduce his first year dividend. One covenant that was voluntarily included in corporate charters very soon after corporations sought to borrow (the early 17th century—Watts, 1977, p. 57) was the restriction that dividends could only be paid out of profits. This restriction is effectively a minimum investment requirement (see Smith & Warner, 1979). In the lumberman case, suppose the business required an original outlay of the amount of the loan, £65,000. Then the profit for the first year is the cash flow £35,000, minus the allocation of the original outlay, £32,500, or £2,500. With a dividend constrained to the profits of £2,500, the lumberman's optimal action is to take the investment.

The dividend problem is an under-investment problem. There are other incentive problems associated with debt apart from the under-investment problem (see Myers, 1977, and Smith & Warner, 1979). Borrowers have incentives to substitute different types of investments for those expected by debt-holders. For example, shareholders may take investments that are value-reducing if they increase the uncertainty of the firm's claims sufficiently to cause a wealth transfer from debt holders to themselves. Borrowers also have incentives to issue additional debt and dilute the claims of existing debt-holders. Covenants aimed at restricting dividend payments, other under-investment activities, investment substitution and claim dilution are commonly included in debt contracts. Many of those provisions use numbers from the audited financial statements to achieve those restrictions.

In the USA, debt covenants that restrict dividends using reported profits are typically more binding than the corporate law restriction that dividends not be paid out of profits. Dividends are restricted to an inventory of payable funds that is typically less than retained earnings.[5] Other covenants use accounting measures of gearing, tangible net worth, working capital and interest coverage to restrict managerial actions.

Note it is also possible that incentive problems with debt are reduced by the incentive mechanisms within the firm. For example, some bonus plans add interest back to earnings and use return on assets to measure managerial performance. Those plans tend to provide the manager with an incentive to maximize *firm* rather than *share* value and so reduce any tendency for the manager to transfer wealth from debt-holders to shareholders.

Sales contracts also make use of accounting numbers. Cost-plus contracts are common not only in the defence industry but also in the construction industry. Those contracts are a way of shifting risk. Zimmer (1986) hypothesizes that Australian real estate developers use cost-plus contracts

to shift risk to their customers. Often those customers are listed firms better able to bear risk than an unlisted developer.

Given identification of accounting's role in the organization and in contracts, the next issue is the generation of explanations for, and predictions of, variation in accounting choice. The explanations and predictions that follow provide an indication of how rich is the theory of the firm approach. They also demonstrate that the approach is still far from developed.

Explanations and predictions

The explanations and predictions generated from accounting's role in the firm are discussed in four sub-sections. First, the decentralization theory's implications for the firm's internal accounting arrangements are discussed. Then explanations for the use of accounting earnings in compensation contracts and predictions as to when earnings will be used are covered. This leads to a sub-section on explanations of the effect of such compensation-use on accounting methods and predictions as to how those methods vary across firms. Finally, the explanations and predictions generated from accounting's use in the firms' debt and sales contracts are discussed.

Decentralization of the firm

There is a literature on the allocation of decision rights within the firm; in particular the determination of the extent to which decision rights are allocated to managers below the chief executive officer (CEO). Hayek (1945) and Harris, Raviv & Kriebel (1982) make the point that a firm's success depends on the extent to which the rights to make a decision and the knowledge relevant to that decision are collocated within the firm. Economic Darwinism suggests that surviving firms will tend to have such collocation (Jensen & Meckling, 1991). The literature tends to assume that knowledge for many decisions rests with lower-level managers, though this is clearly not always the case. Given this assumption, the issue is whether to pass the knowledge up to the CEO or to pass the decision rights down to the lower-level manager. The answer to this question depends on the costs of transfering the knowledge *vis-à-vis* the costs of transferring the decision rights (Jensen & Meckling, 1991, and Melumad, Mookherjee & Reichelstein, 1990).

It is costly to transfer knowledge because understanding a given piece of knowledge may require a lot of experience or training (require human capital) and the CEO cannot be expected to have all that relevant experience or training. Also, the transfer takes time and profit opportunities can be lost in the meantime. Finally, the CEO has limited processing capacity. Transferring decision rights is costly because the lower-level manager acts

in his own interest not that of the CEO and incentive mechanisms are not perfect. So transferring decision rights further down the organization results in more 'control loss' (Melumad *et al.*, 1990).

Christie, Joye & Watts (1991) test whether the extent of decentralization from the executive office to the next line level (e.g., divisional level) is a function of the knowledge transfer costs and control loss. They measure decentralization by the extent to which the units at the next line level below the CEO are operated as profit or cost centres. Williamson (1975), Vancil (1978) and Jensen & Meckling (1991) all claim as an empirical proposition that profit centres typically give the manager more decision rights than do cost centres. Knowledge transfer costs and control loss are predicted to vary with type of information generated in the firm's industry, interdependence of the firm's operating activities, uncertainty attaching to the firm's investments, firm size and extent of regulation. The evidence is consistent with decentralization being greater: the more the industry is characterized by information that is difficult to transfer; the lower the interdependence between the firm's activities; the more uncertainty surrounding the firm's investment activities; the larger the firm; and if the firm is regulated.

