

THE CONTROL OF DIVISIONAL INVESTMENT PROJECTS: SOME EVIDENCE FROM THE US AND UK*

by Robert W. Scapens and J. Timothy Sale

We are grateful to P. Tikkas for his assistance in collecting and analysing the UK data.

The role of residual income (profit less an interest charge) as a measure of performance in divisionalised companies has been debated for some years, but without much impact on practice. It appears generally accepted that the interest element is unnecessary when divisional managers have little or no autonomy in respect of capital expenditure. However, the position is not so clear when such autonomy is present. It is argued in the paper that residual income might also be irrelevant if delegated capital expenditure decisions are controlled independently of the operating decisions. This control could be exercised through a process of corporate authorisation of capital expenditure combined with post completion audits.

The results of a questionnaire survey are presented to explore the extent to which such control of capital expenditure takes place in the UK and US. It is concluded that formal control of capital expenditure is undertaken separately from the control of operating activities and that there is widespread use of post completion audits, especially in the US.

Introduction

In recent years there has been a debate, primarily in the United Kingdom (UK) literature, about the role of "residual income" (profit less an interest charge) as a measure of performance in divisionalised organisations. There has been much discussion of the validity of including an interest charge in the profit calculation. It has been suggested by some writers, for instance, Solomons (1965) and Tomkins (1973) and (1975), that divisional profit measurement should include interest on capital employed (or at least, on some part thereof) to ensure that divisional managers are encouraged to operate with the optimal capital resources. However, Amey (1969a), (1969b) and (1975) argued that it is theoretically erroneous to deduct interest in the appraisal of operating decisions. Some attempts have been made to reconcile the arguments of both sides to the debate, but without much success - see Samuels (1969).

After undertaking a review of the residual income literature, Emmanuel and Otley concluded that "there is still a controversy over the use of residual income as a tool for the measurement of the performance of units and managers in divisionalised organisations" (1976, p. 43). Nevertheless, they did find a general agreement in the literature that when a division's capital base is fixed outside the division, then the interest element is irrelevant. The

*A modified version of this paper will probably be published by a British Journal.

residual income controversy concerns the situations in which divisional managers have responsibility for the capital asset base used in generating their operating profit. Is an interest charge appropriate in determining the performance of such divisions and their managers? The academic literature in the UK has not reached an agreement on this point. However, management accounting text books written by academics in the United States (US) appear to regard residual income as the most appropriate measure of performance for divisions with authority over their capital base, Horngren (1977), Killough and Leininger (1977), Garrison (1976). There does seem to be some measure of agreement between academics in the US. Such agreement is not to be found amongst British academics. It is interesting to note that despite the apparent agreement amongst US academics there does not seem to be a widespread use of residual income in US industry. In a study in the mid-1960's Mauriel and Anthony (1966) found that 27% of their sample used residual income as one of the measures of divisional performance. More recently, Reece and Cool (1978) reported that the percentage of their sample of US companies using residual income was only 34%. These figures suggest that the preference for residual income shown by educators has not had a material effect on practices in US industry. The position in the UK is somewhat similar. Tomkins (1973) found rather limited use of residual income in divisionalised UK companies.

This limited use of residual income in practice might be attributed to the absence of responsibility for capital investment decisions at the divisional level. All decisions concerning capital expenditure might be made at corporate headquarters. This would mean that the interest element in the performance measure would be irrelevant: a conclusion which has received general support in the literature. However, the location of effective decision making may be difficult to establish as informal influences may be exerted on formal decision processes.

The purpose of this paper is to describe the results of the first stage of a research project to identify methods of controlling capital investment in practice and to explore the relationship with divisional performance measures. Although further research is planned, the work to date raises some interesting issues. The results of a questionnaire survey of companies in the UK and the US are described and the implications for profit measurement in controlling divisionalised operations is reviewed.

Profit measurement in divisionalised companies

Corporate management delegate authority for certain activities to divisional managers, but remain responsible for the functioning of the entire business. One way that corporate headquarters can retain control, while allowing divisional autonomy, is through ex post monitoring of divisional performance. This requires that each division is (or can be treated as) a single integrated system with a single, consistent set of goals and that these goals lend themselves to quantitative measures of performance. Mintzberg (1979) argued that organisational forces in a divisionalised company will cause the structure of divisions to satisfy these requirements and emphasis to be placed on financial goals.

When taking decisions divisional managers will be aware that their performance will be measured at some later date. Furthermore, if performance is regarded as good, financial and/or non-financial rewards may be obtained. Thus, ex post monitoring of performance has the potential to influence decisions taken earlier. The performance measure used in this monitoring process should reinforce the divisional goals - i.e., encourage the divisional manager to take decisions which further the goals that corporate management set for the division.

Accounting systems in general and profit measurement in particular can serve an important role in the performance monitoring process. But the performance measure must be selected very carefully. An inappropriate measure could place the divisional manager in an untenable position. Actions to further divisional goals could unfavourably affect reported performance when an inappropriate measure is used. For example, consider a divisional manager who is instructed to maximise the net present value (NPV) of the capital employed in his division - a goal which is consistent with the normally assumed financial objective of shareholder wealth maximisation. An NPV maximising decision to replace inefficient plant and equipment could reduce the historic cost profit measure, at least in the early years of the project, because of the higher depreciation charges associated with replacements. Performance monitoring in terms of such a profit measure will encourage the divisional manager to delay replacement. A manager who pursues the assigned divisional goals and ignores effects on the performance measure may be penalised; whereas attention to reported performance would be rewarded. This could create serious behavioural problems in the organisation and lead to a distortion of the resource allocation process.¹

Accordingly, measures of divisional performance (including profit measures) should be designed to reinforce the divisional goals. Ideally, the ex post performance monitoring process should measure the achievement of those goals directly; e.g., the division's NPV. However, this may be very difficult and surrogate performance measures will have to be used. A good surrogate will encourage divisional managers to take decisions which further the divisional goals; i.e., a manager who focuses on the performance measure will select the same set of activities as the manager who pursues the divisional goals directly. To summarise, the performance measure should provide an appropriate psychological reinforcement of the goals which divisional managers are expected to pursue.

