

DETERMINANTS OF ACCOUNTING CHOICES IN EGYPT

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Abstract

In recent years, Egypt has been developing rapidly from a socialist to a fully developed market-based economy. One may expect that this economic transition towards a more capitalist orientation will influence the country's cultural and socio-economic environment, and consequently the behaviour of its corporate managers. The increasing separation of ownership and control of capital could be expected to increase agency problems associated with managerial decisions. In these circumstances, it should be interesting to identify whether 'positive accounting' hypotheses would apply in such an environment. Therefore, this paper examines the relevance to financial reporting in Egypt of some established positive accounting theory hypotheses in addition to a new hypothesis related to taxation. The evidence of the study is consistent with the validity of the conventional 'bonus' and 'debt' hypotheses and the new 'taxation' hypothesis. These conclusions are also consistent with recent empirical studies of cultural and socio-economic change in Egypt.

Keywords: Accounting choice, positive accounting theories, Egypt, developing capitalist economies.

INTRODUCTION

Egypt is a predominantly Islamic country that since the mid-1980s has sought to replace its socialist planned economy and associated nationalised industries with a growing capitalist economy. This political and economic transition provides an interesting context within which the evolution of accounting practices and the behaviour of economic agents may be studied (see, for example, Gray et al., 1984; Doupnik and Salter, 1995; Brown and Humphreys, 1995; Humphreys, 1996; Abd-Elsalam and Weetman, 2003; HassabElnaby and Mosebach, 2005). Managers' behavior may be influenced by the ethical, cultural and institutional environments in which they operate. Some research has suggested that significant cultural differences may exist between Egyptian and Anglo-American corporate environments (Humphreys, 1996). Nevertheless, more recent research has argued that the changes in the Egyptian economy have been accompanied by significant changes in its national culture. It is reasoned that these changes have in turn produced a change in accounting choices, so that the latter are increasingly similar to those employed in developed market-based economies (HassabElnaby and Mosebach, 2005).

The precise nature of the relationship between national culture and managerial behaviour is complex, and beyond the scope of this paper. However, there is no doubt about the scale and significance of Egypt's transition towards a market-based economy in recent years. The process of reform has been accelerating since 1986, when the privatisation of the country's state-owned utilities was initiated. Since 1991, the Cairo stock market has been reopened, Egypt has joined the World Trade Organisation and it has also established international trade and investment agreements with the US and the European Union. Egypt therefore provides an especially interesting situation for testing the expectations of self-serving personal wealth maximizing behavior by individuals. One could reason that the maximisation of personal utility seems as likely to describe the motivation of Egyptian

managers as it does of Western managers. This reasoning is adopted here, and leads to the hypothesis that, subject to dominating ethical and institutional constraints, Egyptian managers and investors would prefer more wealth to less wealth.

Nevertheless, it is probably necessary to recognise that the business environment in Egypt is still different in some important respects to that in established capitalist economies. More specifically, while Egypt's capital markets are developing rapidly, many large quoted and unquoted Egyptian businesses are owned and controlled by relatively small numbers of people. Consequently, a comparatively high proportion of businesses are owner-controlled relative to their counterparts in the USA or the UK (see PCSU, 2000; World Bank, 2001). This institutional factor might affect the behaviour of managers who are agents, because they are likely to be more closely monitored. Existing literature suggests that a relationship may be identified between the level of owners' control and (at least some) accounting choices (Dhaliwal et al., 1982; Abdel Khalik, 1985; Hunt, 1986; Penno and Simon, 1986; Niehaus, 1989; Carlson and Bathala, 1997). In contrast to their counterparts in closely held firms, managers of Egyptian companies with widely dispersed share ownership frequently face very little external supervision of their decisions (PCSU, 2000; World Bank, 2001). Thus, they might with impunity often pursue their own interests – even if these conflict with the objectives of shareholders.

Positive accounting theory (PAT) (Watts and Zimmerman, 1978; 1986) assumes that accounting choices are influenced by managerial opportunism. PAT researchers hypothesise that (a) to increase their own remuneration when it is based on accounting earnings and (b) to avoid violating debt covenants, managers will often prefer income-increasing accounting methods. These PAT hypotheses have been frequently tested in western industrialised countries (for a summary, see Fields et al., 2001), but their relevance to the economies of other countries is relatively less well researched. However, given the current socio-economic

climate in Egypt, we believe that standard PAT hypotheses may be appropriate. Consequently, this paper is based on a hypothesis that the motivations and behaviour of Egyptian businessmen are similar to those of their Anglo-American counterparts and do not differ because of any cultural or institutional factors identified elsewhere in the literature referenced. Although the empirical evidence was obtained in Egypt, it may be argued that such evidence has wider significance for other Middle-Eastern countries with capitalist economies.

This paper therefore reasons that the empirical evidence in Egypt will be consistent with the conventional (a) bonus plan and (b) debt PAT hypotheses (see Watts and Zimmerman, 1986; 1990). In addition, the paper develops and tests a development of the hypothesis that managers will “make accounting choices in order to reduce their tax burden (and thus increase their cash flows)” (Fields et al., 2001, p.284). The derived hypothesis is that managers are more likely to choose accounting income increasing reporting methods that do not increase the current taxation charges on income than those that do increase those charges. This test is possible because of the Egyptian regulations for calculating taxable income, which are similar to those operating in the UK and the USA.

The reported empirical study follows conventional practice, because it uses an established database of financial information for firms quoted on the Egyptian stock market. However, that market is still small relative to Anglo-American counterparts. Consequently the study also analyses information from an independent questionnaire survey. This methodological expansion enables comparison of the findings from each independent source and allows the study to be extended to many large firms that are not quoted on the stock exchange as well as to companies that are too small to be listed.