The preceding results suggest that not only is the structure of decision rights within the firm determined by the relative costs of allocating decision rights and of incentive schemes, so is the way in which cost or profits are cumulated within the firm—the internal accounting system. Although it is not reported in Christie *et al.*, in empirical work for a follow-on paper, we also find that transfer prices are a function of whether the units are organized as cost or profit centres. Market prices or manager-negotiated prices are more likely to be used if the firm is decentralized.

Accounting earnings in top management compensation schemes. The most empirically investigated effect of organizational arrangements on accounting in the USA is the effect of management compensation schemes, in particular top management compensation schemes. This is probably because the existence and details of accounting-based top management compensation schemes are available in proxy statements.

Most large listed corporations in the USA have formal accounting-based incentive schemes, such as a bonus plan (see for example, Sloan, 1993, Smith & Watts, 1982, and Conference Board, 1989) and those schemes are responsible for a considerable fraction of top management compensation. For example, Murphy (1985) estimates bonus schemes account for over 25% of top management compensation.

The stated purpose of incentive compensation schemes is to align management and shareholder incentives (see Smith & Watts, 1982). Given that purpose, that shareholders are interested in maximizing the market value

of their shares, and that top management is responsible for the performance of the whole firm, it would seem that stock-price-based incentive compensation would be used to the exclusion of accounting-based compensation (see Jensen, 1989, Stewart, 1989, and Rappaport, 1990). This question has caused researchers to investigate why accounting-earnings-based compensation schemes such as bonus plans are used.

The conventional wisdom for the popularity of earnings-based compensation *vis-à-vis* stock-return-based compensation is that earnings reflect factors that are more under management's control and that stock prices are influenced by market factors beyond management's control (see Crystal, 1984, and Sloan, 1993). Theory predicts that optimal incentive compensation contracts will try to filter out fluctuations in the firm's performance that are beyond the manager's control ('noise'—see Holmstrom, 1982). While both earnings and stock returns are noisy measures of performance, it is likely that earnings are noisier. Banker & Datar (1989) identify the necessary and sufficient conditions for the optimal performance measure to be a linear combination of individual noisy performance measures. Further, they demonstrate how the relative weights placed on the individual performance measures vary. Sloan (1993) uses the Banker & Datar analysis to derive testable implications for variation in the relative use of earnings and stock returns in top management compensation, given earnings are the noisier measure. In particular, Sloan predicts the relative weight placed on earnings in the compensation scheme will be greater: (i) the noisier stock returns are relative to earnings; and (ii) the lower the correlation between noise in earnings and noise in stock returns. Sloan's evidence is consistent with his predictions.

Management compensation effects on accounting choice. If accounting earnings have long been used formally (as in bonus plans) or informally in determining top management compensation and in evaluating management, we expect that usage to have effects on the calculation of earnings and on accounting choice. In Watts & Zimmerman (1986) we break the effects on accounting procedures into two: effects on accepted procedures; and effects on management choice within accepted procedures.

Accounting-based incentive schemes would be of little use if the manager had complete control of the accounting performance measure on which compensation is based. Presumably, it is easier for the manager to manipulate the accounting measure than to work to produce good performance. For that reason, even in the absence of accounting regulation, we expect the calculation of the accounting measure to be constrained. In particular, we expect the set of procedures the manager can choose to calculate earnings to be constrained to a set of accepted accounting procedures (see Watts & Zimmerman, 1986, chapter 9). Those accepted procedures would

evolve through experience. In addition, we expect compliance with accepted accounting procedures to be monitored. These expectations are consistent with observed behavior. As I noted earlier, audited financial statements were used for management compensation at least by the 19th century in the UK. Even without regulation, accepted procedures emerged to restrict management's accounting choice and those restrictions were monitored by auditors. Matheson (1893, pp. vii–viii) discusses the tensions between top management earnings-based compensation and accepted accounting procedures from an auditor's perspective.

Earnings-based compensation is also used for managers below the executive office (e.g., divisional managers). There, the ability of the manager to manipulate earnings for compensation purposes is constrained by having accounting policy set by the executive office (see Smith & Watts, 1982).

The form of the organizational arrangements is determined by their cost-effectiveness. Since costs of different arrangements are likely to vary from industry to industry, the organizational arrangements, including accounting procedures, are likely to vary from industry to industry. For example, consider the issue of when to recognize accounting profits. In most industries, profits are recognized when the goods or services are sold. However, in some industries, notably mining and construction, profits are often recognized when the goods or services are produced. I believe that variation in accounting procedures (recognition of profit) is induced by the management compensation and evaluation use of accounting earnings.