Scapens (1979) used an economic model in order to identify a periodic profit measure which is consistent with maximising the division's NPV. A policy of maximising this profit (called economic profit) would lead to identical optimal conditions as the policy of maximising NPV. Thus, economic profit can be regarded as an ideal surrogate for NPV, and its use in the performance monitoring process will reinforce the divisional financial goal. However, there may be non-financial dimensions of goals and performance. But as argued by

¹ The difficulties of using accounting data for performance measurement are discussed in a budget setting by Hopwood (1973).

Mintzberg (1979), the divisional structure will tend to emphasise the financial goals.

Economic profit includes an interest element and has the appearance of a residual income measure, but it can be very complex. The costs of using capital assets are measured in terms of opportunity costs derived from the optimal long-term investment plan. As such costs could be very difficult to compute, economic profit has limited practical applications; but it does highlight certain important issues. The supporters of residual income claim that an interest charge should be included in the performance measure in order to encourage the divisional management to use their capital assets efficiently, Solomons (1965), Tomkins (1975). The economic profit measure suggests that unless certain simplifying conditions are satisfied the interest charge must be applied to the opportunity cost of capital assets. If the decisions concerning capital assets are taken outside the economic model, however, the interest charge and indeed, all costs relating to capital assets can be excluded from the economic profit measure. In this case divisions could be instructed to maximise the contribution to group profits using their capital employed. A performance measure in terms of the sales revenue earned, less divisional costs incurred, would reinforce this instruction. Such a performance measure would lead to the optimal operating decisions for the available capital assets. The inclusion of other costs of using capital assets would be unnecessary, but not necessarily misleading (as all costs associated with the capital assets would represent fixed charges).

It is interesting to explore the circumstances in which costs associated with capital assets can be excluded from the economic profit measure. The economic model was used to identify a *periodic* profit measure - i.e., a performance measure which could be used on a period by period basis (where each period is shorter than the normal life of the capital assets). Decisions are taken each period about the productive resources to be used, including new capital assets to be acquired. As capital assets have a useful life of more than one period, the user cost must be computed for each period. Optimal decisions will be reached only when each period's performance is charged with the opportunity cost of capital assets from the long-term investment plan. If decisions concerning capital asset acquisitions are not within the authority of the divisional manager, then the performance measure will not influence such decisions and the cost of capital assets could be excluded from the profit measure, Scapens (1979, p. 289). This conclusion is equivalent to the general agreement in the literature that the interest element of residual income is irrelevant when the division's capital base is fixed outside the division, Emmanuel and Otley (1976, pp. 43-44).

It may also be appropriate to exclude costs of capital assets even when divisional managers have autonomy in respect of capital investment decisions, *provided* control is exercised over such decisions in some other way. (This approach was suggested by the results of the interviews and questionnaire survey described below.) Although the life of capital assets normally exceeds a single operating period, it should be possible (at least in theory) to control capital investment decisions separately from the operating activities. If this control is achieved, divisions could be required to operate efficiently in each

period with the available (presumably optimal) stock of capital assets. In such circumstances the decisions concerning capital assets would be outside the economic model of divisional operating activities and could be controlled independently of the periodic performance measure. However, can capital investment be controlled separately from the operating decisions? Ex post monitoring and review of expenditures on capital assets might prove very difficult in practice because of the inter-dependencies involved. It may be extremely difficult to isolate the benefits derived from a single project, such as the introduction of a particular machine. (These difficulties and the practical possibilities for ex post control will be described later.)

The above discussion of the economic profit measure raises two empirical questions. Firstly, to what extent do divisional managers have responsibility for decisions concerning capital assets? Secondly, is it possible to delegate such responsibility to divisions, while at the same time retaining some control for corporate headquarters through ex post monitoring of performance *independently* of the periodic reports of operating performance? A questionnaire survey described later provides some evidence concerning these empirical questions.

Formal and informal systems

The empirical evidence published to date suggests that all but the most minor capital investment proposals normally require the sanction of top management; Tomkins (1973), Taylor, Nelson Investment Services (1970) and Baumes (1961). This could be taken to suggest that divisional managers have very limited autonomy over capital investment. However, other writers have argued that corporate management lack the expertise to evaluate individual divisional proposals and generally, do no more than suggest minor alterations; Morgan and Luck (1973) and King (1975). In a study of a large company in the UK, Morgan and Luck were unable to find any instances where a capital project proposal was turned down once it had reached the stage of formal application for the approval of senior management (1973, p. 5). The selection of capital projects was made informally lower down the organisation.

Bower (1972) identified similar informal mechanisms in US companies. He described a process whereby capital projects are normally conceived at the lower levels of the organisation. These projects progress up the organisation, and are considered by progressively more senior managers. If an individual manager supports the project he will pass it on upwards. A project which the divisional manager passes to corporate management for approval generally will have been evaluated by and received the support of a large section of the organisation. It may be very difficult for the corporate management to reject these projects, especially if (as is quite probable) informal discussions with individual corporate managers have previously taken place.

These formal procedures for authorising divisional capital investment cannot be described as decision making by corporate headquarters. Divisions will have considerable autonomy over their capital project proposals. Only projects preferred by the divisional manager will be put forward and in

general, they will be approved. The approval process could be regarded as a form of ex post control. Divisional managers will have made their decisions; corporate management act as a review body to monitor "decision-making" performance.

If corporate management wants to take the capital investment decisions they must direct the search for capital projects and undertake detailed evaluations of the available alternatives. Thus, in such a case we would expect detailed instructions to be issued by the corporate management to ensure that divisional project proposals meet the corporate objectives and also for extensive evaluations of capital projects (probably using sophisticated techniques) to be undertaken prior to the authorisation. An absence of *real* corporate involvement in budgeting capital expenditures and the evaluation of the individual projects would suggest that divisional managers have considerable autonomy.

The use of simple techniques for the formal evaluation of capital projects has been observed in the UK, e.g. Carsberg and Hope (1976), and research in the US suggests that the performance of companies is unaffected by the use (or otherwise) of sophisticated techniques; Klammer (1973). Some writers have attempted to explain the preference for simple techniques in terms of organisational, economic and social factors; Churchman (1964), Sundem (1974) and Cooper (1975).

Generally the quantitative techniques described in the academic literature in recent years do not appear to have been widely adopted in practice. It seems to be generally accepted that practice will lag behind theory. Time is required for new techniques to be accepted and implemented. But the time lag seems excessively long. If the new techniques have the power that their advocates suggest, then one would expect managers in a competitive world to hire suitably qualified specialists to explain and implement the new techniques. Companies that did not do so would be placed at a competitive disadvantage. Nevertheless, many of the quantitative techniques developed 5-10 years ago are not widely adopted, either in the US or the UK. It is very convenient to blame this on the practitioner's lack of knowledge but there may be more fundamental reasons.

