

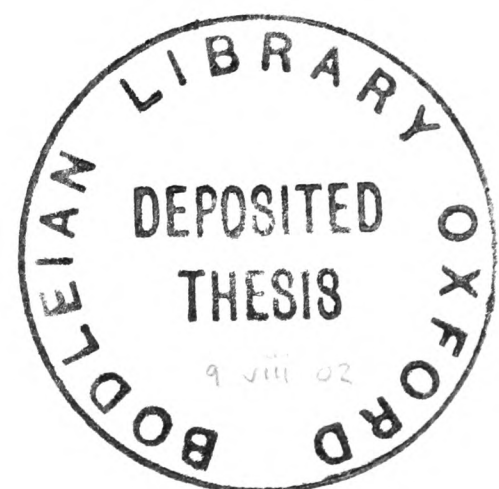
**DETERMINANTS AND OUTCOMES OF
FOREIGN ACQUISITIONS: EXPLAINING AND
EVALUATING THE INVESTMENT DECISIONS
OF MULTINATIONAL ENTERPRISES**

by

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ABSTRACT

This study investigates the causes and consequences of acquisitions—primarily foreign acquisitions undertaken by UK publicly listed firms. Firm- and country-specific factors are found to influence the propensity to acquire and the location of the acquired subsidiary. Indicators of a firm's organisational experience, such as firm size, profitability, and its investment history, increase the probability that an acquisition (relative to no acquisition) is undertaken. Larger and more profitable firms are also more inclined to invest abroad (rather than at home), as are firms engaged in R&D activities. In choosing among foreign locations, an increase in country-specific uncertainty (proxied by exchange rate and stock market volatility) deters a firm from investing in that location. Likewise, at the firm level, uncertainty is found to discourage a firm from acquiring (relative to not acquiring), and to deter an acquirer from undertaking a foreign (relative to a domestic) acquisition.

Based on changes in industry-adjusted profit levels, acquiring firms in general perform poorly after making large foreign acquisitions. However, examining profit variability reveals interestingly that firms more likely to experience a decline in profit levels are also more likely to enjoy a reduction in profit variability, and vice versa, which suggests that a risk-return tradeoff could be a consideration when acquisitions are undertaken.

When acquisition performance is evaluated on the basis of a firm's share price response to its acquisition announcement, the event study shows no evidence of negative performance. Resolving this discrepancy between the two performance measures leads us to examine the reliability of the stock market as an indicator of acquisition outcomes. On the one hand the immediate stock market reaction has some ability to predict a firm's post-acquisition performance, while on the other post-acquisition stock returns are shown to be not completely consistent with market efficiency.

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1. INTRODUCTION

1.1 The Choice of Acquisition – how can it be explained?

The extant literature provides a lengthy list of motivations for the occurrence of mergers and acquisitions, which includes: realising scale economies, increasing market power, lowering the cost of capital, saving on corporate taxes, fulfilling empire-building objectives of managers, disposing of free cash flow, exploiting undervalued assets, and replacing inefficient management. If we include cross-border acquisitions, this list becomes even more extensive. Input costs can be lowered through backward integration with suppliers of raw materials. In particular, this reduces the uncertainty of certain input (such as natural resource) costs, which could be brought about by foreign governments imposing price and quantity controls, or by exchange rate fluctuations. The latter circumstance creates an incentive for backward integration where capital market instruments are unable to provide a complete hedge against such risks. Firms can further reduce production costs by allocating operations that are relatively intensive in a particular input to regions which have lower prices for that specific input. A foreign acquisition is also a means of achieving geographical diversification which, to the extent that the economies of countries are not perfectly correlated, enables the acquiring firm to reduce its exposure to country-specific risks. Multinational enterprises have often been found to possess proprietary assets, such as well-known brandnames, technological know-how or marketing expertise. This has given rise to the internalisation theory (Hymer, 1960; Caves, 1971; Dunning, 1973; Buckley and Casson, 1976; Rugman, 1981; Caves, 1996), which argues that these assets are responsible for the firm's international presence.

Since these explanations are all theoretically plausible, we first want to establish, for a given sample of acquisitions, which of these theories finds empirical support. For the theories that yield testable propositions about the characteristics of the acquiring firm (the bidder) or the acquired firm (the target), the motives involved may be deduced from information about bidder or target attributes. For example, where a firm's R&D intensity can be used as a proxy for knowledge-based proprietary assets, a finding that firms with higher R&D intensities are more likely to acquire abroad would lend support to the internalisation theory. In the spirit of previous studies (e.g. Mueller, 1980; Ravenscraft and Scherer, 1987), this investigation,

which brings together domestic and foreign acquisitions, explores the acquisition motives of a sample of UK companies by examining whether target or bidder characteristics are related to the firm's propensity to undertake a particular type of acquisition.

One distinguishing feature of this study is the analysis of acquisition behaviour within the context of other acquisition options that are available to a potential acquirer. A decision model is thus developed to provide a framework for studying the firm's response to various acquisition choice sets. While previous studies have generally focused on specific types of acquisitions in isolation from other forms, a potential acquirer is likely to have a number of acquisition options available to it concurrently. Consider a UK firm that is observed to undertake an acquisition in France. The reasons that prompted the firm to acquire in France could differ depending on whether its alternative option had been an acquisition in Germany, or an acquisition within the UK. Hence, merely observing an acquisition in France would not have revealed the different motivations that could have been present under these circumstances. Therefore, in order to examine how the availability of other options influences the firm's eventual decision, a framework that takes into account these alternative acquisition choices is required.

1.2 The Acquiring Firm – has it made the right choice?

An acquiring firm is often deemed to have made a good acquisition if the latter enhances the value of the firm. When subsequent performance measures demonstrate that firm value has not increased (or perhaps even decreased), can we conclude that the acquiring firm made the wrong choice? Given that a large corporation usually has more than one group of stakeholders, the definition of a wrong choice would also depend on whose perspective we are referring to. Moreover, the wrong choice could mean that the target selection process was inappropriate, or that the intent of the acquisition was wrong to begin with.

Undertaking an acquisition involves considerable uncertainty, so that calculations performed ex ante cannot be depended upon to yield accurate predictions about ex post outcomes. Because of the wide dispersion of possible outcomes, an acquirer may have computed an expected profit from a transaction but nonetheless has to recognise that the probability of a loss occurring can in fact be fairly substantial. Hence, the realised outcome of an acquisition could differ greatly from the goal for which an acquisition was undertaken. Not surprisingly, examples abound of acquisitions that have performed badly, particularly in cross-border transactions (such as the failed investments of Japanese consumer electronics companies in the US entertainment sector). The study investigates whether bidder and target

characteristics can explain why some companies benefit from acquisitions while others have been less successful. Understanding the potential ramifications of acquiring a subsidiary is a step towards helping potential acquirers improve their target selection procedures for future investments.

When evaluating the performance of an acquisition, we have also to consider the possibility that non-profit maximising motives could be responsible for the acquisition. The empire-building and free cash flow hypotheses cited above are among the class of managerial theories put forward to explain the occurrence of acquisitions that deviate from profit maximising objectives. In large corporations a principal-agent problem could arise where the incentives of managers are not aligned with shareholder interests. Moreover, the dispersed ownership structure in many of these corporations could also make the costs of monitoring managerial performance prohibitively high to individual shareholders. In such situations, managers are effectively given the latitude to pursue their personal preferences at the expense of shareholder interests.

Having invested a substantial amount of their human capital with the firm, managers would take steps to ensure the long-term survival of the firm so as to safeguard their own careers. While ensuring the survival of the firm per se is not incongruent with shareholder interests, problems arise when managers become overly risk averse and become more concerned with reducing risk than improving returns. For example, a foreign acquisition could be a means to diversify risks in the form of exposure to country-specific shocks. However, with the integration of global capital markets, the prospects of diversification that such a firm offers would be of little value to shareholders who can achieve the required level of risk diversification by investing in the stock markets of other countries.

In cases where acquisitions are undertaken for risk diversification (as opposed to profit maximising) motives, the desired outcome would be a reduction in risk rather than an increase in firm value. Hence, from the perspective of the firm's managers, an acquisition that achieves risk reduction would have been considered the "right" choice, even though the shareholders might have preferred an acquisition which could increase firm value. This example illustrates that in some instances acquisitions that have performed badly (i.e. where profit levels have fallen) could have been designed with alternative motives in mind.