To explain the preceding point, consider an Australian rutile mining firm that I audited in the early 1960s. That firm recognized profits at the time of production rather than the more common time of sale. When I questioned the controller as to why the firm followed this particular procedure, he gave a simple, sensible answer. The firm produced four minerals from its mining operations, but one (rutile) was responsible for more than half of its revenues. The controller pointed out that the firm had a contract with Dupont that required Dupont to take all the rutile the firm produced. The price was determined by the closing price in the London market on the day the rutile was loaded f.o.b. in Australia. The sale of most of the firm's output was not under the management's control. What was under the management's control was the efficiency with which the mineral was produced and the firm had earnings-based compensation for its managers all the way down the organization chart to the foremen on the dredges that sucked up the sand for processing into minerals. Recognizing profit at production made the earnings performance measure a more timely and hence a more effective measure.

Now suppose that recognition of profit at production is introduced into a manufacturing firm that doesn't have a guaranteed sale of its output. An

example of such a firm is Sterling Homex, a Rochester firm that was listed in the early 1970s. Sterling Homex's management was credited for the sale of output before the effort to generate the sale was expended. In that situation, I would expect to see the management concentrate more on production and less on sale with dysfunctional consequences. Sterling Homex went bankrupt when its banker suddenly discovered that its large accounts receivables were in fact inventories of its product (housing modules) stored in fields near the factory.

The preceding example illustrates a broader point than that optimal accounting procedures vary across industries. It explains the tension between timeliness and reliability that is observed in the accounting accrual process. *Ceteris paribus*, the optimal performance measure incorporates the effects of the manager's actions on the value of the firm in the period for which he is compensated (Holmstrom, 1982). The problem is obtaining a reliable measure of the valuation effects of the manager's actions. By selection and because of access to information, the manager is likely to have better information on the effects of his actions than the auditor (there is information asymmetry). But, since he is evaluated and compensated on the basis of the measure of the effects of his actions, the manager is likely to provide a biased and noisy estimate of those effects. In the Sterling Homex example, the managers overstated the value generated by the modules they produced. To offset the manager's incentives in providing estimates, the accounting accrual process has always stressed objectivity of accounting estimates (see Watts & Zimmerman, 1986, p. 206).

The accrual process is a trade-off between timely recognition and reliability. When timely estimates of value increases can be made reliably, accepted procedures allow them to be incorporated in earnings (as in the rutile case). When those estimates cannot be made reliably (as in the Sterling Homex case) accepted procedures do not allow them to be incorporated because of their effects on management's actions (i.e., the balance between managers working to inflate the estimates and working to increase performance is changed). The accrual process treats estimates of value decreases differently. For example, the lower of cost or market rule is used for inventories. This differential treatment is presumably because of management's bias towards increasing value (though below we see that occasionally managers have incentives to bias earnings downward).

Dechow (1991) takes the above view of the accrual process and produces testable predictions.[6] She argues that accepted procedures will allow accruals when they improve earnings as a performance measure (when the timeliness effect outweighs any reliability effect). Based on the results of Sloan (1993), Dechow uses the share rate of return adjusted for the market ('noise') as the benchmark performance measure. Dechow expects that in general accruals increase the association between earnings and the bench-

mark. In addition, Dechow generates predictions as to the how the effect of accruals on the association varies across firms. In particular she predicts the longer a firm's operating cycle, the greater the effect of accruals on the association. Dechow's evidence is consistent with the preceding predictions.

Dechow also investigates the differential effect of accruals forced by accounting regulators with accruals existing prior to regulation (e.g., working capital accruals such as inventories, accounts receivable and accounts payable). Given pre-regulatory accruals are driven by cost effective organizational arrangements and regulatory enforced accruals are driven by other objectives, she expects the pre-regulatory accruals to increase, and the regulatory accruals not to increase, the association of earnings with the benchmark. At this stage of her work, the evidence suggests most of the improvement in association is due to working capital accruals; accruals that existed prior to regulation.

While practice in the form of accepted procedures is expected to restrict management's choice of accounting procedures, it isn't expected to constrain that choice completely. Complete specification of accounting procedures is unlikely to be cost effective. First, the cost of completely eliminating management's manipulation of accounting to increase compensation is likely to be infinite; just as it is likely to be infinitely costly for society to eliminate all crime. Second, as we have seen, different accounting procedures are likely to be optimal in different firms or in different divisions of the same firm. The manager most likely has better information as to which procedures are optimal. Third, published accounting reports are used for a variety of purposes other than compensation. For example, published audited financial statements are also used in the political and regulatory process (see Watts & Zimmerman, 1986, chapter 10). Those other uses also constrain management's manipulative choice of accounting procedures (see Mian & Smith, 1990, p. 143).

Note that the use of published financial statements for purposes other than compensating and evaluating management could lead to some departure from procedures that are optimal given only the compensation and evaluation function. This suggests firms could use one set of financial statements for compensation and evaluation and another for public reporting. However, those other uses effectively constrain management manipulation for compensation and evaluation purposes and this benefit has to be offset against any costs of using the one set of financial statements for all purposes.