The use of sophisticated techniques for corporate management's evaluation of divisional capital projects would suggest limited divisional autonomy, especially if combined with corporate involvement in the budgeting of capital expenditures. However, the absence of such techniques (and the lack of involvement in capital expenditure budgeting) may indicate divisional autonomy in this area.

If divisions have autonomy in respect of capital investment decisions, the corporate management will want to retain some element of control. As suggested earlier, control over delegated decisions can be achieved only through the monitoring of performance. The use of the capital authorisation process as a form of ex post monitoring of decision-making performance has already been suggested. This control would be enhanced by a process monitoring the outcomes of capital projects, for instance, post-completion audits. The combination of a system of corporate authorisation of individual projects and post-completion audits could provide ex post control over

delegated responsibility for divisional capital investment.

In concluding this brief discussion of formal and informal systems, it must be recognised that a mailed questionnaire study can explore only the formal system. A direct observation and/or interview approach is needed to explore the informal mechanisms. (Such an approach is planned for a later stage of the project.) However, the existence of particular formal systems will suggest tentative conclusions about the extent of autonomy and the role of corporate control over divisional capital investment.

The questionnaire study

In order to make meaningful comparisons between the responses in the US and the UK identical questionnaires were used in both countries (subject to certain minor amendments which were introduced to account for slight differences in terminology and monetary amounts in the two countries). In the UK the questionnaires were mailed to 744 companies in the Times 1000 – excluded were subsidiaries of overseas corporations. Ten questionnaires were returned untraced, of companies liquidated or merged, giving a reduced sample size of 734. 331 Replies were received; a response rate of 45.1%. Of these replies, 300 were usable. In the US the questionnaires were mailed to the Fortune 500 and 3 were returned; a reduced sample size of 497. Replies were received from 247 US companies; a response rate of 49.7%, and 227 were usable.

The Times 1000 and Fortune 500 contain the largest 1000 industrial companies in the UK and the largest 500 industrial companies in the US. However, not all these companies have divisional structures. For the purposes of the survey a division was defined as “a section within the organisation where the divisional chief executive has responsibility for costs, revenues and at least some discretion over capital expenditure (e.g. working capital management, capital projects up to a specified sum, etc.)”. Respondents were asked to indicate whether or not their organisation is divisionalised according to this definition. If they answered yes, they were invited to complete the remainder of the questionnaire and return it; if they answered no, they were asked to return brief details about the nature of their business and the size of their company. The numbers of divisionalised and non divisionalised companies which returned usable questionnaires are as follows:

	UK	US
Divisionalised	211	205
Non divisionalised	89	22
	<u>300</u>	<u>227</u>

As the survey was concerned with the control of divisionalised operations it was more likely to appeal to respondents in divisionalised companies. Thus a higher response rate may be expected from such companies. Accordingly, the

above figures should not be used to draw inferences about the proportion of the sampled companies which have divisional structures. The results described below are derived from the 211 UK and 205 US responses from companies which are divisionalised according to the definition given above.

The questionnaires were addressed to the corporate headquarters with instructions that they should be completed by "group accounting personnel".² The responses will inevitably reflect the corporate headquarters' perceptions of the accounting systems, and may not fully describe the realities within individual divisions. However, they will indicate the mechanisms which the corporate management use in their attempts to control divisional operations but they will not provide any indication of the effectiveness of this control.

A series of interviews with corporate controllers - 8 in UK and 7 in US - were undertaken prior to the survey in order to assist in the development of the questionnaire. The options provided for questions involving multiple choice were based on the information obtained from these interviews. A draft of the questionnaire was completed by certain of these corporate controllers and revisions were made in response to their comments. In order to avoid biases being introduced through the order of the questions or choices, two versions of the questionnaire were prepared. One half of the UK and US sample companies were sent the first version, while the second version was sent to the remainder.³ The second version contained identical questions, but ordered differently. The order of choices within questions was also changed. Statistical tests were unable to locate any general evidence of question-order bias in the responses.⁴

In order to test the representativeness of the respondents and to identify any non-response bias the turnover, net profit before interest and taxes, and principal activities of the responding companies were compared with the characteristics of the population - i.e. sampled companies in the Times 1000 and Fortune 500. The principal activities of the responding companies were not significantly different from the population. Although responses were generally biased in favour of larger companies, only the net profits of the US companies were significantly different from the population at $t = 0.05$.

A further test for non-response bias was performed by analysing differences in the replies received from the first questionnaire mailing and as a result of a follow-up letter, Moser and Kalton (1971, pp. 185-186). An absence of significant differences suggested that the replies from responding companies give a good indication of the whole population.

The companies participating in the survey showed a particular interest in the study. Copies of the results were requested by 147 UK and 128 US companies. This high level of interest adds to the validity of the results which are discussed below.

² The term "corporate accounting personnel" was used in the US.

³ In the UK the sample companies were divided alphabetically, whereas US companies were divided according to size.

⁴ Some statistically significant differences were observed in the responses to the two versions of the US questionnaire. However, these differences can be explained by the relative size of the companies in the sub-samples; they do not indicate question-order bias.

Results

Table 1 summarises the financial criteria used to evaluate the performance of divisional managers. (For ease of reference, all the tables are presented together in the appendix.) Respondents were asked to indicate the method or methods used in their company - multiple responses were permitted. The percentages indicated in the table disclose the proportion using each method, either alone or in combination with other methods. Not one method is consistently used by all (or most) of the companies. Profit after charging interest, i.e. residual income, does not appear to be widely used. The percentage using residual income in the US (28.8%) is similar to 1966 survey of Mauriel and Anthony (27%) and the 1978 survey of Reece and Cool (34%). There does not appear to have been any increase in the use of this measure despite its predominance in undergraduate textbooks. The percentage is only slightly higher in the UK (37.4%), and that is the lowest proportion (excluding the "other" category).