DEVELOPMENT OF HYPOTHESES

PAT considers the factors that influence managers' choices of accounting policies (Watts and Zimmerman, 1978; 1986; 1990) and suggests that managers will act opportunistically when their accounting choices have economic consequences. It has generated very extensive empirical research, detailed reviews of which are available elsewhere (see, for example, Fields et al., 2001). Accounting variables have economic consequences because remuneration and borrowing contracts often use such variables in an attempt to resolve agency conflicts (Holthausen and Leftwich, 1983). They also have economic consequences when they affect the computation of taxable income, because they then directly affect the timing of cash outflows from a business and consequently the availability of money to finance the firm's activities and its payments to participants in the business (Fields et al., 2001). PAT hypothesises that managers use their discretion to increase accounting profit in order to maximise their bonuses (the 'bonus plan hypothesis') and to avoid constraints associated with borrowing (the 'debt covenant hypothesis'). A further hypothesis is that managers accounting decisions will be affected by their impact on the amount or timing of payments for taxation (Fields et al., 2001). Increases in accounting income can often result in increases in current taxation, while one could expect rational managers to seek to avoid.

It is often assumed that current reported earnings can be increased by adopting: FIFO for inventory valuation; operating rather than capital leases; straight-line depreciation; and pooling-of-interests accounting. Increases in such earnings would frequently increase current earnings-based compensation and reduce the likelihood of breaching any contractual or implied accounting-based constraints associated with borrowing. Unfortunately, they may also increase current taxable income and therefore advance the time for payment of tax on earnings over the firm's lifetime, with adverse effects on financing. Consequently there may be conflicting motivations – some for increasing reported earnings, others for reducing such

earnings.

Bonus Plans Hypotheses

The relationships between the existence of bonus plans and accounting policies have been extensively researched in Anglo-American economies. Evidence by Healy (1985), Gaver et al. (1995), Holthausen et al. (1995) and Guidry et al. (1999) suggests that managers in large firms managed by agents select accounting methods that transfer wealth to themselves from the firm's equity holders. Accounting earnings are expected to possess desirable characteristics not shared by other performance measures, including objectivity, reliability, verifiability and conservatism (Watts and Zimmerman, 1986). They may therefore provide a more appropriate basis for evaluating a manager's performance than alternative measures (Healy, 1985; Sloan, 1993; Dechow, 1994; Emanuel et al., 2003)¹ and are extensively, but not exclusively, used for that purpose. Bonus schemes are one approach to reducing agency conflicts between a firm's managers and its owners by rewarding or punishing poor financial performance of managers (Smith and Watts, 1982; Healy, 1985; Watts and Zimmerman, 1986; Sloan, 1993). They are frequently based on accounting earnings, and it can be assumed that they are positively associated with earnings. A further assumption that executives will prefer higher to lower personal current income then leads to the conventional bonus hypothesis that, subject to the operation of contractual minimum income level constraints, managers with bonus schemes are more likely to choose current income-increasing accounting methods (Ittner et al., 1997, Zmijewski and Hagerman, 1981)². Such choices would accelerate wealth transfers to the managers from the equity holders³.

It is possible that Egyptian managers' behaviour is constrained by their specific socio-economic environment (Humphreys, 1996). Nevertheless, the recent shift towards a market-based economy appears to have introduced capitalist business practices (HassabElnaby and

Mosebach, 2005). This paper takes the view that there is no apparent reason to believe that Egyptian managers have different personal wealth-related motivations to those of their counterparts in Western capitalist countries. Hence one would expect that the relationships between bonus schemes (where they exist) and accounting choices that have been observed in other capitalist economies will also be observed in Egypt. Consequently, it is assumed here that the conventional PAT bonus plan hypothesis is relevant in Egypt. It is adapted in the current research to the alternative hypothesis (H1), below.

H1 Alternative: In Egypt, managers of firms with bonus plans are more likely to adopt current income-increasing accounting choices than those without bonus plans.

Debt Contracts Hypothesis

The literature about the association between levels of financial gearing and accounting policies (see, for example, Bowen et al., 2000) usually focuses on long-term debt (Duke and Hunt, 1990; Press and Weintrop, 1990; Sweeney, 1994). Violation of contractual debt covenants can impose significant costs on firms. Since current income increasing accounting methods can reduce the immediate constraints from some commonly observed covenants⁴, managers have incentives to use such methods when such constraints might be activated. An assumption that the likelihood of violating covenants is positively associated with gearing then leads to the conventional debt hypothesis that the level of gearing is positively associated with the extent to which managers choose income increasing accounting methods (Watts and Zimmerman, 1978; 1986). Other things being equal, an increase in accounting earnings will increase the book value of equity and consequently reduce the gearing ratio (DeFond and Jambalvo, 1994; Sweeney, 1994). Much of the literature relates to the existence of contractual accounting based debt covenants. One can reasonably also claim, however, that the existence of relatively high levels of financial gearing is likely to either deter potential

lenders or alternatively to lead them to impose more onerous conditions in any loan contract. Consequently, levels of financial gearing that are considered to be high, relative to other firms in the industry involved, can be expected to reduce further financing opportunities. Therefore, there are implicit institutional constraints on the acceptable level of leverage. Logically, the strength of managers' motivations reflected in the debt hypothesis depends on the costs of violating the firm's debt covenants (Holthausen and Leftwich, 1983) and on the likelihood that the gearing level will adversely affect future financing. The empirical evidence on the debt hypothesis remains largely mixed. DeFond and Jambalvo (1994) and Sweeney (1994) reported results which were consistent with it, but Healy and Palepu (1990) and DeAngelo et al. (1994) documented an inconsistent set of results.

Most prior research has examined large Western corporations that issue long-term bonds and have an extensive equity base. In contrast, banks are the main source of borrowing by Egyptian industry; sometimes banks also own a percentage of the share capital (PCSU, 2000). Relationships and contracts with Egyptian lenders could therefore be significantly different to those in Western capitalist economies. Given this situation, the debt covenant hypothesis might not offer the same explanatory power for the accounting choices of Egyptian companies. HassabElnaby and Mosebach (2005) identified that accounting-based debt covenants (ABDCs) are used less frequently in Egypt than in the USA. Nevertheless, many Egyptian corporations rely heavily on debt, and HassabElnaby and Mosebach did observe an increasing trend towards the use of ABDCs in Egypt. They also noted that gearing ratios were the most frequently used ABDC. There seems to be no reason why the above mentioned implicit gearing related constraints on borrowing should not apply in Egypt. Consequently, despite the lower level of contractual constraints, the conventional debt covenant hypothesis is assumed to be relevant to Egypt despite the different contracting environment. Therefore, this paper adopts that hypothesis, treating gearing as the independent

variable and current income increasing accounting methods as the dependent variables. H2 is the resulting hypothesis.