Given that management is not completely constrained in its accounting choice, there is likely to be some use of that choice to manipulate accounting numbers to increase accounting compensation. This has led accounting researchers (e.g., Watts & Zimmerman, 1978, Hagerman & Zmijewski,

1979, Bowen, Noreen & Lacey, 1981) to predict that firms with earnings-based compensation plans are more likely to follow earnings increasing accounting procedures (the bonus plan hypothesis). The choice of procedures investigated in these studies are typically accelerated versus straight-line depreciation, LIFO versus FIFO, deferred versus flow-through method for the investment tax credit, and the length of the write-off period for past service costs for pensions. The evidence is generally consistent with the bonus plan hypothesis (see Christie, 1990).

While the existence of a bonus plan might give managers an incentive to choose accounting procedures that generally increase reported earnings, the structure of bonus plans is such that in some years managers may even have an incentive to reduce earnings. More detailed predictions at the firm level can be obtained by making use of the structure of bonus plans. Healy (1983) notes that most bonus plans have a lower bound that must be achieved before any bonus can be earned. That lower bound is typically a fixed rate of return on either equity or assets. Once earnings exceed that lower bound the maximum bonus is a fraction of the excess of earnings over the lower bound. In some cases an upper bound is placed on the maximum bonus. Most often, that maximum bound is dividends paid.

If earnings (before manipulation) are above the lower bound and below the upper bound managers have an incentive to increase earnings to the upper bound. If earnings are above the upper bound (if it exists) managers have an incentive to reduce earnings to the lower bound since they lose any bonus on the excess of earnings over the upper bound. Finally, if earnings are sufficiently below the lower bound, managers have an incentive to reduce earnings (take a bath). The earnings reduction increases expected future earnings and expected future bonuses. Since accounting procedures such as depreciation cannot be changed each year without those changes being brought to the attention of the board of directors' compensation committee by the auditor, the most likely way earnings would be manipulated would be by accruals such as doubtful debts provisions, estimates for the restoration of land after strip mining (the rutile mine) etc. To incorporate these manipulations, Healy predicts total accruals. He expects accruals to be greater when earnings lie between the upper and lower bounds and to be lower when they lie above the upper bound (if one exists) or below the lower bound. Again his evidence is consistent with his predictions.

Contract effects on accounting choice. Debt covenants use audited reported accounting numbers to restrict management actions. Management cannot pay a dividend unless there is a positive inventory of payable funds. Measures of gearing are used to restrict the issuance of new debt and dilution of current debt (see Begley, 1991, for empirical evidence on the

frequency of various covenants). Given these covenants restrict managers actions, manager's incentives are to loosen them. One way of avoiding covenants once they are in place is to choose accounting methods to increase earnings, retained earnings and shareholder's equity.

Accounting-based debt covenants will not be effective in restricting manager's actions unless the manager is restricted in calculating the accounting numbers used in the covenants. Given the manager's bias is to increase earnings and shareholder's equity and the manager's informational advantage, I expect debt contract's use of accounting to reinforce accounting's emphasis on objectivity, reliability and conservatism.

Evidence on the debt contract's effects on accounting can be obtained from debt contracts themselves. Debt contracts tend to use the reported numbers and GAAP. If GAAP changes so do the accounting covenants. However, if GAAP introduces a new standard that is sufficiently non-optimal from a contracting viewpoint, debt contracts are changed to contract out of the procedure. Leftwich (1983) looks at variations from GAAP suggested by the American Bar Association. He finds that goodwill and intangibles are excluded in calculating assets and certain liabilities that aren't required to be included by GAAP are recommended to be included (leases are an historical example of such a liability). These variations from GAAP are all conservative and suggest a concern with reliable measurement.

Not only is there evidence that debt contracts reinforce conservatism and objectivity, there is also evidence that they affect the entity for which the financial statements are prepared. Frances (1986), Whittred (1987) and Mian & Smith (1990) all investigate the effect of debt contracts on accounting choice, in particular the decision whether or not to consolidate subsidiaries when such a choice is optional. They expect subsidiaries are more likely to be consolidated if the debt of one company is guaranteed by another. Francis investigates only guarantees by the parent. The other two investigate cross-guarantees by parent or subsidiary. If guarantees are present the assets of all the guaranteeing companies are relevant to the loan and monitoring of debt agreements is enhanced by consolidation. Whittred and Mian & Smith both find a strong association between the presence of direct guarantees and consolidation. This evidence is stronger because the samples are drawn from different countries and different time periods.

When the likelihood of violating a covenant that involves default becomes high, one would expect the manager to try to avoid violating the covenant by manipulating accounting methods. The basic reason is that default is costly to the firm and the shareholders (see Sweeney, 1991, for evidence) and this is reflected in the manager's compensation. For example, the probability of the manager being fired increases with tech-

nical default (see Gilson, 1989). Sweeney (1991) investigates accounting choice by firms that defaulted. She found that in the default year and years immediately before default those firms changed accounting methods to increase earnings and shareholders' equity more frequently than a control sample of firms. The results are weakened by the fact that some of the accounting changes had direct cash flow effects.