The relatively higher percentage using a cash flow measure in the UK is quite interesting; 41.7% as compared to 21.5% in the US. The high rates of inflation in recent years in the UK have emphasised the importance of cash flow measures. In the mid-1970's when the rate of inflation was 20-30% per annum, many companies experienced severe cash flow problems. Despite this experience and the efforts of certain advocates of cash flow accounting, such as Lawson (1971a) and (1971b), Lee (1972), and others, cash flow measures are not regarded as more important than profit measures. Table 2 indicates the relative importance that the respondents attached to cash flow and profit measures in the assessment of divisional performance. In the US profit measures are generally regarded as more important than cash flow measures (a mean value of 3.83) whereas in the UK there is support for the view that both measures are equally important (a mean value of 3.37). But there is no suggestion in the responses that cash flow accounting is replacing profit measurement.

As discussed earlier, the use of particular performance measures may be explained by reference to the extent of divisional autonomy over capital investment. Table 3 indicates a very widespread use of formal authorisation mechanisms. In the vast majority of companies (82.8% in UK and 89.3% in US) divisional managers require authorisation for capital expenditure above certain limits, and in many of the other companies the expenditure must have been previously authorised in the budget. The limits (or ceilings) on individual projects are generally quite low. The mean ceiling in the UK is £ 104,000 and in the US it is rather lower at \$ 136,000. However these mean values give a somewhat distorted picture because of the existence of a few companies with very large ceilings, Table 4 gives an indication of the range of the ceilings. Of the UK companies 55.4% have ceilings below £ 50,000, while 66.3% of the US companies have ceilings below an approximately equivalent amount of \$ 125,000. Such limits will ensure that all but very minor items of capital investment require authorisation. When examining these figures it should be remembered that the companies concerned are the largest in the UK and US

· with average annual capital expenditures amounting to £19.37m and \$130.41m respectively.⁵

In addition to obtaining approval for capital investment divisions normally have to seek finance from corporate headquarters. Approval of a capital project will generally involve the allocation of the necessary finance. Few divisions have authority to raise finance externally - see Table 5. Those which do have such authority are usually limited to short-term sources - suitable primarily for financing working capital requirements, rather than fixed capital investment.

An indication of the reasons for imposing capital expenditure ceilings is given in Table 6. Respondents were asked:

"If there is a ceiling for the capital projects which can be authorised by divisional managers, what are the reasons for implementing such a policy?"

Three specific options (summarised in Table 6) and an "otherwise" option were provided - multiple responses were permitted. The specific options were suggested during the interviews undertaken prior to the survey. Most of the respondents (92.6% in UK and 93.2% in US) identified capital investment decisions as important for the whole organisation and requiring central control. This option was the first available in one version of the questionnaire, but it was the third option in the other version - the order of options does not appear to have affected the responses.

Only 21.0% in UK and 15.3% in US identified capital rationing as a reason for the ceilings. This confirmed the impression gained at the interviews that companies are not generally experiencing cash flow difficulties. Where there is low investment it is generally because of a lack of acceptable projects, not a shortage of funds.

Some respondents (32.1% UK and 35.8% US) regarded as important the relationship between capital investment decisions and decisions concerning areas of activity and mix of products (i.e. operating decisions). However, the overwhelming view is that capital investment is (for one reason or another) so important as to require central control. Nevertheless, the evidence does not necessarily indicate a lack of divisional autonomy. Divisional managers may have substantial influence over the projects put forward for authorisation.

The pre-questionnaire interviews confirmed the findings of Morgan and Luck (1973). Very few capital investment projects were rejected at the stage of formal authorisation by corporate management. In most instances, there would be consultation between corporate and divisional managers prior to the formal authorisation. On the few occasions when proposed projects were not authorised it was normally because insufficient information had been presented; the proposals were referred back to the division, not rejected entirely. It was suggested by some of the corporate controllers that their examination of divisional project proposals was intended to ensure that the necessary planning had been carried out at the divisional level. In other words,

⁵ A weak statistical relationship was observed between corporate size variables (total capital expenditure, turnover and profit after interest and taxes) and the size of capital expenditure ceilings. Larger companies (especially in the US) tend to set higher ceilings.

they were monitoring the planning and decision making of divisional managers. Such a formal authorisation process could be regarded as an ex post control mechanism for the decisions which had been delegated to divisions.

The survey evidence discussed above is not inconsistent with this suggestion. However, it was not considered possible in a questionnaire survey to identify directly the locus of capital expenditure decisions. Responses to a questionnaire would reflect the individual perceptions of corporate personnel and might not indicate the reality of decision making within divisions. A comprehensive interview study is essential for such research, but inevitably it will be limited in scope. A questionnaire survey can only give indirect evidence, but has the advantage of greater generality. Both research tools will be used eventually. For the present, we will proceed by describing the questionnaire's evidence of corporate involvement in capital expenditure budgeting and in project evaluation.

Table 7 describes the control mechanisms which are used to ensure that divisional projects are in line with corporate objectives. A minority of companies (27.4% UK and 32.2% US) use long-term corporate plans prepared at corporate headquarters as a means of communicating investment goals to divisions, while a majority (51.0% UK and 66.8% US) issue broad guidelines to divisions which are expected to produce their own long-term plans. However, the most widely used control mechanism is the capital expenditure budget (81.3% UK and 93.7% US). A direct corporate involvement in the preparation in these budgets would severely limit divisional autonomy. The responsibility for such budgets is indicated in Table 8. The overwhelming impression is that divisions prepare their own capital expenditure budgets, subject to the formal approval of the corporate headquarters. Every respondent who indicated that these budgets are prepared at the divisional level, also reported that the divisional budgets require corporate approval. Table 9 indicates that in general these budgets are prepared in detail for only one or two years ahead, but that many companies prepare outline budgets for much longer periods.

The financial analysis produced for the formal authorisation of divisional projects (when the proposed expenditure is above a certain limit) is rather limited, and frequently avoids the rigorous techniques suggested in the academic literature. Table 10 indicates the techniques used to evaluate divisional project proposals involving an extension of existing facilities. Discounted cash flow techniques are more widely adopted in the US (84.3%), than in the UK (51.7%). Payback and accounting rates of return are still widely used, especially in the UK.

Discounted cash flow is the term used for a family of techniques which can be applied with various degrees of mathematical complexity. In the UK only 36.1% of the respondents using such techniques have any special procedures for projects with very risky outcomes. These procedures include sensitivity analysis, adjusting the required rate of return, and complex risk analysis techniques; but in the main companies use subjective evaluations of the risk. In the US the proportion using special procedures for dealing with risk was slightly higher at 49.0%. Other companies simply apply discounting techniques using rates varying from 5% to 32% in the UK and 10% to 40% in the US. The average rates (in money terms) are 18.5% and 17.1% respectively.