Therefore, an evaluation of acquisition performance would have to take into account motives other than profit maximisation. Apart from measuring the impact of the acquisition on the acquiring firm's level of performance, this study also examines other moments of the outcome distribution as a means of assessing the impact on risk. The performance appraisal is

carried out in two ways—through measures of profitability derived from accounting data; and through the returns to shareholders, using the event study methodology. Studies of the performance of domestic mergers and acquisitions based on accounting and stock market performance variables have often yielded conflicting results. Using both sets of measures to evaluate the performance of foreign acquisitions will not only provide a more complete picture of the possible outcomes, but will also reveal whether the conflicts arising from the domestic sample carry over to the cross-border cases.

1.3 The Stock Market – is it a good indicator of acquisition performance?

In an event study, we rely on the stock market's reaction to a news event as a means of assessing the impact of that event. In other words, our assessment of the event is accurate only to the extent that the stock market's expectation reflects changes in firm value brought about by the acquisition (as opposed to being driven by fads or bubbles). While the event study methodology yields fairly unambiguous and robust results in most applications (including this one), there remain concerns about the reliability of these results. If the stock market responds positively to an acquisition announcement, can we be sure that it is not due to acquisitions being fashionable at the time, and that the acquisition is indeed beneficial to the firm?

Before we can conclude that event study results provide a good indication of acquisition performance, the stock market's reaction to the event would have to satisfy two criteria. First, it would have to reflect (or at least be correlated with) the actual post-acquisition outcome, i.e. for a given sample of acquisitions we should be able to predict, based on stock returns earned during the event period, how an acquiring firm is likely to perform relative to another. This can be verified against an alternative measure of performance, such as post-acquisition changes in profitability. Second, the notion of efficiency should be given due consideration, especially in a discussion of stock market performance—an efficient stock market would utilise all publicly available information (i.e. semi-strong form of efficiency) present at the announcement of the acquisition. This gives rise to the corollary that we should not be able to use such information to predict the future path of stock prices. While the issue of stock market efficiency has been extensively researched on many fronts (such as earnings and dividend announcements, size and seasonal anomalies, and initial and repurchase stock offers), evaluating efficiency on the basis of the stock market's reaction to news of acquisitions offers a fresh perspective to the ongoing debate. Specifically, we investigate whether publicly available information that predicts

relatively good post-acquisition profitability can be used to achieve abnormal stock market returns from a trading rule.

Thus, in the analysis that follows the stock market is tested on both of these counts. Regardless of the results obtained, we should bear in mind the caveat that the performance yardstick used in these tests is a measure of profit changes, which itself is beset by certain limitations (discussed in Chapter 3), and is by no means a perfect measure. While it would be good if both measures were found to deliver the same verdict on acquisitions, we should not immediately conclude that the stock market was deficient if it fell short of these criteria—it could also mean that the profit measure was in error.

1.4 Structure of the Thesis

The headings to the previous sections represent the underlying questions that motivate the principal themes addressed in this study. These themes are developed in the four main empirical chapters of the thesis. Following this chapter, the remainder of the study is organised as follows.

Chapter 2, a product of the ideas that were introduced in Section 1.1, studies the factors that determine a firm's choice of acquisition. The firm's decision is examined within the context of various choice sets, which involve combinations of the following: (1) whether or not to undertake an acquisition, (2) whether to undertake a foreign or a domestic acquisition, and (3) where, among various foreign locations, to acquire. The determinants of acquisition choice are drawn from various theories in the mergers and acquisitions literature, as well as the real options model, which provides an alternative approach to explaining firm acquisition behaviour.

In Chapter 3, the impact of a foreign acquisition on the acquiring firm is evaluated by measuring changes in profitability that occur after an acquisition has been undertaken. Apart from changes in profit levels, the variability of these changes is also used as an additional performance criterion. In order to identify potential differences between transitional and permanent effects brought about by the acquisition, profit changes are measured over two post-acquisition time periods: a shorter-term window from years 1 to 3 (year 0 being the year of the acquisition), and a longer-term window from years 4 to 6. Profitability changes are also related to a set of characteristics specific to the acquisition and the acquiring firm.

Likewise, Chapter 4 conducts an evaluation of acquisition performance, albeit with a different performance measure. Examined in an event study setting, the stock market's reaction to acquisition announcements offers an alternative means of assessing the

performance of foreign acquisitions. The abnormal returns earned by the acquiring firm are calculated for various event windows (up to 21 trading days) centred on the announcement day, the period during which expectations about the acquisition's performance are most likely to be captured in the firm's share price.

Chapter 5 evaluates the stock market's reaction to the foreign acquisition announcement, which in turn has implications for market efficiency. As described in Section 1.3, the stock market is evaluated on the basis of the findings from Chapters 3 and 4. Moreover, this also provides the opportunity for comparing the results generated by the two measures of acquisition performance.

Chapter 6 concludes the study with a summary of the findings and their implications.

2 EXPLAINING THE FIRM'S CHOICE OF ACQUISITION

2.1 Introduction

This chapter sets out to study the factors that determine whether or not a firm chooses to undertake an acquisition, as well as the location of the firm being acquired. We relate the factors to various theories explaining the motivations for acquisitions that have been put forward in the mergers and acquisitions literature (and where relevant the multinational enterprise literature). For example, managerial theories claim that acquisitions provide a means for managers to fulfil their personal ambitions in cases where they have an opportunity to escape the scrutiny of shareholders (Donaldson, 1984; Roll, 1986; Jensen, 1988). The proprietary assets (or internalisation) theory¹ has also been frequently invoked to explain the occurrence of acquisitions, especially in the multinational arena (Hymer, 1960; Caves, 1971; Dunning, 1973; Buckley and Casson, 1976; Rugman, 1981; Caves, 1996). These and other theories, which yield testable propositions on the characteristics of firms undertaking acquisitions, are explored in the relevant sections that follow. In so doing we hope to shed light on the reasons for a firm's choice of acquisition, as well as to assess the relative importance of these theories with regard to the group of firms in our sample.

In addition to exploring a firm's acquisition motives, we are also interested in the effect of uncertainty on the investment decision—a relationship that has been debated extensively in the investment literature. Some theoretical models suggest that uncertainty has a negative effect on investment (Bermanke, 1983; McDonald and Siegel, 1986; Bertola, 1988; Pindyck, 1988; Dixit, 1989), while others argue that investment increases with uncertainty (Hartman, 1972; Abel, 1983). From a theoretical perspective, the sign of the effect of uncertainty on investment remains ambiguous. This has prompted attempts to resolve the issue on empirical grounds. There have, however, been relatively few empirical studies, and the extant evidence is far from conclusive (Leahy and Whited, 1996; Guiso and Parigi, 1999).

An acquisition can be regarded as a form of firm investment. While the physical assets of an acquired firm can be resold at a later date, the intangible assets (such as

¹ This theory explains acquisitions in the light of firms choosing to internalise activities or transactions that would otherwise have been carried out in the market. Under some conditions (e.g. if the firm owns proprietary assets), conducting certain activities within the firm's internal systems may achieve a more efficient outcome relative to the arms-length market. We explore the impact of such conditions on acquisition behaviour.

marketing campaigns or human capital invested in establishing the new subsidiary) cannot be recovered. Since an acquisition bears the characteristics of a lumpy and partially irreversible investment, models pertaining to irreversible investment can be used to analyse the firm's choice of acquisition. Specifically, we apply the real options model (re: Section 2.2) to acquisitions and from this alternative angle provide further empirical evidence on the investment-uncertainty relationship.

2.2 The Theory of Real Options²

In analysing the firm's decision to invest, the orthodox approach focuses on calculating the present value of the expected stream of profits from the investment. When this value exceeds the investment outlay, i.e. the net inflow of funds is positive, the firm is deemed to have found a profitable investment and should therefore proceed with it. This decision-making procedure is encapsulated by the net present value (NPV) rule, which simply states that firms should undertake investments that have positive NPVs. Not only has the NPV rule found centre stage in the field of corporate finance, but it is also a feature of the neoclassical theories of investment, where the NPV rule is manifested through the principle that a firm should invest until the value of an incremental unit of capital is just equal to its cost. This basic formulation has given rise to various investment models (e.g. Jorgenson, 1963; Tobin, 1969), each of which adopts a different approach to determining the value of the incremental unit of capital, and its attendant cost.