Most studies of the effect of debt covenants on accounting choice investigate the extent to which firms' use of income increasing accounting procedures varies with gearing (see Holthausen & Leftwich, 1983, Watts & Zimmerman, 1986, 1990, and Christie, 1990, for summaries of these studies). Firms with higher gearing are expected to be closer to their debt covenants and so be more likely to violate those covenants (see Kalay, 1979). There is strong evidence that accounting choice does vary with gearing as predicted by the debt/equity hypothesis (e.g., see Christie, 1990). There is also evidence to suggest that mandated oil and gas accounting standards had an effect on stock prices via debt contracts (see for example, Lys, 1984).

There is a question as to whether both gearing and income-increasing accounting procedures might be driven by another variable (e.g., the firm's investment opportunity set—see Watts & Zimmerman, 1986). Also, Frost & Bernard (1989) investigate the link between stock prices and mandated oil and gas accounting standards and find few firms violated debt covenants because of such standards. These questions led researchers to investigate the linkage between gearing and closeness to covenants in greater depth. Press & Weintrop (1990) and Duke & Hunt (1990) both provide evidence that higher geared firms are closer to their covenants. An attempt by Press & Weintrop to determine the extent to which the debt/equity results are due to closeness to covenants and to which they are due to gearing *per se* is unsuccessful. Healy & Palepu (1990) investigate whether firms close to zero inventory of payable funds change accounting procedures to avoid having to cut dividends and find they do not and instead cut dividends. Begley (1990) points out that the Healy & Palepu firms generally self-select themselves into the sample. For example, they have new issues that set close to binding dividend covenants or their earnings are reduced, not by reduced cash flows, but by accruals that could be discretionary. Firms that are voluntarily making the dividend restrictions binding are unlikely to be trying to avoid that restriction by changing accounting methods. Begley also notes that few firms with public debt in the Frost and Bernard sample issued subordinated debt which typically includes few covenants and is not representative of non-subordinated public debt. Overall, while there is agreement that firms with higher gearing use more income-increasing accounting methods, it isn't certain that association is due to debt covenants.

The rutile mining example indicates how sales contracts can affect accounting choice. There, the guaranteed sale led to the recognition of profit at production rather than sale. Zimmer (1986) makes another prediction. He predicts that when Australian real estate development firms have the option of capitalizing interest costs, those with cost-plus contracts that include interest as a cost are more likely to capitalize interest. In those firms, the interest generates revenues and so is capitalized to be matched later with the revenues it generates. Firms in which interest is not included as a cost in the cost-plus contracts are expected to expense interest as incurred. Zimmer's evidence is consistent with his prediction.

The preceding predictions and explanations generated from the implications of the theory of the firm as it relates to organizational arrangements and contracting are not all the predictions generated in the literature. There have been more, particularly in the area of manipulation to increase compensation. However, the explanations and predictions given provide some notion of the organizational arrangements' rich potential for explaining and predicting accounting choice.

Political process

The preceding discussion of the theory of accounting choice draws on the theory of the firm to derive predictions and explanations, with little role given to regulators and accounting standard setters. In contrast, most discussions of accounting choice give standard setters a prime role. And it does appear that financial accounting is influenced by the political process (see the evidence summarized in Watts & Zimmerman, 1986, and more recent studies by Jones, 1988, Wong, 1988*a*, 1988*b*, and Lemke & Page, 1992).

The reason I have given little prominence to the role of the political process in the theory of the firm is that I think the nature of accounting, as we know it, has been primarily determined by the use of accounting by firms as described above. The accrual process that underlies accounting is driven by the use of accounting in organizational arrangements. Periodically, we see individuals wanting to use regulation to force accounting to depart from that process (e.g., to require all assets to be accounted at market value—see later). But, significant departure imposes significant costs and generates significant political opposition.

The theory of the firm takes the property rights as given. Clearly though, those property rights are not fixed and do change from time to time. In accounting, as in economics, we tend to assume individuals act the same in the political process as they act in the market and in the firm—i.e., to maximize their own utility. Hence, individuals try to use the political process to increase their own wealth. One way of increasing wealth is to change the property rights to transfer wealth to oneself at the

expense of other parties. Most of the empirical literature explaining and predicting accounting choice takes this route.

For example, consider Jones' analysis of firms seeking government relief from imports. The managers of those firms want import restrictions to give the firms rents and increase their own welfare. To improve their case before the relevant government agency the managers use accounting methods to show poorer results. Increased restrictions on free trade most likely reduce the welfare of most individuals in the economy, so any gains obtained by the manager are due to wealth transfers.

In using the political process to generate predictions about accounting choice, the empirical accounting literature has concentrated on opportunistic actions rather than actions that increase general welfare. The reason is that opportunistic effects are easier to identify and predict. It is possible that some regulations do increase general welfare. Competition in the political process could increase welfare. However, it is far from clear which regulations achieve that objective.

Many of the early studies use size as a surrogate for costs in the political process and hypothesize that because of their larger political costs, larger firms are more likely to adopt accounting procedures to reduce reported earnings. Size, whether measured by total assets or sales, does appear to be associated with the use of earnings-reducing accounting procedures (see Christie, 1990). However, size can proxy for many variables besides political costs (see Ball & Foster, 1982) or can even affect accounting itself via the theory of the firm. Christie, Joye & Watts (1991) produce evidence that large firms are more likely to diversify and use profit centres. Nevertheless, the results of studies such as Jones (1988) suggest the political process affects accounting choice.