These responses do not suggest a general use of rigorous financial evaluations of the capital projects put forward by divisions. This evidence and the interviews discussed earlier are indicative of a monitoring process, rather than an absence of divisional autonomy. The formal authorisation mechanism appears to be an ex post control of decisions which are delegated to divisional managers. However, if capital expenditure decisions are apparently delegated, why are periodic performance measures not normally related to the capital asset base? i.e. why are the residual income and (to a lesser extent) the rate of return criteria not more widely used?

If residual income and rate of return are generally regarded as appropriate measures of performance when capital investment decisions are delegated, then it might be expected that companies with greater delegation would be more likely to use such measures. In other words, there should be a relationship between the financial criteria used to evaluate the performance of divisional managers (as shown in Table 1) and the extent of divisional autonomy over capital investment. Unfortunately, we do not have a satisfactory measure of the extent of autonomy, but some surrogates are available in the data discussed above. A chi-squared (X^2) test was used to identify relationships between the responses in Table 1 and:

- a) Table 3 · divisional autonomy over capital expenditure;
- b) Table 4 · capital expenditure ceilings on individual projects; and
- c) Table 6 · reasons for capital expenditure ceilings.

No consistently significant relationships were observed to explain the variety of financial criteria for performance evaluation. In the UK data the only relationship which was significant as $X^2 = 0.05$ was cash flow and the capital expenditure ceilings in Table 4 ($X^2 = 0.0044$). The cash flow criteria was also significant in the US data. However, the statistics do not suggest a consistent relationship between the criteria for divisional performance and the indicators of divisional autonomy.⁶ This might be explained by the use of some independent procedure(s) to control capital projects.

Table 11 describes the mechanisms used by the responding companies to monitor the progress of authorised capital investment. Project accounts are used by a little over half the respondents in both countries and Table 12 indicates that these accounts are normally the responsibility of divisional controllers. The use of post-completion audits differs substantially between the UK and US. Only 36.3% of the respondents in the UK undertake such audits, compared with 84.2% in the US. Table 13 provides some additional information concerning these audits, but no general picture emerges. In some companies, divisions audit their own projects (and report the results to corporate headquarters) while in other companies the corporate headquarters are responsible for undertaking the audit. There is also much variation in the timing of the audits. However, there is clear evidence that post-completion audits are undertaken in practice.

It has been suggested in recent years in the UK that it is impracticable to audit capital investment projects after they have been implemented. Consider

⁶ There was also no significant relationship between the criteria for performance evaluation and the financial analysis techniques.

for instance, a new item of plant in a production department. There may be many joint costs involved in operating that plant and it may be very difficult to identify the benefits which it produces (as distinct from other items of plant in the same department). These difficulties led many UK corporate controllers to reject the idea, but in the US post completion audits gained acceptance in the late 1950's. A report published in 1952 by the National Industrial Conference Board indicated that:

"It is the exception rather than the rule for management to make a retro active check on a completed capital project in order to determine if the advantages claimed at its inception have materialized." Watson (1953, p. 38).

However, a similar report in 1963 concluded from a study of 346 manufacturing companies that:

"Most companies make some post-completion audits to determine whether forecast benefits are in fact being realised." Pflomm (1963, p. 80).

The pre-questionnaire interviews indicated one reason why post-completion audits may be used in spite of the difficulties involved. A divisional controller explained that:

"Since introducing post-completion audits we have found a substantial improvement in project proposals . . . the effect (of post-completion audits) is mainly psychological."

As divisional managers are aware that their projects will (or simply, may) be audited, they plan more carefully, avoid overstating their proposals and give greater attention to the implementation. Most companies using post-completion audits do not review all projects - a selection is made. Sometimes the selection is random (or at least, it appears random to the divisional managers) and other times it is based on the size of the projects (i.e. the larger projects are audited).

This use of post-completion audits is consistent with the idea of reinforcing the corporate objectives discussed earlier. The authorisation process provides reinforcement after the decision but before implementation; while the post-completion audits provide a further reinforcement after implementation. A divisional manager will be aware when making capital investment decisions that performance is monitored at the time of authorisation and again after implementation. These monitoring processes are independent of the evaluation of operating activities and if they are effective, the operating activities can be evaluated without reference to the capital base of the division. Thus, the measurement of residual income or rate of return will be unnecessary.

Discussion

The above results indicate that much divisional capital investment requires the formal approval of corporate management. This does not necessarily suggest that divisions lack autonomy regarding capital projects. Divisional managers

are generally responsible for the budgeting of capital expenditures and the preparation of project proposals. A manager at the divisional level will probably exert substantial influence over project selection, and corporate management approval will normally be obtained. It was argued that the observed requirements for corporate approval of capital projects is part of the ex post monitoring process which is necessary if corporate management is to retain some element of control over the decisions delegated to divisional managers.

As residual income may be useful when divisional managers have autonomy in respect of capital investment, its limited use in practice might suggest a lack of divisional autonomy. But this presupposes that residual income is the appropriate measure *whenever* capital expenditure decisions are delegated to divisional managers. As discussed earlier, the economic model described by Scapens (1979) demonstrated that a conventional measure of residual income will be an appropriate performance measure (i.e. will reinforce the economic goals of the division) only if certain simplifying conditions exist. A historic cost-based measure of residual income can be valid only if prices remain stable - see Solomons (1965, pp. 90-93). During a period of rising prices current costs (or price adjustments) must be used. Furthermore, a current cost measure of residual income will only reinforce the economic goals if market prices provide a satisfactory measure of opportunity costs, as for instance when the division can buy or sell capital assets without restriction at the prevailing market price, Scapens (1979, pp. 295-297). If there are constraints on the purchase (or sale) of capital assets, then the residual income measure will not encourage divisional managers to take optimal decisions unless the capital assets are valued at their opportunity cost in the long-term investment plan for the whole organisation - see also Amey (1969a). Whether or not such constraints exist is an empirical question that is outside the scope of the present study. Further research is needed to establish the empirical validity of the simplifying assumptions. Such research should include an examination of the nature of the markets for capital assets.