However, the NPV rule is founded on a number of essential basic assumptions that may often be invalid. In particular, it assumes that either the investment is costlessly reversible (i.e. the firm can undo the investment and recover its expenditure) or, if the investment is irreversible, it is a "now or never" proposition (i.e. if the firm does not invest now, it will never be able to undertake the same investment in the future). Not surprisingly, the failure of these conditions to hold can significantly alter the predictions of the standard neoclassical investment models.

Practically all investments involve some degree of sunk cost. For example, most investments in marketing and advertising are firm specific, and hence are irreversible. Even investments that are not firm specific can often be considered partially sunk because of the "lemons" problem. For example, vehicles, computers and other office equipment have resale values well below their purchase costs, even if nearly new. Furthermore, government regulations or institutional arrangements can also lead to sunk costs. Capital controls may

² The exposition of the real options idea is adapted from Dixit and Pindyck (1994).

prevent investors from selling or reallocating their assets across national boundaries. Investments in new workers (or human capital) can also be irreversible as a result of high costs of hiring, training, and firing.

The firm with an opportunity to invest can thus be represented more accurately as the holder of a call option, since it has the right but not the obligation to buy the asset. Undertaking the investment is equivalent to exercising the call option at a certain strike price (which is the sunk cost of the investment), while the returns from the investment represent the option's payoffs. The asset can be sold to another investor, but the money that was paid to exercise the option cannot be recovered. Exercising the option is thus irreversible. When a firm undertakes the investment, it exercises, or "kills", its option to invest. This lost option value is an opportunity cost that must be included as part of the cost of the investment. The earlier method for calculating the NPV of an investment could mislead the firm into believing that it should invest when in fact it was better off waiting for more information to be revealed in future periods. Apart from computing the expected profits and expenditures of the investment, the firm should also take into consideration the opportunity cost of the lost option value when the investment is undertaken. It may not be optimal to exercise the option at the instant its intrinsic value becomes positive because the option also has a value of waiting, called the "holding premium" or "time value."

Since the value of an investment opportunity is akin to that of a call option, the theory of option pricing has been used to evaluate how much the investment option is worth to the firm (Dixit and Pindyck, 1994). By weighing this value against the returns from the investment, the investment decisions of firms can be analysed in a variety of situations, such as new entry, completion of successive stages of a complex multistage project, temporary shutdown and restart, and permanent exit (e.g. Pindyck, 1988; Dixit, 1989). In each of these cases, the investment problem is similar to the trade-off faced by holders of financial call options, who have to decide whether or not to exercise their option. In contrast to financial call options which are essentially derivative securities, the option to invest has been termed a "real option" because it conveys to the holder of the option an opportunity to invest in real assets.

The role of uncertainty in the investment decision is also elucidated by these models. In an uncertain economic environment, information about a particular investment project does not become available all at once. At each moment in time, the firm faces a dynamic problem in which it has to decide whether it should invest in this period or defer its investment decision to the next period. When the firm decides to invest (and to the extent that

the investment is irreversible), the firm has effectively given up the possibility of waiting for new information to arrive. With more information, the firm can make a better assessment of the prospects of the investment. Since a later decision can turn out to be a better one, waiting has positive value. However, it is highly unlikely that the firm will ever amass all the information it needs with regard to a particular investment. The firm can only hope that with time, more information is revealed. Delaying the investment also means forfeiting the stream of profits that the firm would otherwise have started accruing from the current period.

The problem becomes a dynamic trade-off in which the firm will invest provided the opportunity cost of investing (which arises from “killing” the option) is less than the payoff derived from the investment. This opportunity cost increases with uncertainty, which increases the potential for gain on the upside. The downside loss is, however, limited (as in the case of a call option) because the investor can choose not to exercise the option. Hence, uncertainty increases the value of the firm’s investment option, so that the firm is more likely to prefer keeping the option alive rather than exercising it for a given value of the investment. The relationship between uncertainty and investment as predicted by the real options framework is therefore a negative one.

We present one means of testing the validity of this proposition by observing the acquisition behaviour of the firms in our sample. The firm’s opportunity to acquire a subsidiary, whether domestic or foreign, can similarly be regarded as a call option on a real asset—in this case another firm located in a domestic or foreign market. Given that such an investment also entails an irreversible component, the acquisition is thus comparable to the type of investment analysed by the real options model.

2.3 A Model for the Investment Decision

When making an investment decision, firms are often presented with an array of investment opportunities. We focus on a firm that is considering an investment in the form of an acquisition.³ The firm faces a diverse menu of choices which range from domestic targets to foreign targets located in various countries. In deciding among these options, a profit-maximising firm evaluates the payoffs from each investment and selects the option that yields the highest returns to the firm. Alternatively, if all the investments generate lower returns for the firm than if it had not made any acquisition, the firm could also choose the latter option.

³ Investment is defined as acquisitions of existing businesses since these are readily observable and constitute a substantial proportion of firm investment, especially in the context of international ventures. Section 3.2 provides figures on the increasing importance of acquisition relative to greenfield investment as the vehicle for foreign direct investment.

In order to study the factors that influence a firm's acquisition decision, we need to observe which option the firm chooses and the conditions under which the decision is made.

From an econometric perspective, we consider a model with an outcome variable that represents the available choices. This places us in the realm of qualitative response models, specifically one that can accommodate multinomial choice. A widely used model in this category is the multinomial logit (MNL), which permits easy computation but has a restrictive pattern of inter-alternative substitutions, imposing the Independence from Irrelevant Alternatives (IIA) condition.⁴ The accuracy of the MNL thus hinges on the assumption that the odds of choice i being selected over choice j is independent of the availability or attributes of alternatives other than i and j . In the context of the acquisition decision, the probability that the firm chooses not to acquire over a domestic acquisition has to be independent of the availability of the foreign acquisition option. Not surprisingly, the IIA property is theoretically implausible in many applications, including this one (evidence of which is given in Section 2.7). In contrast, the nested multinomial logit (NMNL) model relaxes the IIA assumption by assuming instead that choices within each stage are similar in unobserved factors, so that IIA holds for any pair (or group) of alternatives within each stage, but not the entire choice set. A further motivation for adopting the NMNL model is its flexibility in accommodating a different set of explanatory variables at each stage. This is useful, since the factors that determine which foreign location the firm chooses are likely to be quite different from those that determine whether the firm acquires or not.

Given the diversity of choices available to the firm, we group together and compare closely related options using factors that can potentially affect the desirability of one option relative to another. First, we focus on whether or not the firm decides to undertake an acquisition. For the firms that are investing in the current period, we then look at whether they are acquiring subsidiaries at home or abroad. Among the firms that make foreign acquisitions, the next decision category involves the location of their new subsidiary. Under this category, we consider the 6 countries with the highest number of acquisitions made by UK firms over the sample period, namely Australia, France, Germany, the Netherlands, Spain and the US.

The choices that are available to the firm can be represented as a nested set of options illustrated in Figure 2.1. The firm's decision is captured by the variable y_{afc} , where each subscript is used to distinguish between alternative choices within the same level of the

⁴ While the multinomial probit (MNP) model is not restricted by the IIA requirement, it is rarely used because of computational complexities that render models with more than three alternatives difficult to evaluate and interpret.

decision tree. Thus, a takes on a value of 1 when the firm undertakes an acquisition, and 0 when no acquisition is made. For values of $a = 1$, let $f = 1$ for acquisitions in foreign countries, and let $f = 0$ for acquisitions in the home market. Firms that have undertaken foreign acquisitions (i.e. $a = f = 1$) are further characterised by the location of their new subsidiaries, where $c = 1, 2, 3, 4, 5, \text{ or } 6$, represents each of the 6 foreign countries.