H2 (Alternative): In Egyptian firms, the use of current income–increasing accounting choices is positively associated with leverage.

Some taxation regimes make stipulated adjustments to accounting income when computing taxable income. A particularly important adjustment in many countries, which is also made in Egypt, relates to depreciation. Accounting depreciation is disallowed for tax purposes and is replaced by depreciation allowances that are calculated using methods and rates that are stipulated by the government agencies involved. In contrast, inventory valuations in the income statements are accepted without adjustments for taxation purposes, provided that they comply with acceptable accounting standards. The consequences are that enhancements to accounting income arising from policy choices affecting depreciation do not incur an extra tax charge, whereas those arising from inventory valuations do incur a charge.

Appendix 1 models the differences that arise from the different situations⁵. It demonstrates that: (a) managers will always receive less bonus (based on after tax profits) from increases in accounting income that are subject to tax than those that are not subject to tax (the difference could be large with high rates of tax); (b) that the reduction in the firm's cash flows is higher with taxable enhancements than with non-taxable enhancements with any positive rate of taxation and bonus rates of less than 100% of the income enhancement; and (c) that rejection of income enhancing accounting adjustments will usually lead to higher future bonuses when the resulting enhancements are taxable than when they are not taxable. Consequently, managers with bonus plans, based on after-tax earnings, will gain more personal wealth from accounting policies that increase income without effect on tax charges than from policies which result in increases in current tax charges. The reasoning and

evidence that underpin the adoption of the debt hypothesis (H2) suggests that bonus schemes may not be the only motivation for increasing earnings. Clearly, when managers increase taxable profit in order to achieve other benefits, such as enhanced borrowing capacity, current taxation costs will usually also increase. Consequently, there is a clear advantage to managers who wish to increase reported earnings to make policy decisions that do not affect tax charges (see, for example, Fields et al., 2001 for a discussion concerning the choice of accounting policies that reduce tax charges). This leads to an expectation that rational managers would prefer to make accounting income increasing adjustments that do not affect tax charges to those that affect such charges.

Accepting these arguments leads to the following hypothesis:

H3 (Alternative): In Egyptian firms, managers with bonus schemes are more likely to adopt current income increasing accounting methods that do not affect taxation charges than methods that increase taxation charges.

EMPIRICAL HYPOTHESES

The hypotheses H1 and H2 identify the dependent variable ‘current income-increasing accounting choice’ and independent variables ‘management bonus scheme’ and ‘leverage’. In order to test them one needs to identify empirically observable data that can proxy for such variables. In the past, accounting choices whose effect on current net income is relatively unambiguous and which are usually disclosed in the corporation’s annual report have been used as proxies for current income increasing policies (see, for example, Hagerman and Zmijewski, 1979; Zmijewski and Hagerman, 1981; Healy, 1985; DeAngelo, 1988). This paper follows a similar strategy.

The dependent variables most widely used in the literature to indicate income increasing accounting methods are depreciation method, inventory method, the treatment of investment tax credits and the period of pension amortisation (see, for example, Hagerman

and Zmijewski, 1979; Holthausen and Leftwich, 1983; Watts and Zimmerman, 1986; Penno and Simon, 1986; Dhaliwal, 1988; Press and Weintrop, 1990; Bowen et al., 2000; Bowen et al., 2002). Investment tax credits operate in the USA and some Western countries but not in Egypt. Also, pension amortisation does not appear in the Egyptian income statements, because under Egyptian Accounting Standard (EAS) No. 21 the pension system is subject to a special fund system and the investment of this special fund has a separate financial statement.

This study therefore only examines depreciation method (using the subscript 'a') and inventory valuation choices (using 'b'), which arguably are sufficient because they can have large and systematic effects on the assets and expenses reported in firms' financial statements (Bowen et al., 2000; 2002). The literature usually assumes that the adoption of (a) straight-line depreciation (SLD) and (b) the first-in-first-out (FIFO) stock valuation method will increase reported earnings in the short-term. FIFO will only consistently increase current earnings if replacement costs of inventory usually rise over time, which has occurred in Egypt, where average annual inflation ranged between 2.8% and 9.4% during the period 1994 to 2001. The conventional assumptions are therefore relevant to, and are adopted in, this study. They lead to two sets of empirically testable sub-hypotheses, H_a refers to depreciation and H_b to inventory valuation.

As indicated above, the commonly identified economic factors that might influence a firm's choice of accounting methods are in this paper hypothesised to be the existence of a management bonus scheme and a firm's gearing characteristics (see H1 and H2). Healy (1985) has shown that the contractual details of specific bonus plans can have a significant effect on managers' accounting choices. Such details are not publicly available in Egypt. Consequently, when testing H1, the bonus variable (MP) was measured as one (1) if the managers have bonus plans based on accounting numbers and zero (0) if not. H2 was tested using firms' total debt to total assets as the independent variables. Both that variable and the

long-term debt to equity ratio have been widely employed in the literature as proxies for a firms' dependency on debt financing (Duke and Hunt, 1990; Press and Weintrop, 1990; Healy and Palepu, 1990; DeAngelo et al., 1994; Jung and Kwon, 2002; Bauwhede et al., 2003). HassabElnaby and Mosebach (2005) observed that in Egypt the most widely used constraint was 'tangible net worth'. Nevertheless, the total debt to total assets ratio was chosen in this study because the alternatives were not identifiable from the survey data. Although the ratio of debt to tangible net worth was available for database firms, the debt to total assets ratio was also used for those firms, in order to enhance comparability of the findings concerning the two data sets. The likelihood of observing significant relationships will be reduced if total assets is an inferior basis compared to net assets. Consequently, any such relationships, if found, are likely to be acceptable evidence. The same reasoning would also apply if gearing is considered to be inferior to interest coverage as a representation of potential debt-related constraints, which is perhaps unlikely in Egypt given HassabElnaby and Mosebach's observations.

Adoption of the proxy variables identified above enables the hypotheses H1 and H2 to be reformulated by replacing the terms 'current income increasing accounting choices' by (a) straight-line depreciation (SLD) and (b) first-in first-out (FIFO) stock valuation for each test. Table 1 shows the resulting hypothesised associations for H1 and H2.