A priori it might be expected that residual income (if measured in terms of current cost) will be valid for some companies, but not for others. If there are constraints on the purchase (or sale) of capital assets residual income may not be appropriate and an alternative monitoring mechanism will be needed to encourage optimal capital expenditure decisions. The use of post-completion audits might provide this alternative. In the UK there was a statistically significant relationship between the use of residual income and post-completion audits (significant at $\chi^2 = 0.0300$). However, the two techniques were complementary rather than alternatives. Residual income was used by 47.2% of respondents using post-completion audits, but by only 30.7% of respondents not using post-completion audits. No significant relationship was observed in the US data.

Thus it appears that post-completion audits and residual income are used jointly in the UK. This is not generally the case in the US where post-completion audits are widely adopted, despite the very limited use of residual income. The reasons for this difference in practice need further study. It is possible that residual income is avoided in general because it does not

provide appropriate reinforcement of corporate goals - for instance, because of the existence of constraints on capital asset purchases. However, in some companies where working capital is an important part of the division's asset base (and possibly because the division can use external sources of short-term finance) residual income may be used to control working capital.

The limited use of post-completion audits in the UK is possibly due to the perceived practical difficulties. However, these difficulties appear to have been overcome in the US. Corporate managers in the UK may prefer to rely on closer personal contacts between corporate and divisional managers and this may be easier in the UK where divisions are not so geographically dispersed as in the US.

To conclude this discussion of the results some comments should be made about the general pattern of responses from UK and US companies. Probably the most striking feature of the two sets of replies is the extent of the similarity of practice in the two countries. The relationship between the responses has not been measured statistically, but a review of Tables 1 to 13 shows very similar replies. The two major differences concern the extent to which discounted cash flow techniques and post-completion audits are used - both are more widely used in the US.

Despite their more extensive use in the US, discounted cash flow techniques do not appear to be rigorously applied. Fewer than half the respondents reported special procedures for dealing with uncertainty, and many of these only subjectively assess the risk. This does not suggest a widespread use of the complex evaluation techniques which have been proposed by academics in recent years. The absence of these techniques in UK practice may not be entirely the result of a timelag between theory and practice, except at the most superficial level. Research is needed to identify the reasons for the failure of the academic techniques to be adopted in practice - for a discussion of this proposal see Scapens (1980).

The other major difference between UK and US practice is the use of post-completion audits. This cannot be described as an academic technique and its limited use in the UK cannot be ascribed to a timelag between theory and practice. There has been no real pressure from academics in the UK for the use of post-completion audits. However, the evidence of US practice indicates that use can be made of such audits, despite the difficulties involved in isolating the relevant costs and benefits. As residual income is not widely used a strong case could be made for other forms of monitoring divisional capital investment decisions. Post-completion audits could be very useful for such a purpose.

Conclusions

In the earlier part of this paper two empirical questions were raised. Firstly, to what extent do divisional managers have autonomy in respect of decisions concerning capital assets? Secondly, is it possible to delegate such autonomy to divisions, while at the same time retaining control for corporate headquarters through ex post monitoring of performance - *independently* of the periodic reports of operating performance?

The results of the questionnaire survey have provided some indirect evidence concerning divisional autonomy. However, further research involving interviews at both corporate and divisional levels is planned. In the meantime it may be tentatively concluded that in general divisional managers are able to exercise substantial influence over their capital investment decisions.

The questionnaire survey and the preliminary interviews provided more direct evidence concerning the second question. Post completion audits are widely used in the US. These audits can provide a mechanism for the ex post monitoring of delegated capital investment decisions independently of the periodic measurement of operating performance.

APPENDIX - TABLES

TABLE 1 Financial criteria used to evaluate the performance of divisional managers

	UK		US	
	<i>No.</i>	<i>%[†]</i>	<i>No.</i>	<i>%[†]</i>
Rate of return	92	44.7	106	51.7
Profit after charging interest	77	37.4	59	28.8
Profit before interest and taxes	104	50.5	93	45.4
Cash flow	86	41.7	44	21.5
Budget	90	43.7	101	49.3
Other	<u>18</u>	8.7	<u>42</u>	20.5
Total responses	206		205	
No answer	<u>5</u>		<u>—</u>	
	<u>211</u>		<u>205</u>	

[†] Percentage of respondents (excluding no answers) using each criterion: multiple responses were permitted.

TABLE 2 Relative importance of cash flow-v-profit in assessing divisional performance

	UK		US		Notional Value ^a
	No.	%	No.	%	
Cash flows most important (and profit unimportant)	2	1.0	2	1.0	1
Cash flows slightly more important than profit	19	9.4	8	3.9	2
Both measures equally important	103	50.7	56	27.6	3
Profit slightly more important than cash flows	62	30.5	92	45.3	4
Profit more important (and cash flows unimportant)	16	7.9	43	21.2	5
Neither measure important	<u>1</u>	<u>0.5</u>	<u>2</u>	<u>1.0</u>	
	203	<u>100.0</u>	203	<u>100.0</u>	
No answer	<u>8</u>		<u>2</u>		
	<u>211</u>		<u>205</u>		

^a Using notional values:

Mean	3.37	3.83
Standard deviation	0.67	0.84

TABLE 3 Divisional autonomy over capital investment

	UK		US	
	<i>No.</i>	%	<i>No.</i>	%
All capital expenditure requires group approval	10	4.8	7	3.4
Divisional managers allowed to spend on individual projects up to a certain limit	173	82.8	183	89.3
Divisional managers allowed to spend amounts authorised by their budget, but no limit for individual projects	25	12.0	14	6.8
Divisional managers can spend without restriction, provided they can obtain the necessary finance	0	0.0	1	0.5
Otherwise	<u>1</u>	<u>0.4</u>	<u>0</u>	<u>0.0</u>
	209	<u>100.0</u>	205	<u>100.0</u>
No answer	<u>2</u>		<u>—</u>	
	<u>211</u>		<u>205</u>	

TABLE 4 Capital expenditure ceilings on individual projects

			UK	
			<i>No.</i>	%
Over	£ 250,000		26	17.3
£ 100,000 –	£ 250,000		25	16.7
75,000 –	99,000		8	5.3
50,000 –	74,000		8	5.3
25,000 –	49,000		22	14.7
Less than	25,000		<u>61</u>	<u>40.7</u>
			150	<u>100.0</u>
No answer			23	
No ceiling (per Table 3)			<u>38</u>	
			<u>211</u>	
			US	
			<i>No.</i>	%
Over	\$ 250,000		37	22.7
\$ 125,000 –	\$ 250,000		18	11.0
75,000 –	124,000		28	17.2
50,000 –	74,000		13	8.0
37,500 –	49,000		10	6.1
25,000 –	37,000		8	4.9
Less than	25,000		<u>49</u>	<u>30.1</u>
			163	<u>100.0</u>
No answer			20	
No ceiling (per Table 3)			<u>22</u>	
			<u>205</u>	