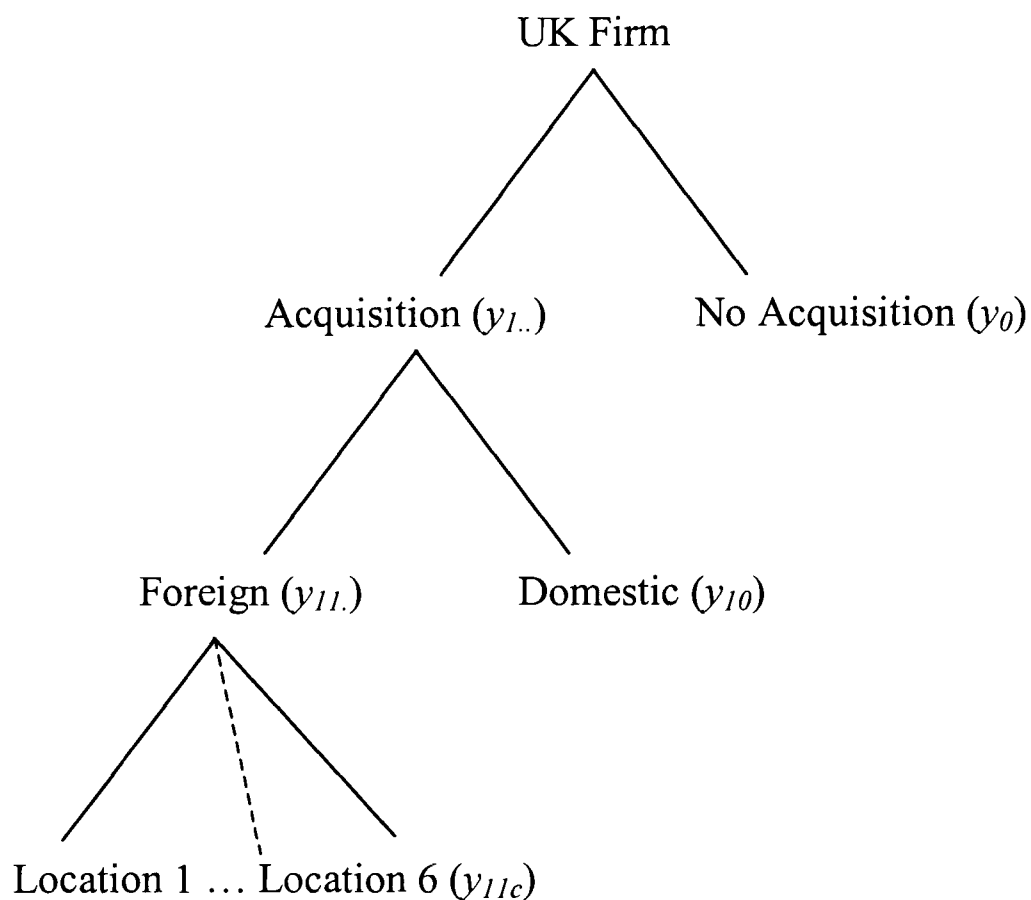


Figure 2.1: Firm's set of choices

We assemble three groups of explanatory variables, one for each level of the decision tree, based on the relevant theoretical models. Each analysis primarily features two classes of explanatory variables. The first set of explanatory variables is drawn from the mergers and acquisitions literature, and hence encompasses factors that account for a firm's motivation to conduct an acquisition. The second set of variables, which essentially represent different facets of uncertainty, enable us to examine the uncertainty-investment relationship. We combine both sets of variables in the analyses so as to control for the first set of factors while studying the effect of uncertainty on acquisition choice. For example, consider a model with two explanatory variables—one representing R&D and the other uncertainty. Should both explanatory variables be correlated and should R&D have a significant effect on acquisition choice (the dependent variable), omitting the R&D variable would result in the effect showing up on the uncertainty variable instead. While it is not possible to identify all the

potential variables that could have an influence on acquisition choice, we have included the principal factors that have been cited in the mergers and acquisitions literature.

Various methods of estimating the decision tree are explored in subsequent sections (2.4-2.8). Given the structure of the decision tree, our final objective is to investigate these choices using a nested logit model. We work towards that in gradual steps (i.e. by estimating stages of the decision tree separately) in order to establish the relevance of the explanatory variables that have been selected, as well as present an interesting comparison of the relevant merits of various econometric models. First we investigate the acquisition decision at each choice node. Each pair (or group) of alternatives within the same level is estimated as a distinct model using a simple logit or conditional logit,⁵ depending on the number of alternatives at that level (details of which are given in Sections 2.4-2.6). Having investigated the firm's choice of acquisition at each node, we proceed by bringing together the choices from different nodes. For example, we first look at acquiring vs. not acquiring as a binary choice. In the next procedure, the acquiring choice is further subdivided into foreign and domestic acquisitions, so that the firm has three choices instead of two. While a simple logit model would suffice for the first analysis, we need more complex econometric models to analyse the expanded choice sets. In Section 2.7, we explore alternative specifications (including the multinomial and conditional logit models) for analysing these expanded choice sets before embarking on the nested logit model in Section 2.8.

2.4 Acquisition vs. No Acquisition

At the highest level of the decision tree, we compare firms that have chosen to undertake acquisitions with those that have not. In constructing the dependent variable, companies that performed acquisitions in a particular year are assigned a value of 1, while those that reported no acquisitions are given a value of 0. In the following section, we introduce determinants that can potentially affect the firm's decision of whether or not to undertake an acquisition. Each of the characteristics mentioned below are lagged one period, i.e. for an acquisition that occurs in year t , the relevant variable is taken from year $t-1$.⁶ Although for the same firm most figures vary only slightly from year to year, the year just

⁵ The term "conditional logit" is used when the explanatory variables in the model being estimated are choice specific (e.g. the country-specific variables in the bottom layer of the decision tree). This is distinct from the multinomial logit (re: Sections 2.6 and 2.7), which refers specifically to situations where the explanatory variables represent characteristics of the individual (i.e. firm-specific variables).

⁶ Stock variables (e.g. assets and debt) are measured at the end of the year $t-1$.

preceding the acquisition was selected because the characteristics of the firm at this point in time would most likely influence its acquisition decision.⁷

2.4.1 Explanatory Variables

While having a large size per se is not necessarily advantageous to a firm, the size of the firm conveys some information about the firm's propensity to acquire new subsidiaries. Larger firms, which generally have to deal with more dispersed bundles of assets, may be better equipped to handle the inclusion of new subsidiaries to their networks. Their accessibility to sources of capital also gives them an edge over their smaller rivals in a field that involves substantial capital outlays (Morck and Yeung, 1992). Furthermore, since larger firms usually span diverse regions in terms of geographical and product space, they are likely to be better informed about investment opportunities in various markets. Instead of procuring information from external sources, their existing subsidiaries can provide feedback on business conditions in their respective markets. Being large may also indicate that managers have a taste for expansion. These factors contribute to the expectation that large firms are better poised to undertake acquisitions. We investigate whether this is true for the firms in our sample using the variable *FirmSize*, which measures the size of the firm by the quantity of assets⁸ it owns.

R&D activities often generate knowledge-based proprietary assets for the firm. Although valuable to the firm, these assets cannot easily be traded in arms-length transactions. Such intangible assets suffer from asymmetric information problems which render the drawing up of contracts especially difficult in principal-agent settings. For example, should a firm with a new production technology wish to increase output of that product or enter a new market, it is often better off establishing the new plant on its own than licensing an agent to use its technology. The ownership of such proprietary assets could thus provide one impetus for firms to undertake acquisitions, as a means of propagating these assets. Moreover, a fixed cost is usually required to establish an R&D outfit—even as the firm becomes larger, it can still be served by its existing R&D facilities. In order to achieve economies of scale, firms that have established R&D capabilities would thus be motivated to expand.

⁷ As a robustness check we substitute the year $t-1$ variables with variables from years $t-2$ and $t-3$, and the principal findings of the study remain unchanged. In a separate regression that includes year $t-1$ and year $t-2$ jointly as explanatory variables, the effects of the year $t-1$ variables are unaffected while those of the year $t-2$ variables are insignificant, indicating that no further explanatory information is conveyed by year-to-year changes in these variables.

⁸ Sales revenue is used as an alternative measure of firm size in Section 2.4.4.

As a means of accounting for firms that conduct R&D, we construct the term *R&D*, a dummy variable set equal to 1 for firms that report expenditures on R&D, and 0 otherwise. Furthermore, a second R&D variable, *R&Dintensity*, measures the proportion of the firm's sales revenue that goes toward R&D expenses (i.e. R&D expenditure/sales). Two separate R&D variables are used to distinguish (i) firms that conduct R&D from those that do not, and (ii) firms that have different R&D intensities. We expect firms engaging in R&D to be more likely to acquire than firms without R&D. The second R&D variable, *R&Dintensity*, is created to capture the possible divergence in outcomes caused by varying levels of R&D within the group of R&D-active firms.