TABLE 1 ABOUT HERE

As indicated above, in Egypt reductions in depreciation figures in the financial statements do not give rise to increases in taxation charges. In contrast, increases in the value of inventory will increase taxation charges (Abdel-Rahman, 2001). Therefore the empirical alternative hypothesis for H3 can be formulated as:

H3 (Alternative): In Egyptian firms, managers are more likely to use SLD than FIFO methods.

Table 2 summarises the variables used in the study and the basis on which they were measured. A measure of size is included as a control variable⁶, because such measures have been found to influence the findings of other relevant empirical studies. In their review of 14 papers from the empirical research literature on accounting choice, Holthausen and Leftwich (1983) found that firm size and gearing were the only two significant variables explaining choices of accounting techniques (see also Fields et al., 2001).

TABLE 2 ABOUT HERE

RESEARCH METHOD AND DATA

Accounting policies, the use of management bonus plans and gearing were obtained from databases⁷ of companies listed on the Cairo Stock Exchange. Most empirical studies of accounting choice tend to rely on such sources, but in this case the available data was limited to companies that were actively traded⁸. Consequently, the resulting database sample of 96 companies⁹ was biased towards businesses that were larger and more widely held than most Egyptian firms. It was thought that information about smaller firms and those with more concentrated ownership would enhance the study; a questionnaire was therefore distributed to the 320 largest (by working capital in 2001) firms¹⁰ operating in the Cairo, Alexandria and Menoufia Governorates, which are the most industrialised areas in Egypt. Ninety-three firms responded to the questionnaire, a response rate of 29%. The sizes of the firms in the database and the survey are shown in Table 3, using both total sales and total assets¹¹. The mean of *SALES* categories (1 to 8) is 3.9 for the survey companies and 5.4 for the database firms, so on average firms included in the database have larger sales than their counterparts included in the survey. Similarly, for total assets the mean categories are 3.0 for the survey firms and 4.58

for the database firms. Table 3 shows that the range of values for both assets and sales in each category are unequal. This arose because the ranges appearing in the questionnaire were set in Egypt by the researcher administering the instrument, on the advice of local experts. The figures are, however, approximately on logarithmic scales. In order to enhance comparability with the survey results, the database firms were then analyzed using the same categories as applied to the survey firms – but with an extension of the categories because of the greater range of values involved.

TABLE 3 ABOUT HERE

Clearly, the companies in the database were on average much larger than those in the survey. There may have been a small overlap between the respondents in the survey and the firms identified in the database¹², because more than half of the respondent firms in the questionnaire survey are listed on the stock exchange. Nevertheless, most of the latter are likely to be infrequently traded firms not included in the database. For the purposes of statistical analysis, the two samples were kept separate and the same tests were applied independently to both samples.

Table 4 shows information concerning the adoption of bonus schemes. Such schemes are clearly used to motivate agent-managers. They are unnecessary for controlling owner-managers, who are able to determine for themselves the amount of cash withdrawn from the business for personal use. This paper therefore assumes that the existence or absence of bonus schemes indicates the ownership-control status of the firm. Comparison of survey and database firms in table 4 then suggests that far more of the database firms were agent managed firms than was the case with the survey firms.

TABLE 4 ABOUT HERE

The hypotheses H1 and H2 are tested by examining the association between the use of SLD and FIFO and (i) the existence of bonus schemes and (ii) the level of leverage. H3 is tested by

examining the association between the choice of SLD and that of FIFO. The null hypotheses are all direct negatives of the alternative hypotheses.

The data used in the analysis was obtained from the survey and from the database, and not from a designed experiment. Consequently, the distribution of firms and managers with various characteristics arises by chance and may not allow straightforward comparisons of the effects as orthogonal contrasts. At least the usual level of multi-collinearity can be expected to be encountered in the data sets constructed. The existence of relationships between possible explanatory variables creates difficulties in ascribing different outcomes as being attributable to different levels of those variables. Given that situation, it is conventional practice to employ both simple and multivariate analysis to provide additional evidence in support of the multivariate findings. This paper adopts such a procedure in testing hypotheses H1 and H2 (see, for example Dechow et al., 1996).

RESULTS

Descriptive Statistics

Panel A of Table 5 presents the descriptive statistics for firms in the survey while Panel B does likewise for the database. Table 5 shows that, on average, firms included in the database have higher debt-to-total asset ratios than firms included in the survey, (with a mean of 3.5 compared with 2.4). They also make greater use of bonus schemes (mean 0.72) than firms in the survey (mean 0.54) implying that more of the survey firms are owner-managed.

TABLE 5 ABOUT HERE

Univariate Analysis

As indicated above, hypotheses H1 and H2 were tested separately from data recorded from the database and survey using univariate analysis¹³ and multivariate analysis (see, for example, Dechow et al., 1996). The results of the univariate analysis for H1 and H2 are set

out in detail in Appendix 2 and summarised in Table 6. This indicates for H1 that *MP*, which is a proxy for management incentive plans, is significantly positively associated (at the 1% level) with management's choice of income-increasing methods (depreciation and inventory). This finding is consistent across both the questionnaire survey and the database firms so the null for H1 can be rejected. That observation is consistent with the prediction that managers with bonus plans are more likely to adopt income-increasing accounting choices than those without such bonus-based incentives (H1_a and H1_b).

TABLE 6 ABOUT HERE

The results for the gearing hypothesis H2 indicate that *LEV*, which is used as a proxy for the existence and tightness of a firm's debt covenants, is positively and significantly associated (at the 5% level) with management's choice of income increasing depreciation methods in the database. Yet the association is not significant in the questionnaire survey. This could reflect the much lower average level of gearing (relative to the database) shown in Table 5. Although the coefficient of the associations between *LEV* and management's choice of FIFO are positive, the associations are not statistically significant in either the questionnaire survey or the database. The null hypothesis H2_a can be rejected for the database, but the nulls for H2_b and H2_a for the survey cannot be rejected. Overall, the univariate results provide some support for the hypothesis that the higher the leverage, the greater the likelihood that a firm will choose the income increasing depreciation methods (H2_a). They provide no significant support for the prediction that the higher the leverage, the greater the likelihood that a firm will choose the inventory valuation method which increases current income (H2_b). As indicated above, depreciation charges are not used in taxation computations in Egypt, so increases in accounting earnings via reduced depreciation do not give rise to extra tax charges. The situation is different for inventory valuation – so one would expect executives to prefer adjustments made through depreciation to those made through a

change in the inventory method.