TABLE 5 Divisional authority to raise external finance

	UK		US	
	<i>No.</i>	%	<i>No.</i>	%
Divisions have authority to raise external finance	30	14.4	25	12.4
Divisions do not have authority to raise external finance	179	85.6	176	87.6
	<u>209</u>	<u>100.0</u>	<u>201</u>	<u>100.0</u>
No answer	<u>2</u>		<u>4</u>	
	<u>211</u>		<u>205</u>	
Sources of finance: ⁹				
– Bank overdraft	25	75.8	11	45.8
– Hire purchase	13	39.4	7	29.2
– Leasing	17	51.5	13	54.2
– Cash management (delay creditors, reduce debtors)	30	90.9	17	70.8
– Other sources	6	18.2	1	4.2
Total responses	33 ¹⁰		24	

⁹ Sources for divisions which have authority to raise external finance. Percentages indicate the proportion of the (total) respondents with such authority - multiple responses were permitted.

¹⁰ This figure should be 30 i.e. the number responding that divisions have authority to raise external finance. Three respondents gave inconsistent answers.

TABLE 6 Reasons for capital expenditure ceilings

	UK		US	
	No.	% ¹¹	No.	% ¹¹
Investment decisions important for whole group and require central control	150	92.6	164	93.2
Management wants to control cash, because of a shortage of funds	34	21.0	27	15.3
Management wants to control areas of activity and mix of products	52	32.1	63	35.8
Otherwise	<u>9</u>	5.6	<u>5</u>	2.8
Total responses	162		176	
No answer	11		7	
No ceiling	<u>38</u>		<u>22</u>	
	<u>211</u>		<u>205</u>	

¹¹ Proportion of total responses to this question selecting each option - multiple responses were permitted.

TABLE 7 Control mechanisms to ensure that divisional projects in line with group objectives

	UK		US	
	No.	% ¹²	No.	% ¹²
Investment goals stated in long-term corporate plans issued by headquarters and agreed with divisions	57	27.4	66	32.2
Broad guidelines produced by headquarters, each division produces its own corporate plan	106	51.0	137	66.8
Control exercised through capital expenditure budgets	169	81.3	192	93.7
Otherwise	<u>7</u>	3.4	<u>14</u>	6.8
Total responses	208		205	
No answer	<u>3</u>		<u>—</u>	
	<u>211</u>		<u>205</u>	

¹² Proportion of total responses to this question selecting each option - multiple responses were permitted.

TABLE 8 Budgeting for capital expenditure

	UK		US	
	<i>No.</i>	%	<i>No.</i>	%
Capital expenditure budgeted at corporate level <i>together</i> with other operations	3	1.7	2	1.0
Capital expenditure budgeted at divisional level <i>together</i> with other operations	102	59.0	55	28.8
Capital expenditure budgeted at corporate level <i>separately</i> from other operations	2	1.1	2	1.0
Capital expenditure budgeted at divisional level <i>separately</i> from other operations	56	32.4	68	35.7
There is interaction between the divisional and corporate levels in budgeting capital expenditure	9	5.2	33	17.3
Otherwise	<u>1</u>	<u>0.6</u>	<u>31</u>	<u>16.2</u>
	173	<u>100.0</u>	191	<u>100.0</u>
No answer	<u>38</u>		<u>14</u>	
	<u>211</u>		<u>205</u>	

TABLE 9 Planning capital expenditure

	UK		US	
	No.	%	No.	%
<i>Detailed capital expenditure budgets prepared for:</i>				
More than 4 years ahead	4	2.4	5	3.2
4 years ahead	1	0.6	13	8.3
3 years ahead	7	4.2	13	8.3
2 years ahead	10	5.9	16	10.2
1 year ahead	146	86.9	110	70.0
No answer	<u>5</u>	<u> </u>	<u>34</u>	<u> </u>
	<u>173¹³</u>	<u>100.0</u>	<u>191¹³</u>	<u>100.0</u>
 <i>Outline capital expenditure budgets prepared for:</i>				
More than 4 years ahead	33	24.3	43	26.4
4 years ahead	10	7.3	56	34.4
3 years ahead	50	36.8	26	15.9
2 years ahead	37	27.2	22	13.5
1 year ahead	6	4.4	16	9.8
No answer	<u>37</u>	<u> </u>	<u>28</u>	<u> </u>
	<u>173¹³</u>	<u>100.0</u>	<u>191¹³</u>	<u>100.0</u>

¹³ Total of responses in Table 8.

TABLE 10 Financial analysis techniques for investment appraisal

	UK		US	
	<i>No.</i>	<i>%¹⁴</i>	<i>No.</i>	<i>%¹⁴</i>
Discounted cash flow (NPV or IRR)	106	51.7	172	84.3
Payback	113	55.1	115	56.4
Accounting rate of return	114	55.6	83	40.7
Non-financial criteria used	<u>49</u>	23.9	<u>47</u>	23.0
Total responses	205		205	
No answer	<u>6</u>		<u>1</u>	
	<u>211</u>		<u>205</u>	

¹⁴ Proportion of total responses to this question selecting each option - multiple responses were permitted.

TABLE 11 Ex post control of capital projects

	UK		US	
	<i>No.</i>	<i>%¹⁵</i>	<i>No.</i>	<i>%¹⁵</i>
Projects monitored through project accounts	110	54.7	115	56.9
Post-completion audits undertaken	73	36.3	170	84.2
Otherwise	<u>48</u>	23.9	<u>14</u>	6.9
Total responses	201		202	
No answer	<u>10</u>		<u>3</u>	
	<u>211</u>		<u>205</u>	

¹⁵ Proportion of total responses to this question selecting each option - multiple responses were permitted.