Numerous explanations for the occurrence of mergers and acquisitions centre on the firm's pre-merger performance. We first examine pre-merger profitability. Profitable firms have an advantage when it comes to making acquisitions. Firstly, they have better access to sources of funding for the investment, including internally generated funds. If using internal funds is cheaper than using external funds, profit-maximising firms will be less likely to make acquisitions when they have to rely on external funds (i.e. due to financing constraints). Moreover, internal funds are often weakly monitored by external investors (Shleifer and Vishny, 1988). Managers thus have more liberty to incur heavy expenditures, such as in financing acquisitions. For managers of firms that are highly profitable and thus have more free cash flow (Jensen, 1988), acquisitions can provide an attractive means to dispose of the cash. Hay and Liu (1998) confirm, in studying the determinants of acquisition behaviour, that free cash flow was an important variable in explaining growth by acquisitions.

Firms usually have to spend on acquiring information about investment opportunities. Since profitable firms can better afford the search costs, there is a higher probability that these firms have first pickings of good targets for acquisition.

Alternatively, profitability of current operations could serve as a signal that the firm has good investment opportunities. One factor that allows firms to achieve high levels of profitability is good management. With a good management team, the firm is also in a better position to coordinate a network of diverse asset bundles, a skill that will come in useful when acquiring a new subsidiary. Other attributes that enable the firm to become profitable include a well-regarded brand name, superior technology, or effective marketing strategies—generally known as proprietary assets. We test these hypotheses by introducing the variable *Profitability*, which is here calculated as the firm's net income divided by its total assets.⁹

⁹ Robustness of the findings to using net income divided by sales as an alternative measure of profitability is considered in Section 2.4.4.

Another variable that provides some insight to the firm's pre-merger status is the term *Leverage*, given by the ratio of debt over assets held by the firm. *Leverage* serves as an indicator of the firm's accessibility to sources of funding. To the extent that a high leverage ratio reflects a shortage of cheaper alternatives in a pecking-order framework, companies that rely heavily on debt finance face a higher cost of capital since the cost of external funds is higher than that of internally generated cash. As a result, such firms may find it more expensive or have greater difficulty in obtaining funds to finance acquisitions than firms that have access to less costly forms of capital. In this case, higher values of *Leverage* would tend to lower the probability of an acquisition being observed.

Furthermore, the leverage ratio serves as another signal (in addition to profitability) for the amount of free cash flow available to the firm. The presence of free cash flow gives the firm's managers more latitude to spend on projects without being monitored by external investors. Presumably firms with large amounts of debt have less free cash flow as their funds are committed to paying interest on their debt, often regarded as an effective method of imposing discipline on managers. Thus, managers of firms that have incurred high levels of debt are less able to pursue non-value-maximising acquisitions. On the other hand, for the errant manager of a firm that is unencumbered by debt, acquisitions could not only help to fulfil his empire-building objectives but also provide an expedient way of disposing of the funds (instead of paying out higher dividends to shareholders).

In order to obtain an indicator of how active an investor the firm has been, we generate the variable *Investment*, the growth in the firm's capital stock, given by the expenditure on tangible assets as a fraction of the firm's existing stock of tangible fixed assets. Firms can invest either by building upon existing capacity or by acquiring from other companies, both of which are captured by the *Investment* variable. A high value of *Investment* suggests that the firm has acquired substantial investment experience, which enhances the firm's ability to manage new subsidiaries. Rapid building of capacity by a firm could also be an indication that it has good investment prospects. It is thus likely that active investors would have a higher probability of undertaking an acquisition relative to less active investors.

The effect of uncertainty on the acquisition outcome is examined through the variable *Uncertainty*. A firm may not know for certain future prices, future demand for its product, or even its own future productivity (should technology change). Because the uncertainty that a firm faces can stem from a wide diversity of sources, many of which (such as technology shocks) are unobservable, it is difficult to identify and measure specific sources of uncertainty. Instead, we construct a general measure of the uncertainty facing a firm from the

variance of the firm's daily stock return for each year in the sample, since this captures the type of uncertainty deemed to be important by the firm's investors. The variable *Uncertainty* is obtained by scaling this variance by the firm's debt/equity ratio so as to adjust for the larger variance experienced by firms that are more highly leveraged. This measure is also used by Leahy and Whited (1996), who nevertheless recognise that such a measure could potentially be affected by bubbles, noise traders and other extraneous elements that need not necessarily reflect changes in the fundamentals of the firm.

2.4.2 Data

The data consists of a sample of UK publicly listed companies derived from the Financial Times' *Extel (Company Analysis)* database, which comprises accounting data from each company's annual report to shareholders. The sample includes all companies¹⁰ with reported accounting data over the period 1986-1997. In addition to the standard accounting data, there are two variables of interest that we extract from *Extel*, namely the items labelled "Businesses acquired" and "Subsidiaries acquired" that reside in the company's cash flow statement. These items indicate whether the company has undertaken acquisitions in a particular year. For a company that reports a non-zero entry under either of these headings, the company is designated as an acquirer. In this way, we obtain a sample comprising 16156 observations,¹¹ of which 6677 are acquisitions (both domestic and foreign). Based on this information, we construct a dependent variable which takes on a value of 1 for firms that report acquisition activity in a particular year, and 0 for firms that did not (i.e. those with an entry of zero under the items "Businesses acquired" and "Subsidiaries acquired"). Of the 6677 observations, 1088 (or approximately 16.3 percent) are accounted for by firms that performed acquisitions in every year throughout the observation period. In order to ensure that the results are not driven by this relatively significant group of firms, which we term "serial acquirers", the model is first estimated using the entire sample, and subsequently re-estimated (in Section 2.4.4) without the serial acquirers.

The variables relating to R&D bear special mention because of a change in the reporting requirements of company accounts in the course of the period being studied. Following legislation in 1989 firms that met certain criteria were required to report

¹⁰ Companies that operate solely in the financial sector are excluded as they are generally concerned with the value of financial, rather than real, assets. Hence, their investment decisions are often driven by factors that are different from those considered in this analysis.

¹¹ These refer to firm-year observations. On the basis of individual firms, the sample contains 2316 firms, of which 808 remain throughout the sample period (i.e. 1986-1997), 1302 enter after 1986, and 2002 exit before 1997.

expenditures on R&D (though in anticipation of this most companies started disclosing in the years preceding 1989). These criteria were: that the firm had more than 2,500 employees, a turnover of at least £80 million and a balance sheet total exceeding £39 million. Firms that met two out of the three conditions (most of the companies in the sample) would have to report their R&D expenditures. Based on this information, we designate firms with missing R&D data to be non-R&D firms. This is done for accounting periods after 1989. For firms with missing data before 1989 but with high R&D expenditures (more than £100,000) after 1989, this indicates that they had already been involved in R&D prior to 1989. Hence, these firms are assigned a value of 1 for the R&D dummy variable.¹² The actual R&D expenditure is, however, unknown and hence the associated variable for R&D intensity is left as a missing observation. As a result, there is substantially less data for the *R&Dintensity* variable than for the *R&D* (dummy) variable. In order to make use of the information from the additional observations available in the *R&D* variable, we first estimate the model in Section 2.4.3 with the R&D variable only, then re-estimate the model with the *R&Dintensity* variable.

The problem of missing data also occurs with the *Uncertainty* variable. As we see later in Table 2.4, including *Uncertainty* further reduces the number of observations in the logit model, from 13574 to 10246. This is because the other explanatory variables are derived solely from *Extel*, while the *Uncertainty* variable requires an additional source of data, *FT Prices*, which has less complete coverage of past records belonging to companies that have since ceased to be listed on the stock exchange.¹³ The latter source provides daily stock returns of firms (from which the variance is calculated) while the former provides the debt and equity figures (required to compute the debt/equity ratio).

The distribution of acquisitions over the period and summary statistics of the explanatory variables are given in Tables 2.1 and 2.2 respectively. All summary statistics are calculated based on the entire sample, except for *R&Dintensity*, which is calculated only for the 3331 observations that are denoted R&D-active (i.e. where *R&Dintensity* is strictly greater than zero) and have R&D expenditure data available. The distribution of the variable *R&Dintensity* is found to be skewed to the right because of some firms that have very little sales revenue.¹⁴ For example, the maximum *R&Dintensity* value is 8.4, i.e. R&D expenditures are 8 times higher than the firm's revenue from sales. If we define outliers to be

¹² We test the validity of this inference by re-estimating the model without using the pre-1989 observations, and find the main results to be unchanged.

¹³ The Data Appendix at the end of this chapter describes the construction of the variables used in this analysis.