Table 7 shows the number of firms with bonus schemes that use SLD and FIFO. It is interesting to observe that, by comparison with the database sample, survey firms were much more likely to use FIFO, an income increasing method given the inflationary environment in Egypt. The reasons for this are unclear. There is clearly a much greater propensity for firms in both samples to use SLD than FIFO. This finding was tested using chi-squared analysis and the resultant p-value for H3 shown in Table 6 is statistically significant (at the 1% level). Therefore the null hypothesis can be rejected and the evidence is consistent with the validity of H3.

INSERT TABLE 7 ABOUT HERE

In summary, the univariate analyses results provide strong support for the bonus plans hypothesis (H1_a and H1_b). In addition, the results for the database are consistent with hypotheses H2_a concerning the association between gearing and depreciation method, but there was no significant support for the hypothesis concerning depreciation from the survey. The hypothesis concerning the association between gearing and inventory valuation method (H2_b) received no statistically significant support. The evidence provides strong support for the rejection of the null for H3. Overall, there appears to be a marked difference between accounting income accelerating behaviour relating to depreciation and to inventory – which could be attributable to their different treatment for taxation purposes.

One can reasonably claim that the univariate analysis provides evidence that the use of management incentive plans was positively and significantly related to the use of income increasing accounting choices, whether these choices related to depreciation or to inventory valuation methods. In the database, the level of gearing was significantly related to current income increasing depreciation accounting choices – although not to inventory decisions, which potentially affect charges for taxation. The analysis provides highly significant

evidence consistent with the hypothesis that taxation factors influence the relative preferences for accounting income increasing methods. The observations concerning bonuses and gearing are consistent with many of the findings of earlier studies using univariate analysis (Fields et al., 2001). In the next section, a multivariate analysis provides the possibility of different insights concerning the relative influences of explanatory variables.

Multivariate Analysis

The multivariate analysis was performed for the survey sample with the variables listed in Table 2. It was undertaken for the database sample using all of the variables in Tables 2 and 8¹⁴. Appendix 3 contains more information about the variables used. As Appendix 4 explains, use of this range of variables produced an unacceptable level of multi-collinearity. Standard statistical techniques were therefore used to identify the variables that provided the most significant models, which were then checked for plausibility.

INSERT TABLE 8 ABOUT HERE

The identified variables were then used in the following logit model for each of the depreciation (DEP) and inventory (INV) valuation dependent variables. Consistent with the extant literature, β_1 and β_2 are predicted to be positive whereas β_3 is predicted to be negative, i.e.:

$$\text{DEP (or INV)} = \beta_0 + \beta_1 MP_i + \beta_2 LEV_i + \beta_3 SALES_i$$

Predicted signs	(+)	(+)	(-)
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Statistically significant results for the multivariate analysis are shown in Appendix 5 and summarised in Table 9. The nulls for the set of H1 hypotheses are all rejected at highly significant levels. The results in that table show highly significant evidence consistent with

the research hypotheses H1_a; firms that employ bonus plans seem more likely to opt for the SLD method than those without bonus plans (for the total survey and database samples). The survey and database samples also show strong evidence consistent with for the bonus hypotheses (H1_b), when tested by reference to the use of FIFO. Results for the gearing hypothesis H2 are mixed. The samples show significant rejection of the null H2_a (depreciation) for the database (at the 5% level) but not for the survey. The null is not rejected in either sample for inventory decisions. Interestingly, the multivariate analysis in Table 9 shows exactly the same pattern of rejection of null hypotheses as the univariate analysis in Table 6. As indicated above, this observation provides an increased level of confidence that the observations reflect the characteristics of the samples.

TABLE 9 ABOUT HERE

DISCUSSION

The findings from the study as a whole (including both univariate and multivariate analyses) suggest that the existence of management incentive plans are significantly positively associated with depreciation policies and inventory valuation methods that increase accounting income. Also, there is some evidence that the gearing of database companies is positively associated with the choice of straight-line depreciation. One can conclude that the study provides statistically strong evidence consistent with the relevance of the bonus PAT hypothesis to accounting in Egypt, and some limited evidence consistent with the debt contracts hypothesis. It provides strong evidence consistent with the hypothesis that managers will prefer adjustments that do not increase tax payments to those that do increase such outlays.

It is perhaps not surprising that much of PAT, which is primarily based on the Anglo-American experience and institutional environment, seems to be relevant to Egypt. Whilst this

paper has not directly explored the question, one may reason that managers' motivations may to some extent be conditioned by the institutional, cultural, ethical and political environments in which they work. The findings of this study are consistent with recent research (HassabElnaby and Mosebach, 2005) which found an association between economic reform, socio-economic change, and accounting choice. In the climate of rapid institutional transformation to a market-driven economy, it could be expected that Egyptian managers will be influenced by 'rational' considerations of their personal wellbeing. The findings of this study suggest that motivations of managers in emerging capitalist economies may be influenced by similar factors to those that influence managerial behaviour in established capitalist economies.

This study inevitably suffers from the limitations of the data on which it is based. In particular, one should emphasise that consistency with hypotheses is not 'proof' that the hypotheses are 'correct'. There may be other reasons for accounting choices that are not identified in the study. The survey used in this analysis also sought data on respondents' opinions of the reasons for the choice of depreciation and of stock valuation methods. Analysis of that data will be presented in a subsequent study.

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Notes

¹ Other studies document a significant statistical association between variants of accounting earnings and incentive–pay programmes (see, for example, Antle and Smith, 1985; Lambert and Larcker, 1987; Jensen and Murphy, 1990).

² Hall (2002) noted that the use of stock options had increased substantially between 1990 and 1999 in the USA, but earnings-based bonuses are the most common in Egypt.

³ Most of these methods result in lower earnings in later years – for example, increased inventory values in the current period lead to increased costs in subsequent periods.