MORE IMPLICATIONS FOR CAPITAL MARKET RESEARCH

I motivated the paper by suggesting that knowledge of accounting theory choice is critical to capital markets' research and that much capital markets research ignores accounting choice at its peril. The point was made that accounting methods are correlated with variables such as risk and gearing and that investigations of associations between accounting numbers and rates of return should control for such associations. It is probably appropriate at the end of the paper to point specifically to areas where theory of the firm and accounting choice theory can help the capital markets research.

One area where those theories can help is the concern raised by Lev (1989) and others about the low association between accounting earnings and share rates of return. Some capital markets papers have already pointed out that an important reason for the low association between annual

earnings and annual rates of return is that many events are reflected in share returns in years prior to the earnings year (see for example, Easton, Harris & Ohlson, 1992, and Kothari & Sloan, 1992). However, the theory and evidence discussed in this paper suggests that the correlation between share returns and accounting earnings is not necessarily an appropriate criterion for evaluating accounting earnings even if the appropriate periods are chosen. The theory and evidence in papers such as Sloan (1993) suggests that if the goal of accounting earnings is to evaluate management, accounting earnings would not reflect all the share price changes. In particular, if market factors in share returns are beyond the manager's control (e.g., interest rate movements) and essentially contribute noise to the measure of the manager's performance, they should not be included in earnings.

The theory also provides predictions as to how differences in timing between earnings and share returns vary across firms. In particular, the theory suggests growth firms are one set of firms where difference between the time events show up in share returns and the time they show up in earnings is the greatest. In growth firms, managerial decisions are likely to be reflected in share returns at the time that they are made but will not be reflected in earnings until the cash flows resulting from those decisions can be reliably estimated.

The theory also has predictions for the effects of the SEC's current push for current value accounting on earnings as a performance measure. Marking assets traded in an active market to market price is likely to increase earnings' value as a performance measure. Some of those assets were marked to market in earlier days and are not marked to market now because of regulator's actions (particularly bank regulators). However, any attempt to expand recognition markets where market prices are not readily observable and reliable estimates of value cannot be observed will reduce the value of earnings as a performance measure. Further, such an attempt will interfere with the use of accounting earnings numbers in their primary function and produce significant opposition in the political process.

CONCLUSIONS

This paper's objective is to provide an outline of the theory of accounting choice and to give some understanding of its relevance to capital market research. Hopefully the sketchy outline I have given will encourage readers to pursue the original papers and gain a more complete understanding of the literature as it exists. The outline also points to the importance of control for accounting choice in capital markets studies. Finally, I hope the outline will encourage future accounting scholars and policy analysts

to seek to gain a thorough understanding of the stewardship and other contracting effects of existing accounting practice before calling for wide ranging policy changes such as current value accounting.

NOTES

1. Garman & Ohlson (1980) introduce a more general linear valuation model that encompasses the Capital Asset Pricing Model (CAPM) and other common models as specific cases. As might be expected, given it is the same class of model as the CAPM, accounting has no endogenous role in the Garman and Ohlson model either. Empirical implications are derived by the *ad hoc* assumption that earnings provide information on current and future dividends (see Ohlson, 1983).
2. This assumption is made for convenience in making a point and is not descriptive. In fact, the market learns of events reflected in annual earnings in previous years (see Beaver *et al.*, 1980, Brown *et al.*, 1985, Collins & Kothari, 1989, and Kothari & Sloan, 1992).
3. For those not familiar with this literature, equation (2) is obtained as follows. First, by definition,

$$r_t = \frac{P_t + X_t - P_{t-1}}{P_{t-1}}$$

since dividends are equal to X_t. Second, substituting equation (1) yields,

$$r_t = \frac{X_t + \frac{\Delta X_t}{r}}{P_{t-1}}.$$

Adding and subtracting X_{t-1},

$$r_t = \frac{X_{t-1}}{P_{t-1}} + \frac{\Delta X_t + \frac{\Delta X_t}{r}}{P_{t-1}} = r + \left(1 + \frac{1}{r}\right)\frac{\Delta X_t}{P_{t-1}}$$

or

$$r_t - r = \left(1 + \frac{1}{r}\right)\frac{\Delta X_t}{P_{t-1}}.$$

4. Since this talk was presented, I have become aware of another paper (Salamon & Kopel, 1991) that makes the same point.
5. The inventory of payable funds for quarter t (IPF_t) is typically defined as:

$$IPF_t = k\sum_{\tau=0}^{t} A_\tau + \sum_{\tau=0}^{t} SS_\tau + DIP - \sum_{\tau=0}^{t-1} DIV_\tau$$

where A_τ is the earnings of quarter τ, SS_τ is the proceeds from the sale of common stock net of transactions costs in quarter τ, DIP is a fixed number, less than retained earnings at the time of debt issue (quarter 0), that is known as the "dip", and DIV_τ is cash or asset dividends and share repurchases in quarter τ (see Kalay, 1982).
6. The Dechow study post-dates the Strathclyde Summer School and so these explicit predictions were not presented there.