¹⁴ These are primarily firms in the biotech sector—it is likely that many of them are still at a “research phase”, where R&D has yet to generate the valuable proprietary assets that motivate acquisitions in the internalisation theory.

observations with *R&Dintensity* values beyond 1 (i.e. where R&D expenditures are more than sales) and remove these 40 observations from the sample, the resulting mean value drops to 0.034, or roughly half of the original amount. In Section 2.4.4, we investigate whether the effect of R&D intensity is consistent throughout this wide range of values.

TABLE 2.1
Distribution of Acquisitions by Year

Year	Acquisition?	
	<i>Yes</i>	<i>No</i>
1986	255	419
1987	356	393
1988	404	458
1989	400	508
1990	535	535
1991	524	983
1992	549	1008
1993	623	1034
1994	730	1043
1995	765	1060
1996	810	1011
1997	726	1027
Total	6677	9479

TABLE 2.2
Acquisition vs. No Acquisition: Summary Statistics

Variable	Mean	Standard deviation
FirmSize (x10 ⁹)	0.4607	2.3642
R&D	0.3116	0.4632
R&Dintensity	0.0659	0.3592
Leverage	0.3510	0.5449
Profitability	0.0228	0.2508
Investment	0.2292	0.7554
Uncertainty	0.0099	0.0512

2.4.3 Results

We first look at the differences between acquisition and non-acquisition observations on a univariate basis. Having divided the observations into these two groups, the mean of each explanatory variable for each group is calculated. For each variable, the mean value of the acquiring group is then subtracted from that of the non-acquiring group. To verify if the difference between the groups is significantly different from zero, the means are compared using a *t*-test. Table 2.3 shows the group mean differences and their associated *t*-statistics.

Relative to firms that have undertaken acquisitions, non-acquiring firms are generally smaller, more highly leveraged, less profitable, less active investors, and experience greater uncertainty, all of which are consistent with our earlier predictions. These differences, which are highly significant (at the 0.01 level), illustrate the importance of firm-specific characteristics in determining the firm's propensity to undertake an acquisition. The effect of R&D on acquisition choice is, however, mixed. While firms that conduct R&D are more likely to undertake acquisitions than those with no involvement in R&D activities, non-acquirers on average have a higher R&D intensity than acquiring firms.¹⁵ Whether this result holds for the entire range of *R&Dintensity* values is investigated in the following section.

TABLE 2.3
Acquisition vs. No Acquisition: Univariate Comparisons

Variable	Difference: Non-acquirers – Acquirers	<i>t</i> -statistic
FirmSize (x10 ⁹)	-0.4711	-12.06
R&D	-0.1726	-22.84
R&Dintensity	0.0779	6.24
Leverage	0.0634	7.02
Profitability	-0.0465	-11.21
Investment	-0.0745	-5.95
Uncertainty	0.0049	5.08

These relationships are explored further in the context of a multivariate analysis. The results of the logit estimation (obtained using the “logit” command in *Stata 6.0*) are given in Table 2.4. In column 1, the estimation is first conducted without the *R&Dintensity* and *Uncertainty* variables. As mentioned in Section 2.4.2, because of a large number of missing observations in the variable *R&Dintensity*, this variable is excluded so as to utilise all of the information embodied in the *R&D* (dummy) variable. This also provides a means of ensuring that dropping the missing observations from subsequent estimations does not systematically alter the effects of the other explanatory variables. The same argument applies to the *Uncertainty* variable which, relative to *R&Dintensity*, has even more missing observations (re: Section 2.4.2). Columns (2) and (3) contain the results of the same model re-estimated first with *R&Dintensity* included, then with *R&Dintensity* as well as *Uncertainty* included.

¹⁵ As we have done in Table 2.2, the mean values of the variable *R&D* are calculated for the entire sample, while those of the variable *R&Dintensity* only compare acquirers and non-acquirers within the group of firms that are active in R&D.

The coefficients reported in Table 2.4 are the marginal impact on the *odds ratio* of a firm acquiring relative to not acquiring. An odds ratio of 1 corresponds to the variable having no effect on the probability of acquiring. Hence, the z-statistic tests the null hypothesis that the odds ratio is not significantly different from 1. Odds ratios above 1 thus have positive z-statistics, while odds ratios below 1 have negative z-statistics. For example, from the first column of results we can infer that a firm that conducts R&D (as denoted by the variable *R&D*) is approximately two times more likely to make an acquisition. Conversely, a unit increase in the firm's leverage ratio (e.g. where the value of *Leverage* increases from 0 to 100 percent) reduces its probability of making an acquisition to roughly 0.9 times of its former value.

TABLE 2.4
Acquisition vs. No Acquisition: Logit Estimation

Explanatory variable	(1)	(2)	(3)
FirmSize (x10 ⁹)	1.149 (8.74)	1.126 (7.67)	1.096 (5.97)
R&D	2.074 (19.73)	2.247 (18.54)	2.243 (16.41)
R&Dintensity	--	0.312 (-3.92)	0.356 (-2.30)
Leverage	0.895 (-3.05)	0.905 (-2.70)	0.873 (-2.93)
Profitability	3.923 (10.38)	3.258 (8.55)	4.879 (8.99)
Investment	1.142 (5.83)	1.160 (6.04)	1.208 (5.97)
Uncertainty	--	--	0.093 (-4.42)
No. of obs.	14880	13574	10246
Log likelihood	-9706.9	-8816.3	-6726.0

Note: z-statistics appear in parentheses

The odds ratios generally agree with the predicted effects for each of the variables. Moreover, excluding the missing observations in *R&Dintensity* and *Uncertainty* does not lead to significant changes in the odds ratios of the other variables, confirming that there are no systematic differences between the (two) sub-samples of firms.

The variables *FirmSize* and *Profitability*, both indicators of a firm's ability to run its operations, increase the probability of an acquisition being undertaken.

The results also confirm that the intensity of investment activity, given by the variable *Investment*, translates to a similar propensity to make acquisitions. Firms with experience from past investment projects are likely to be in a better position to manage subsequent investments, which could take the form of an acquisition.

In addition, firms that are highly leveraged (*Leverage*) demonstrate a lower probability of making an acquisition. This could be a result of the higher costs of capital that they encounter in a pecking-order framework, so that it is either more expensive or more difficult for them to raise capital from external markets in order to fund their acquisitions. Alternatively, this result could be interpreted as a corroboration of the free cash flow hypothesis.

The negative odds ratio on *Uncertainty* is consistent with the real options model, which predicts that the value of the investment option, and hence the firm's preference for keeping the option alive, increases with uncertainty. This could also reflect managers' attitudes to risk—they might choose to pursue a less risky strategy in order to safeguard their jobs. In both cases, higher levels of uncertainty result in a lower probability of an acquisition occurring.

The only surprise comes from the variable *R&Dintensity*. Although the dummy R&D variable confirms that R&D firms as a whole are more likely to acquire than non-R&D firms, the variable *R&Dintensity* shows that within the group of firms that conduct R&D, firms with higher R&D intensity are less likely to acquire. This is subsequently found to be true only for observations with *R&Dintensity* values above 0.012, this being the median value for the subsample of firms that are active in R&D. For observations with *R&Dintensity* values below the median, the variable has no distinguishable effect on the propensity to acquire (re: Section 2.4.4 for further discussion).

2.4.4 Robustness Checks

This section documents a series of checks that are performed to ensure the robustness of the findings.

The first sensitivity analysis investigates the frequency with which acquisitions are undertaken by a single firm. Of the 6677 acquisitions in the sample, 1088 (or approximately 16.3 percent of the sample) are accounted for by firms that perform acquisitions in every year throughout the observation period. Firms that acquire on a consistent basis (which we term “serial acquirers”) could be motivated by objectives that are different from firms that conduct one-off acquisitions. In order to ensure that the results are not driven by the relatively

significant group of serial acquirers, the model is re-estimated without this group of firms. Comparing the odds ratios in column 1 of Table 2.5 with those of the original estimation (in column 3 of Table 2.4), we find that the effects of the explanatory variables generally retain their highly significant values. These results show that while serial acquirers have contributed towards these effects, they are not limited to serial acquirers, and extend to other acquirers in the sample.