⁴ Increases in accounting income increase both the ratios of earnings to interest and (subject to any resulting withdrawals of cash by way of bonuses or additional dividends) of net assets to debt, both of which feature in debt contracts (see, for example, Duke and Hunt, 1990; Healy and Palepu, 1990; Press and Weintrop, 1990).

⁵ This appendix proves what is perhaps intuitively obvious, but also shows analytically the interaction of variables in the differing situations.

⁶ The selection of total sales as the specific proxy measure was motivated by (a) the wide range of industry sectors (both capital and labour intensive) included in the survey firms in the study and (b) the statistical limitations of using total assets data in the analysis (see note 11).

⁷ Data was compiled from three resources: (i) the Capital Market Authority in Cairo, (ii) the Disclosure Department of Cairo Stock Exchange and (iii) the *Kompass Egypt* business database. The resulting database did not include information concerning industry classifications.

⁸ The Egyptian Stock Exchange identifies companies as either, (i) actively traded; or (ii) rarely traded. The rarely traded companies are in most cases closely held.

⁹ Only firms for which (a) the complete financial statements were obtained for the years 1999-2001 and which (b) adopted and disclosed unchanged depreciation and inventory policies during the years ending 1999-2001 were included in the sample. The data used in the study is based on observations collected from the financial statements ending in 2001.

¹⁰ It was felt that larger firms were more likely to exhibit the range of variables being investigated.

¹¹ Because the standard error of the coefficient of the variable for total assets was larger than it would have been with the absence of multicollinearity, this variable was not included as a control variable in the statistical analysis.

¹² Any direct comparison was prevented because of the anonymity of responses, adopted because it was judged that such a policy would increase the response rate. The distribution of questionnaires was not restricted to firms not included in the database, because it was intended to analyse each of the database and survey data sets independently and the authors felt that it was therefore preferable to send the survey to all firms in the identified category. Because of the independent analysis of each data set this has not resulted in double counting results.

¹³ For the univariate statistical analysis the chi-squared test, using a 2 x 2 contingency table, was utilized to establish the association between the dependent variables and the dichotomous independent variable *MP*. The relationship between the dependent variables and the categorical independent variable *LEV* was investigated using the non-parametric Kendall's tau-b test of association for ordinal variables.

¹⁴ The data for all of the variables in Table 8 (with the exception of *ASSETS*) was not available for the survey sample.

Table 1: Alternative Sub-hypotheses for H1 and H2

Positive association with use of income-increasing methods	H1 (bonus plans)	H2 (leverage)
Firms using SLD	H1 _a	H2 _a
Firms using FIFO	H1 _b	H2 _b

Table 2: Variable Definitions and Measurement

Variable	Type of variable	Measurement method
Depreciation method (<i>DEP</i>)	Dependent variable	Coded 1 if the firm adopts SLD and 0 if the firm adopts other methods of depreciation.
Inventory valuation method (<i>INV</i>)	Dependent variable	Coded 1 if the firm adopts FIFO method of inventory valuation and 0 if the firm chooses other methods of inventory valuation.
Existence of Management incentive plans (<i>MP</i>)	Independent variable	Coded 1 if the managers have bonus plans based on accounting figures and 0 if not.
Gearing (<i>LEV</i>)	Independent variable	The ratio computed by the company's debt / total assets, coded 1 – 5.
Firm Size (<i>SALES</i>)	Control variable	Measured by total sales, coded 1 – 5 in the survey sample and 1 – 8 in the database sample.

Note: *LEV* coded as 1 = <20%, 2 = 20-40%, 3 = 40-60%, 4 = 60-80%, 5 = >80%,
SALES coded using the categories shown in Panel B of Table 3.

Table 3: Categorisation by Total Assets and by Total Sales

Panel A: Total Assets					Panel B: Total Sales			
Cat.	Survey Firms		Database Firms		Survey firms		Database firms	
	Assets (£m Egyptian)	Total	Assets (£m Egyptian)	Total	Sales (£m Egyptian)	Total	Sales (£m Egyptian)	Total
1	< 50	10	< 50	1	< 10	8	< 10	2
2	50 – 100	27	50 – 100	7	10 – 25	11	10 – 25	2
3	100 – 250	24	100 – 250	23	25 – 50	10	25 – 50	3
4	250 – 500	16	250 – 500	17	50 – 100	18	50 – 100	18
5	500 +	16	500 – 1,000	21	100 +	46	100 – 250	25
6			1,000 – 2,500	13			250 – 500	18
7			2,500 – 5,000	7			500 – 1,000	15
8			> 5,000	7			> 1,000	9
	TOTAL	93	TOTAL	96	TOTAL	93	TOTAL	92

Note: Complete sales data for four companies from the database sample could not be obtained.

Table 4: Usage of Management Bonus Schemes

Panel A: Survey firms		
	Number of firms	%
No bonus scheme	43	46.2
Bonus scheme	50	53.8
Total	93	100.0

Panel B: Database firms		
	Number of firms	%
No bonus scheme	27	28.1
Bonus scheme	69	71.9
Total	96	100.0

Table 5: Descriptive Statistics

Panel A: Survey firms					
Variable	Mean	Median	Std. Dev.	Min.	Max.
<i>DEP</i>	0.796	1	0.405	0	1
<i>INV</i>	0.430	0	0.498	0	1
<i>MP</i>	0.538	1	0.501	0	1
<i>LEV</i>	2.355	2	1.204	1	5
<i>SALES</i>	3.892	4	1.363	1	5

Panel B: Database firms					
Variable	Mean	Median	Std. Dev.	Min.	Max.
<i>DEP</i>	0.885	1	0.320	0	1
<i>INV</i>	0.198	0	0.401	0	1
<i>MP</i>	0.719	1	0.452	0	1
<i>LEV</i>	3.469	3	1.036	1	5
<i>SALES</i>	5.402	5	1.569	1	8

Note: See Table 2 for definitions of variables and for the scales and the bases on which they were measured.