REFERENCES

Alchian, A. A. (1950). 'Uncertainty, evolution and economic theory', *Journal of Political Economy*, Vol. 58, pp. 211–221.

Alchian, A. A. & Demsetz, H. (1972). 'Production, information costs and economic organization', *American Economic Review*, Vol. 62, pp. 777–795.

Ball, R. (1989). The firm as a specialist contracting intermediary: Application to accounting and auditing, unpublished paper (University of Rochester).

Ball, R. & Foster, G. (1982). 'Corporate financial reporting: A methodological review of empirical research, Studies on current research methodologies in accounting: A critical evaluation, supplement to vol. 20', *Journal of Accounting Research*, 161–234.

Banker, R. & Datar, S. (1989). 'Sensitivity, precision, and linear aggregation of signals for performance evaluation, *Journal of Accounting Research*, Vol. 27, pp. 21–39.

Beaver, W. H., Lambert, R. & Morse, D. (1980). 'The information content of security prices', *Journal of Accounting & Economics*, Vol. 2, pp. 23–28.

Begley, J. (1990). 'Debt covenants and accounting choice', *Journal of Accounting & Economics*, Vol. 12, pp. 125–139.

Begley, J. (1991). Restrictive covenants included in public debt agreements: An empirical investigation, University of British Columbia, Vancouver, B.C., Canada.

Bowen, R., Noreen, E. & Lacey, J. (1981). 'Determinants of the corporate decision to capitalize interest', *Journal of Accounting & Economics*, Vol. 3: 2, pp. 151–179.

Boyd, E. (1905). 'History of auditing', in E. Boyd (ed.), *A history of accounting and accountants*, New York, NY. Augustus M. Kelley, 74–92.

Brown, P., Foster, G. & Noreen, E. (1985). Security analyst multi-year earnings forecasts and the capital markets Studies in accounting research #21, American Accounting Association, Sarasota, Florida.

Chandler, A. D. Jr (1962). Strategy and structure: Chapters in the history of the industrial enterprise, Cambridge, MA. The M.I.T. Press.

Chandler, A. D. Jr (1977). The visible hand: The managerial revolution in American business, Cambridge, MA. Harvard University Press.

Cheung, S. N. S. (1983). 'The contractual nature of the firm', *Journal of Law & Economics* Vol. 26, pp. 1–21.

Christie, A. A. (1990). Aggregation of test statistics: An evaluation of the evidence on contracting and size hypotheses, *Journal of Accounting & Economics*, Vol. 12, pp. 15–36.

Christie, A. A., Joye M. P. & Watts, R. L. (1991). Decentralization of the firm: theory and evidence, William E. Simon Graduate School of Business, University of Rochester, Rochester, NY.

Coase, R. H. (1937). 'The nature of the firm', *Economica*, Vol. 4, pp. 386–405.

Collins, D. & Kothari S. P. (1989). An analysis of the intertemporal and cross-sectional determinants of earnings response coefficients, *Journal of Accounting & Economics*, Vol. 11, pp. 143–181.

Crystal, G. (1984). Questions and answers on executive compensation: How to get what you're worth, Englewood Cliffs, NJ. Prentice-Hall.

Dechow, P. M. (1991). Accounting earnings and cash flows as measures of firm performance: The role of accounting accruals, thesis proposal, William E. Simon Graduate School of Business, University of Rochester, Rochester, NY.

Duke, J. C. & Hunt, H. G. III, (1990). 'An empirical examination of debt covenant restrictions and accounting-related debt proxies', *Journal of Accounting & Economics*, Vol. 12, pp. 45–63.

Easton, P. & Harris, T. (1991). 'Earnings as an explanatory variable for returns', *Journal of Accounting Research*, Vol. 29, pp. 19–36.

Easton, P., Harris, T. S. & Ohlson, J. A. (1992). 'Aggregate accounting returns can explain most of security returns: The case of long return intervals', *Journal of Accounting & Economics*, Vol. 15, pp. 119–142.

Easton, P. & Zmijewski, M. (1989). 'Cross-sectional variation in the stock market response to the announcement of accounting earnings', *Journal of Accounting & Economics*, Vol. 11, pp. 117–141.

Fama, E. F. & Jensen, M. C. (1983). 'Separation of ownership and control', *Journal of Law & Economics*, Vol. 26, pp. 301–326.

Foster, G. (1980). 'Accounting policy decisions and capital market research', *Journal of Accounting & Economics*, Vol. 2: 1, pp. 29–62.

Frances, J. R. (1986). 'Debt reporting by parent companies: Parent-only versus consolidated statements, *Journal of Business Finance and Accounting*, Vol. 13, pp. 393–403.

Frost, C. & Bernard, V. (1989). 'The role of debt covenants in assessing economic consequences of limiting capitalization of exploration costs', *Accounting Review*, Vol. 64, pp. 788–808.