The second test (in column 2) examines further the effect of R&D intensity on acquisition choice. When observations with R&D intensity values above the median value of 0.012 are dropped and the model re-estimated, *R&Dintensity* loses its effect on the dependent variable, while the remaining explanatory variables are largely unaltered. Hence, the negative result that was previously obtained appears to have arisen from the group of firms with high R&D intensities (i.e. above the median value). One motivation cited for R&D-active firms to undertake acquisitions was to achieve economies of scale. However, firms that are highly R&D-intensive are likely to have surpassed the minimum efficient scale required in setting up R&D facilities. Therefore, there is no longer a motivation for them to increase their firm size for the purpose of achieving better utilisation of their R&D capabilities.

In the original estimation, *FirmSize* was represented by total assets owned by the firm. By adopting sales revenue as an alternative measure of firm size, we check whether the effect of *FirmSize* is dependent on how the variable is measured. Likewise, we replace assets by sales in the profitability measure, so that the variable *Profitability* is now given by net income over sales instead of net income over assets. Column 3 shows that after incorporating these changes the odds ratios on both *FirmSize* and *Profitability* remain positive and significant (albeit altered in magnitude), while the remaining variables are unaffected.

Although the finding that uncertainty has a negative effect on acquisitions is consistent with the real options model, it can be argued that the negative effect works through a different mechanism. Firms that are credit constrained are less able to afford the high capital outlays required for making acquisitions. To the extent that the degree of risk to which the firm is exposed affects its access to credit, risky firms would be observed to undertake fewer acquisitions. In this scenario, the effect of uncertainty on the acquisition outcome arises from uncertainty serving as a proxy for the firm's (lack of) access to credit, not from its effect on the option value of the acquisition. As a means of addressing this concern, we re-estimate the model with an added variable—*Cashflow*, which is the firm's cash flow¹⁶ scaled by its

¹⁶ This is the item marked “*cf*” in *Extel*, and defined as the total of all cash inflows into a company during the year before allowing for foreign currency translation.

assets, since measures of cash flow have been found to reflect liquidity constraints (Bond and Meghir, 1994). If the *Uncertainty* variable had merely been substituting for the firm's liquidity constraints, including the *Cashflow* variable could be expected to weaken the odds ratio on *Uncertainty*. However, the results in column 4 demonstrate that the effect of uncertainty, as well as that of the other explanatory variables, is robust to the inclusion of the *Cashflow* variable.

TABLE 2.5
Acquisition vs. No Acquisition: Robustness Checks

Explanatory variable	(1)	(2)	(3)	(4)
FirmSize (x10 ⁹)	1.039 (3.42)	1.052 (3.60)	1.151 (7.43)	1.071 (4.60)
R&D	1.898 (12.16)	2.477 (8.58)	2.143 (15.31)	2.347 (15.56)
R&Dintensity	0.277 (-2.34)	104.2 (0.27)	0.359 (-1.97)	0.246 (-2.51)
Leverage	0.843 (-3.45)	0.848 (-3.36)	0.854 (-3.25)	0.893 (-2.32)
Profitability	3.620 (7.47)	4.045 (7.43)	1.516 (4.84)	5.650 (8.58)
Investment	1.212 (5.97)	1.217 (5.97)	1.261 (6.95)	1.209 (4.96)
Uncertainty	0.168 (-3.52)	0.124 (-3.76)	0.102 (-4.25)	0.112 (-3.71)
Cashflow	--	--	--	0.406 (-4.24)
No. of obs.	9369	8921	9843	8087
Log likelihood	-6139.0	-5871.3	-6519.0	-5294.7

Note: z-statistics appear in parentheses

For the logit estimations reported in Tables 2.6 and 2.8, dummy variables are introduced to represent the year in which the observation occurs and the industry sector to which the acquirer belongs. The Year X dummy is set equal to 1 if the observation is in year X and 0 otherwise. Similarly, the Ind X dummy is set equal to 1 if the observation is in industry X and 0 otherwise, where the industry sectors are governed by the first 2 digits of their primary SIC codes (given in *Extel*). For firms that operate in more than one primary sector, the sector in which the firm reports the highest value of sales is used. The aim of this analysis is twofold. The first coincides with the objective of this section, namely to test whether the findings are robust to changes in the specification of the model. If the effects of the explanatory variables disappear when the year or industry dummies are included, then it

could mean that the variables were merely reflecting the year- or industry-distribution of the acquisitions (provided in Tables 2.1 and 2.7 respectively), rather than explaining the probability of an acquisition within a year, or within an industry. Therefore, introducing year and industry dummies allows us to hold the year or industry constant while investigating the effects of the other explanatory variables. In addition, the odds ratios on these year and industry dummies indicate how well the existing explanatory variables fare in terms of explaining the acquisition patterns observed, by revealing the extent to which the distribution of acquisitions cannot be accounted for by the set of explanatory variables.

In view of the objectives of this exercise, the results in Table 2.6 show firstly that the original effects of the explanatory variables remain robust despite the inclusion of the year dummies. Secondly, the relatively insignificant odds ratios on most of the year dummies attests to the explanatory power of the variables in terms of explaining the distribution of acquisitions over the sample period.¹⁷ Nevertheless, as a group these year dummies still contribute to explaining the observed acquisition choices—a significant chi-squared statistic of 58.99 (with 11 degrees of freedom) is obtained in a likelihood ratio test comparing two models identically specified except for year dummies being included in one and not the other.

¹⁷ Since the dummy variable for the year 1986 is omitted (to avoid perfect collinearity), the odds ratios reported for the other year dummies represent effects relative to that observed for 1986, which can be considered the base category. Similarly, in Table 2.8 the industry sector 10 (representing agriculture, forestry and fishing) is omitted, making that the base category.

TABLE 2.6
Acquisition vs. No Acquisition: Year Dummies

Explanatory variable	Odds ratios	z-statistic
FirmSize (x10 ⁹)	1.096	5.94
R&D	2.279	16.52
R&Dintensity	0.323	-2.44
Leverage	0.886	-2.61
Profitability	4.326	8.38
Investment	1.190	5.47
Uncertainty	0.091	-4.44
Year87	1.376	1.87
Year88	1.398	2.03
Year89	1.145	0.87
Year90	1.405	2.28
Year91	0.844	-1.18
Year92	0.907	-0.68
Year93	1.006	0.04
Year94	1.154	1.01
Year95	1.248	1.58
Year96	1.272	1.72
Year97	1.003	0.02
No. of obs.	10246	
Log likelihood	-6696.3	

TABLE 2.7
Industry Distribution of Acquiring and Non-acquiring Firms
(grouped by first 2 digits of SIC codes)

	Major Industry Type	Acquirers	Non-acquirers
10	Agriculture, forestry and fishing	30	51
11	Coal	17	27
13	Extraction of mineral oil and natural gas	97	228
14	Oil refining	14	4
16	Electricity supply	37	90
17	Water supply industry	67	103
21	Extraction, preparation of metalliferous ores	45	117
22	Iron and steel	115	115
23	Quarrying and mining	51	58
24	Building materials	198	193
25	Chemicals	387	299
31	Metal manufacture	176	219
32	Capital good manufacture	431	384
33	Electronic equipment manufacture	63	110
34	Electrical manufacture	458	521
35	Motor vehicle manufacture	108	105
36	Other transport equipment manufacture	75	113
37	Scientific instruments	83	110
41	Food manufacture	205	103
42	Sugar and sugar by-products	237	373
43	Spinning and weaving	136	272
45	Clothing and footwear	119	289
46	Wood	92	158
47	Paper and printing	391	365
48	Rubber and plastic	195	141
49	Miscellaneous manufacture	46	99
50	General construction and demolition work	226	535
61	Wholesaling	501	573
62	Scrap metal dealers	14	6
64	General retailing	119	320
65	Specialised retailing	199	445
66	Catering and entertainment	130	288
67	Repair	11	24
72	Land transport	71	38
74	Sea transport	40	45
75	Air transport	11	21
76	Transport support services	35	88
77	Miscellaneous transport services and storage	74	97
79	Post and telecommunications	35	35
83	Miscellaneous services	617	763
84	Equipment hire	90	119
85	Owning and dealing in real estate	200	805
92	Cleansing services	69	30
93	Education	25	19
94	Research and development	24	52
95	Health care	60	71
97	Leisure services	225	430
98	Services	28	28
	Total:	6677	9479