Table 6: A Summary of Results of the Univariate Analysis

	Depreciation		Inventory	
	Survey	Database	Survey	Database
Null for H1 rejected		H1_a		H1_b
	p = 0.000**	p = 0.000**	p = 0.0005**	p = 0.003**
Null for H2 rejected		H2_a		H2_b
	p = 0.209	p = 0.019*	p = 0.301	p = 0.711
Null for H3 rejected for both survey & database	H3			
	p = 0.000**			

*significant at the 5% level

**significant at the 1% level

Table 7: Summary of Usage of SLD and FIFO by Sampled Firms with Bonus Schemes

	Survey Firms	Database Firms
Use SLD	49	68
Do not use SLD	1	1
Total	50	69
Use FIFO	29	18
Do not use FIFO	21	51
Total	50	69

Table 8: Additional database sample variables definition and measurement

Variable	Type of variable	Measurement method
Firm Size (<i>ASSETS</i>)	Independent variable	Measured by using total assets
Risk (<i>BETA_i</i>)	Control variable	The firm-specific systematic risk measured by the company's beta estimated from the market model. Beta computed using the daily returns around December 31, 2000 and a value weighted market index. Beta was obtained from the CMA in Cairo.
Capital intensity (<i>CI_i</i>)	Control variable	The fixed assets divided by total sales
Competition (<i>CR_i</i>)	Control variable	Concentration ratios were measured by eight-firms concentration ratios for industries (percentage of sales).
<i>PROFIT_i</i>	Control variable	Measured as earnings before interest and taxes for the financial year divided by the book value of assets.
<i>TAXRATE_i</i>	Control variable	Tax expense divided by net income.

Table 9: A Summary of Results for the Multivariate Analysis

	Depreciation		Inventory	
	Survey	Database	Survey	Database
Null for H1 rejected	H1_a p = 0.0003**	p = 0.0001**	p = 0.001**	H1_b p = 0.001**
Null for H2 rejected	H2_a p = 0.105	p = 0.033*	p = 0.158	H2_b p = 0.165

*significant at the 5% level

**significant at the 1% level

Appendix 1: Comparison of cash flows with taxable and non-taxable enhancements of accounting income

Bonus receipts

Assume that bonuses are paid as a percentage of after tax accounting income.

E_1 = the increase in income from an accounting adjustment that is not subject to taxation

E_2 = the increase in income from an accounting adjustment that is subject to taxation

b = the proportion of accounting income increases that is paid in bonuses to managers

t = the rate of tax paid on income

B_1 = the amount of bonus paid on E_1

B_2 = the amount of bonus paid on E_2

Assume that $E_1 = E_2 = E$

$$B_1 = bE \quad [1]$$

$$B_2 = bE (1 - t) \quad [2]$$

$$B_1 - B_2 = tbE \quad [3]$$

The conclusion from this is that managers with bonuses based on after tax profits will always receive less bonus from enhancements subject to taxation than from those that are not – the reduction will be reflected by the rate of taxation.

Firm's cash flows

Now consider the differential effects of E_1 and E_2 on the firm's cash flows – ignoring lags in the payment of taxes. The latter merely complicates the illustration without adding additional insights.

Let C_1 = cash outflows from E_1

C_2 = cash outflows from E_2

$$\text{Then } C_1 = bE \quad [4]$$

$$\begin{aligned} C_2 &= tE + bE (1 - t) \\ &= E (t + b - tb) \end{aligned} \quad [5]$$

$$C_2 - C_1 = tE (1 - b) \quad [6]$$

Hence, even after the reduction in bonus consequent on E_2 instead of E_1 , the firm suffers the outflow of cash as a consequence of making adjustments that create tax charges instead of those that do not create such charges.

Effects of current bonuses on future bonuses

Assume that managers expect that they will remain in post for the next operating period and that their bonuses will remain at b of accounting enhancements. Further, assume that they expect that investments I made in the current period will yield $I (1 + r)$ in period 2. Then it will be worthwhile for managers to forgo bonus bE_1 if that sum is re-invested and

$$p < i < r$$

where p = managers' time preferences consumption, i = their opportunity cost of capital (i.e. the rate at which they can personally invest).

For then they would prefer to invest rather than to consume and

$$bE_1 (1 + i) < bE_1 (1 + r)$$

Hence, the bonus hypothesis implicitly assumes either that $p > r$, that $i > r$ or that the manager does not anticipate continuity of employment on the same terms.

Avoidance of E_2 provides proportionately more cash to invest (ΔI) than avoidance of E_1 – i.e. from [6]

$$\Delta I = tE (1 - b)$$

leading to additional future bonuses (from [2])

$$\Delta B_{2F} = tE (1 - b) (1 + r) (1 - t) \quad [7]$$

With r positive and b and t less than 1, equation 7 will always provide a positive value. Consequently, the reward to managers for deferring receipt of bonus will always be greater when the enhancement in income is taxable than when it is not taxable. Note that if bonuses are paid on the basis of pre-tax accounting income the term ‘ $-t$ ’ disappears from [7] – and the conclusion is unchanged.

Appendix 2: Univariate Statistical Analysis

Table A1: Associations between Dependent Variables and Management bonus schemes

Panel A: Association with Depreciation						
MP	Survey firms			Database firms		
	No SLD	Uses SLD	Total	No SLD	Uses SLD	Total
No bonus scheme	18	25	43	10	17	27
Bonus scheme	1	49	50	1	68	69
Total	19	74	93	11	85	96
Likelihood Ratio: 25.903			Likelihood Ratio: 22.303			
p-value for a one-sided test: 0.000			p-value for a one-sided test: 0.000			
Panel B: Association with Inventory						
MP	Survey firms			Database firms		
	No FIFO	FIFO	Total	No FIFO	FIFO	Total
No bonus scheme	32	11	43	26	1	27
Bonus scheme	21	29	50	51	18	69
Total	53	40	93	77	19	96
Likelihood Ratio: 10.171			Likelihood Ratio: 7.759			
p-value for a one-sided test: 0.0005			p-value for a one-sided test: 0.003			

Note: (a) this analysis is based on the Chi-squared test; (b) there is a positive association between the use of bonus schemes and the use of both SLD and FIFO.