TABLE 12 Responsibility for project accounts

	UK		US	
	<i>No.</i>	%	<i>No.</i>	%
Divisional controllers responsible for project accounts	78	65.5	83	72.8
Corporate controllers responsible for project accounts	41	34.5	24	21.1
Otherwise	<u>0</u>	<u>0</u>	<u>7</u>	<u>6.1</u>
	119	<u>100.0</u>	114	<u>100.0</u>
No answer	<u>10</u>		<u>1</u>	
	<u>129</u> ¹⁶		<u>115</u> ¹⁷	

¹⁶ Total includes responses from "otherwise" option in Table 11.

¹⁷ Total agrees with responses in Table 11.

TABLE 13 Post-completion audits

	UK		US	
	<i>No.</i>	%	<i>No.</i>	%
Responsibility for undertaking audits:				
Corporate headquarters	43	50.6	72	43.6
The division	39	45.9	83	50.3
Another division	1	1.2	2	1.2
Otherwise	<u>2</u>	<u>2.3</u>	<u>8</u>	<u>4.9</u>
	85	<u>100.0</u>	165	<u>100.0</u>
No answer	<u>10</u>		<u>5</u>	
	<u>95¹⁸</u>		<u>170¹⁹</u>	
Timing of audits:				
Annually (after acceptance)	15	18.3	31	18.6
After expenditure incurred	12	14.6	32	19.2
After revenues realised	34	41.5	70	41.9
No specific pattern	<u>21</u>	<u>25.6</u>	<u>34</u>	<u>20.3</u>
	82	<u>100.0</u>	167	<u>100.0</u>
No answer	<u>13</u>		<u>3</u>	
	<u>95¹⁸</u>		<u>170¹⁹</u>	

¹⁸ Total includes responses from "otherwise" option in Table 11.¹⁹ Total agrees with responses in Table 11.

References

- Amey, L. R. (1969a), *The Efficiency of Business Enterprises* (George Allen and Unwin, 1969).
- Amey, L. R. (1969b), "Divisional Performance Measurement and Interest on Capital", *Journal of Business Finance* (Spring 1969) pp. 2-7.
- Amey, L. R. (1975), "Tomkins on "Residual Income",", *Journal of Business Finance and Accounting* (Spring 1975) pp. 55-68.
- Baumes, G. C. (1961), "Division Financial Executives", *Business Policy Study No. 101* (National Industrial Conference Board Inc., 1961).
- Bower, J. L. (1972), *Managing the Resource Allocation Process* (Richard D. Irwin, 1972).
- Carsberg, B.V. and A. J. B. Hope (1976), *Business Investment Decisions Under Inflation* (Institute of Chartered Accountants in England and Wales, 1976).
- Churchman, C. West (1964), "Managerial Acceptance of Scientific Recommendations", *California Management Review*, (Fall 1964) pp. 31-38.
- Cooper, D. J. (1975), "Rationality and Investment Appraisal", *Accounting and Business Research* (Summer 1975) pp. 198-202.
- Emmanuel, C. R. and D. T. Otley (1976), "The Usefulness of Residual Income", *Journal of Business Finance and Accounting* (Winter 1976), pp. 43-51.
- Garrison, R. H. (1976), *Managerial Accounting* (Business Publications Inc., 1976).
- Hopwood, A. (1973), *An Accounting System and Managerial Behaviour* (Saxon House, 1973).
- Hornigren, C. T. (1977), *Cost Accounting: A Managerial Emphasis* 4th Ed., (Prentice-Hall, 1977).
- Killough, L. N. and W. E. Leininger (1977), *Cost Accounting for Managerial Decision Making* (Dickenson, 1977).
- King, P. (1975), "Is the Emphasis of Capital Budgeting Misplaced?", *Journal of Business Finance and Accounting* (Spring 1975), pp. 69-82.
- Klammer, T. (1973), "The Association of Capital Budgeting Techniques with Firm Performance", *Accounting Review* (April 1973) pp. 353-364.
- Lawson, G. H. (1971a), "Measuring Divisional Performance", *Management Accounting* (May 1971) pp. 147-152.
- Lawson, G. H. (1971b), "Cash-Flow Accounting", *The Accountant* (28 October 1971) pp. 586-589 and (4 November 1971) pp. 620-622.
- Lee, T. A. (1972), "A Case for Cash Flow Accounting", *Journal of Business Finance* (Summer 1972) pp. 27-36.
- Mauriel, J. and R. H. Anthony (1966), "Misevaluation of Investment Center Performance", *Harvard Business Review* (March-April 1966), pp. 98-105.
- Mintzberg, H. (1979), *The Structuring of Organisations* (Prentice-Hall 1979).
- Morgan, J. and M. Luck (1973), *Managing Capital Investment* (Mantec, 1973).
- Moser, C. A. and G. Kalton (1971), *Survey Methods in Social Investigation* 2nd Edition (Heinemann, 1971).
- Pflomm, N. E. (1963), "Managing Capital Expenditure", *Studies in Business Policy No. 107* (National Industrial Conference Board, 1963).
- Reece, J. S. and W. R. Cool (1978), "Measuring Investment Center Performance", *Harvard Business Review* (May-June 1978) pp. 28-46 and 174.
- Samuels, J. M. (1969), "Divisional Performance Measurement and Interest on Capital: A Contributed Note", *Journal of Business Finance and Accounting* (Autumn 1969), pp. 3-4.
- Scapens, R. W. (1979), "Profit Measurement in Divisionalised Companies", *Journal of Business Finance and Accounting* (Autumn 1979), pp. 281-305.
- Scapens, R. W. (1980), "Directions for the Future" in Arnold, Carsberg and Scapens (eds.) *Topics in Management Accounting* (Philip Allen, 1980).
- Solomons, D. (1965), *Divisional Performance: Measurement and Control* (Richard D. Irwin, 1965).
- Sundem, G. L. (1974), "Evaluating Simplified Capital Budgeting Models Using a Time-State Preference Metric", *Accounting Review* (April 1974) pp. 306-320.
- Taylor, Nelson Investment Services (1970), "The Why and the How of Company Investment", *The Director* (November 1970), pp. 334-9.
- Tomkins, C. (1973), *Financial Planning in Divisionalised Companies* (Haymarket, 1973).
- Tomkins, C. (1975), "Another Look at Residual Income", *Journal of Business Finance and Accounting* (Spring 1975), pp. 39-53.
- Watson, J. H. III (1953), "Controlling Capital Expenditures", *Studies in Business Policy No. 62* (National Industrial Conference Board, 1953).