Garman, M. & Ohlson, J. A. (1980). 'Information and the sequential valuation of assets in arbitrage-free economies', *Journal of Accounting Research*, Vol. 18, pp. 420–440.

Gilson, S. (1989). 'Management turnover and financial distress', *Journal of Financial Economics*, Vol. 25, pp. 241–262.

Hagerman, R. & Zmijewski, M. (1979). 'Some economic determinants of accounting policy choice', *Journal of Accounting & Economics*, Vol. 1: 2, pp. 141–161.

Harris, M., Kriebel, C. H. & Raviv, A. (1982). 'Asymmetric information, incentives and intrafirm resource allocation', *Management Science*, Vol. 28, pp. 604–620.

Hayek, F. A. (1945). 'The use of knowledge in society', *American Economic Review*, Vol. 35, pp. 519–530.

Healy, P. (1985). 'The effect of bonus schemes on accounting decisions', *Journal of Accounting & Economics*, Vol. 7, pp. 85–107.

Healy, P. & Palepu, K. (1990). 'Effectiveness of accounting-based debt covenants', *Journal of Accounting & Economics*, Vol. 12, pp. 97–123.

Holmstrom, B. (1982). 'Moral hazard in teams', *Bell Journal of Economics*, Vol. 13, pp. 324–340.

Holthausen, R. & Leftwich, R. (1983). 'The economic consequences of accounting choice: implications of costly contracting and monitoring', *Journal of Accounting & Economics*, Vol. 5: 2, pp. 77–117.

Jarrell, G. A., Brickley, J. A. & Netter, J. M. (1990). 'The market for corporate control: The empirical evidence since 1980', *Journal of Economic Perspective*, Vol. 2, pp. 49–68.

Jensen, M. C. (1989). 'Eclipse of the public corporation', *Harvard Business Review*, Vol. 89, pp. 61–74.

Jensen, M. C. & Meckling, W. H. (1991). 'Knowledge, control and organizational structure, forthcoming'. In L. Werin & H. Wijkander (eds), *Main currents in contract economics*, Oxford, Blackwell.

Jones, J. (1988). The effect of foreign trade regulation on accounting choices, and production and investment decisions, University of Michigan, Ann Arbor, Michigan.

Kalay, A. (1982). 'Stockholder-bondholder conflict and dividend constraints', *Journal of Financial Economics*, Vol. 10, pp. 211–233.

Kaplan, R. & Roll, R. (1972). 'Investor evaluation of accounting information: Some empirical evidence', *Journal of Business*, Vol. 45, pp. 225–257.

Klein, B., Crawford, R. G. & Alchian, A. (1978). 'Vertical integration, appropriable rents, and the competitive contracting process', *Journal of Law and Economics*, Vol. 21, pp. 297–326.

Kothari, S. P. & Sloan, R. (1992). Information in prices about future earnings: Implications

Vancil, R. (1978). Decentralization: Managerial ambiguity by design (Dow Jones-Irwin, Homewood IL).

Watts, R. L. (1977) 'Corporate financial statements, a product of maket and political processes', *Australian Journal of Management*, Vol. 2, pp. 53–75.

Watts, R. L. & Zimmerman, J. L. (1978). 'Towards a positive theory of the determination of accounting standards', *Accounting Review*, Vol. 53, pp. 112–134.

Watts, R. L. & Zimmerman, J. L. (1983). 'Agency problems, auditing and the theory of the firm: Some evidence', *Journal of Law & Economics*, Vol. 26, pp. 613–634.

Watts, R. L. & Zimmerman, J. L. (1986). Positive accounting theory, Englewood Cliffs, NJ. Prentice-Hall.

Watts, R. L. & Zimmerman, J. L. (1990). 'Positive accounting theory: A ten year perspective', *Accounting Review*, Vol. 65, pp. 13–156.

Whittred, G. (1987). 'The derived demand for consolidated financial reporting', *Journal of Accounting & Economics*, Vol. 9, pp. 259–285.

Williamson, O. E. (1975). Markets and hierarchies: Analysis and anti-trust implications, New York, NY. The Free Press.

Wong, J. (1988*a*). 'Political costs and an interperiod accounting choice for export tax credits', *Journal of Accounting & Economics*, Vol. 10, pp. 37–51.

Wong, J. (1988*b*). 'Economic incentives for the voluntary disclosure of current cost financial statements', *Journal of Accounting & Economics*, Vol. 10, pp. 151–167.

Yamey, B. S. (1962). Some topics in the history of financial accouning in England 1500–1900. In W. T. Baxter & S. Davidson (eds), *Studies in accounting theory*, pp. 14–43. London. Sweet and Maxwell.

Zimmer, L. (1986). 'Accounting for interest by real estate developers', *Journal of Accounting & Economics*, Vol. 8, pp. 37–51.

Zimmerman, J. (1979). 'The costs and benefits of cost allocations', *Accounting Review*, Vol. 54, pp. 504–521.

Received July 1992.