Table A2: Associations between Dependent Variables and Leverage

Panel A: Association with Depreciation						
	Survey firms			Database firms		
LEV	No SLD	Uses SLD	Total	No SLD	Uses SLD	Total
<20%	7	19	26	1	2	3
20-40%	6	25	31	3	10	13
>40-60%	2	18	20	5	28	33
>60-80%	4	5	9	1	29	30
>80%	-	7	7	1	16	17
Total	19	74	93	11	85	96
Kendall's tau-b: 0.078, DF: 4			Kendall's tau-b: 0.207, DF:4			
p-value for a one- sided test: 0.209			p-values for a one- sided test = 0.019			
Panel B: Association with Inventory						
	Survey firms			Database firms		
LEV	No FIFO	FIFO	Total	No FIFO	FIFO	Total
<20%	16	10	26	3	-	3
20-40%	17	14	31	9	4	13
>40-60%	11	9	20	27	6	33
>60-80%	7	2	9	23	7	30
>80%	2	5	7	15	2	17
Total	53	40	93	77	19	96
Kendall's tau-b: 0.049, DF:4			Kendall's tau-b: -0.050, DF:4			
p-values for a one- sided test: 0.301			p-values for a one- sided test = 0.711			

Note: Gearing is positively associated with both SLD and FIFO.

Appendix 3: Selection of Variables in Multi-variate Analysis

In the questionnaire survey, size was measured using three measures: namely, current market value (*SIZE1*), the total value of sales (*SALES*) and the balance sheet value of the total assets reported in the most recent financial statements (*ASSETS*). When determining the size measure to be employed in the current analysis for the responses to the questionnaire survey, market value (*SIZE1*) was eliminated because many respondents did not provide this information. Thus, in both the questionnaire survey and the database, size was initially measured using (a) the total value of sales (*SALES*) and (b) the most recently reported balance sheet figure for the total assets (*ASSETS*). For all companies in the database firms, the ‘most recently reported balance sheet figure’ related to the financial year ending in 2001. For the survey firms, the questionnaire specifically asked for the most recently reported figure.

Control Variables

The hypothesized relationship between dependent and explanatory variables is influenced by other factors that should be controlled in the analysis. Hagerman and Zmijewski (1979) argued that firms with (i) high systematic risk, (ii) high capital intensity technology or (iii) belonging to industries which have high concentration ratios have incentives to reduce the mean of their reported earnings through choosing income decreasing accounting choices. Their argument is based on the belief that high accounting profits by firms with these characteristics are more likely to compensate investors for the additional risk being borne and to avoid attracting new competitor entrants into the sector. A similar approach has been adopted in the current study. The three variables suggested by Hagerman and Zmijewski (1979) were initially employed as controls in the current study; in addition, another two variables (*PROFIT* and *TAXRATE*) were also included as control measures.

The definition of risk in the current study is the beta coefficient from the market model which is calculated as the volatility of the company's share relative to the volatility of the market as a whole. *BETA* coefficients were available for the 96 firms included in the database from the CMA in Cairo. They were computed using the daily returns around December 31, 2000 and a value weighted market index. Relative capital intensity (*CI*) was estimated by dividing fixed assets by total sales. As Hagerman and Zmijewski (1979) suggest, the concentration ratio (*CR*) is assumed to be a proxy variable for the ability of a firm to earn monopoly rents. It was measured by the eight largest firms' concentration ratios for their industries (their percentage of the sector's sales). Since unsuccessful firms are more likely to choose income increasing accounting procedures than their successful counterparts, *PROFIT* was also included as a control variable. *PROFIT* was measured as the earnings before interest and taxes for the financial year divided by the book value of assets. In addition, since inventory method choices could be affected by tax incentives, *TAXRATE* was included as a control variable. The *TAXRATE* is the firm's tax rate calculated by dividing the tax expense by net income before taxes.

Appendix 4: Multicollinearity in the logistic model

The strong correlation between *SALES* and *ASSETS* (Kendall's tau-b = 0.722 in the survey and 0.532 in the database) revealed the possibility that multi-collinearity could exist between these variables. No collinearity diagnostics are available from logistic regression in SPSS. However, since collinearity is solely a function of the independent variables, one could use linear regression to determine the extent to which collinearity is present.. Thus, one dependent 'Y' variable was supplied and the same independent variables on the regression models statement that developed in the logistic model were tested. Ideally, the variance inflation factor (VIF) for each independent variable should be 1 (this would happen when variables in the model are orthogonal). Values of VIF exceeding 5 are often regarded as indicating multicollinearity, but in a weaker model, which is often the case in logistic regression, values above 2.5 may be a cause for concern. The VIF for *SALES* and *ASSETS* variables were 2.452 and 2.517 respectively for survey firms and 2.142 and 2.356 respectively for database firms. Thus, the standard error of the coefficient of the *ASSETS* variable for survey was larger than it would have been with in the absence of multicollinearity (values above 2.5) and the standard error of the coefficient of *ASSETS* variable for the database was very close to 2.5. Since both *SALES* and *ASSETS* variables were used as alternative proxies for size, one of these two variables was dropped from the analysis.

Table A3: Collinearity statistics

Variable	Survey		Database	
	Tolerance	VIF	Tolerance	VIF
<i>MP</i>	0.729	1.371	0.851	1.175
<i>LEV</i>	0.894	1.118	0.611	1.638
<i>LEVI</i>	-	-	0.660	1.514
<i>SALES</i>	0.408	2.452	0.467	2.142
<i>ASSETS</i>	0.397	2.517	0.424	2.356
<i>TAXRATE</i>	0.763	1.310	0.478	2.092
<i>BETA</i>	-	-	0.630	1.587
<i>CI</i>	-	-	0.637	1.570
<i>CR</i>	-	-	0.881	1.135
<i>PROFIT</i>	-	-	0.459	2.176

Tolerance = 1 / VIF. These results are from an OLS regression of y-variable depreciation on all independent and control variables.

Appendix 5: Multivariate Statistical Analysis

Table A4: Associations in the Logistic Analysis

	DEP		INV	
	Value of B	p-value	Value of B	p-value
<i>Survey:</i>				
Bonus Scheme (B ₁)	3.653	0.0003**	1.449	0.016*
Gearing (B ₂)	0.298	0.105	0.190	0.158
<i>Database:</i>				
Bonus Scheme (B ₁)	4.178	0.0001**	2.273	0.016*
Gearing (B ₂)	0.037	0.033*	0.005	0.165

Notes: (a) All identified associations were positive, (b) Sales (B₃) showed no significant associations at the 5% level.