TABLE 2.8
Acquisition vs. No Acquisition: Industry Dummies

Explanatory variable	Odds ratios	z-statistic
FirmSize (x10 ⁹)	1.142	7.31
R&D	1.919	11.04
R&Dintensity	0.235	-2.71
Leverage	0.975	-0.54
Profitability	4.467	8.80
Investment	1.230	6.32
Uncertainty	0.117	-3.99
Ind11	2.829	1.87
Ind13	0.610	-1.40
Ind14	4.684	1.86
Ind16	0.477	-1.86
Ind17	1.245	0.59
Ind21	0.811	-0.55
Ind22	1.716	1.61
Ind23	2.191	2.05
Ind24	1.882	1.96
Ind25	2.789	3.21
Ind31	1.993	2.13
Ind32	2.104	2.38
Ind33	1.076	0.20
Ind34	1.593	1.49
Ind35	1.615	1.40
Ind36	1.435	0.98
Ind37	1.430	1.02
Ind41	4.187	4.25
Ind42	1.167	0.49
Ind43	1.152	0.44
Ind45	0.976	-0.08
Ind46	1.561	1.33
Ind47	2.347	2.72
Ind48	2.846	3.13
Ind49	0.782	-0.63
Ind50	0.921	-0.26
Ind61	2.439	2.88
Ind62	6.775	2.55
Ind64	0.822	-0.60
Ind65	1.183	0.53
Ind66	1.250	0.68
Ind67	4.082	2.06
Ind72	16.513	5.35
Ind74	1.913	1.59
Ind75	0.803	-0.38
Ind76	1.090	0.21
Ind77	2.401	2.36
Ind79	1.965	1.27
Ind83	2.037	2.31
Ind84	1.848	1.78
Ind85	0.566	-1.81
Ind92	5.604	4.33
Ind93	8.072	4.02
Ind94	3.764	2.52
Ind95	2.301	2.20
Ind97	1.376	0.99
Ind98	3.016	2.50
No. of obs.	10246	
Log likelihood	-6430.2	

In Table 2.8, apart from *Leverage* which loses its negative effect, the remaining explanatory variables are robust to the inclusion of industry dummies. Nevertheless, there remains substantial variation across industries that cannot be fully accounted for by the existing explanatory variables. This could be due to certain inherent characteristics (such as market concentration) or exogenous shocks (such as technological breakthroughs) peculiar to an industry that could make its firms' more/less inclined to undertake acquisitions. The propensity for such firms to acquire or not acquire would thus not be adequately captured by firm-specific variables alone, and this is reflected by the significant odds ratios on a number of industry dummies.

A likelihood ratio test comparing estimates obtained by models with and without industry dummies yields a highly significant chi-squared statistic of 591.21 (with 47 degrees of freedom). Not surprisingly, when a fully saturated model that includes both year and industry dummies is compared against the original model (from column 3 of Table 2.4), an even larger test statistic of 650.56 (with 58 degrees of freedom) is obtained. The effects of the original set of explanatory variables are, however, generally robust to the inclusion of year and/or industry dummies.

2.5 Foreign vs. Domestic Acquisition

Next we investigate determinants of the probability of the acquired subsidiary being a foreign or domestic company within the group of firms that have undertaken acquisitions. As in Section 2.4, the variables are obtained from the company's accounts for the year preceding the acquisition. The dependent variable represents the firm's acquisition choice, where foreign and domestic acquisitions are denoted by 1 and 0 respectively.

2.5.1 Explanatory Variables

From a theoretical perspective, the characteristics that determine whether a firm chooses to acquire or not are likely to be similar to those that determine whether a firm chooses a foreign acquisition or a domestic one. Hence, the explanatory variables used in Section 2.4 are also included in the analysis of a firm's choice between a foreign and domestic acquisition. Since the theoretical priors that support the inclusion of these characteristics are an extension of those introduced in the previous section, we review them only briefly here in the current context of the firm's choice.

Because foreign investments are generally more risky ventures that require larger capital outlays (relative to domestic acquisitions), firms with more information, a greater

amount of experience or better access to funds will fare better than firms without these attributes. As we have suggested in the previous section, the variables *FirmSize*, *Leverage* and *Profitability* serve as good indicators of these attributes. For example, profitable firms, as well as firms with low leverage ratios, are likely to have better access to funds. The variables *FirmSize* and *Investment* can be proxies for a firm's experience in dealing with diverse bundles of new assets. Both *FirmSize* and *Profitability* provide an indication of a firm's ability to manage its operations. Moreover, a larger firm is less vulnerable to fluctuations in demand or cost conditions that may affect its subsidiaries in foreign countries since it can respond to such shocks by reallocating production across its extensive network. Being well insulated from such country-specific shocks, larger firms have an advantage in the field of foreign direct investment. For these reasons, the expected signs on the relationships between these variables and the dependent variable also remain unchanged.

The internalisation theory, as cited in Section 2.1, is among the more widely accepted explanations for the existence of multinational firms. The ownership of proprietary assets provides a strong motivation for firms to expand their firm boundaries into new markets as a means of realising the returns on these assets. R&D activities, which enable a firm to generate knowledge-based proprietary assets, are often employed in studies of the internalisation theory. Likewise, this analysis includes as explanatory variables the variables relating to R&D, viz. *R&D* and *R&Dintensity*, that were constructed in the previous section. Given that firms with more proprietary assets have more incentive to expand abroad (than firms with less proprietary assets or firms with none), both R&D variables are expected to have a positive effect on the dependent variable.

As before, the effect of uncertainty on the firm's acquisition choice is explored through the variable *Uncertainty*. Since the variable is a measure of the degree of uncertainty inherent to a firm, we can examine whether the firms choosing domestic acquisitions have risk characteristics that differ from those choosing foreign acquisitions. In terms of the real options framework, both types of acquisitions can be regarded as options, each subject to its own risk exposure. Because the returns from foreign acquisitions are deemed to be less predictable (than domestic acquisitions), they could convey greater risk to the acquiring firm. This compounds the risk that a firm has to deal with, so for firms that already have a high exposure to risk, the foreign acquisition option would mean even more uncertainty for such firms. It is thus unlikely that these firms would acquire abroad, since the high level of uncertainty would increase the attractiveness of holding the option relative to exercising it. Thus, if a foreign acquisition option (with a given level of risk) were held by two firms, then

all else equal the firm with inherently lower uncertainty would be more likely to exercise the option. In other words, we expect the variable *Uncertainty* to be negatively correlated with the probability of a foreign acquisition being observed.

In addition to the above variables, three new explanatory variables are introduced, the first of which is *Mfg*. The manufacturing sector has a longer history of foreign direct investment than the service sector. Through their experience over the years, manufacturing firms would have acquired a wealth of expertise in the field of foreign investment. Such expertise can help the firm to pre-empt problems that could arise from managing subsidiaries in foreign markets. We thus expect that foreign acquisitions are more likely to be undertaken by manufacturing firms. In order to verify the validity of this statement for the firms in our sample, the term *Mfg* (set equal to 1 for manufacturing firms, and 0 otherwise) is used to distinguish firms in the manufacturing sector (SIC codes beginning with 2, 3 or 4) from those that are not.

Another new variable is *ForeignProd*, which is the share of a firm's sales that is produced outside the UK. Existing subsidiaries are readily accessible sources of information about the markets they reside in, so that when an investment opportunity becomes available, the information is quickly conveyed to the parent company. Moreover, since firms with foreign production bases have accumulated expertise (such as learning how to deal with teething problems) in setting up foreign subsidiaries, they are well equipped to acquire further in foreign markets. These firms may also have certain inherent advantages, such as ownership of proprietary assets, which conferred on them the ability to venture abroad in the first place. Therefore, relative to firms that operate solely in domestic markets, we expect firms that have established foreign production facilities to be more active foreign investors.

The final variable used in this analysis is *ForeignMkt*, which is the fraction of a firm's total sales that is earned from sales in foreign markets. This variable has been included, its close correlation of 0.79 with *ForeignProd* notwithstanding, because it casts a different light on the importance of a firm's international presence. Having production facilities in foreign countries does not necessarily imply that the firm also has a ready market in that country. Multinational firms have been known to locate their subsidiaries in foreign countries to take advantage of the proximity to raw materials or cheap labour, while the finished product is still transported back to the home country for sale. *ForeignMkt* therefore focuses specifically on whether the multinational firm has a well-established market overseas. With an established market, the firm encounters less uncertainty in terms of demand for its products and can set output levels accordingly. However, the existence of a ready market also means that the

firm's rivals can tap into its pool of customers. In order to prevent rivals from entering its market, the firm has to grasp investment opportunities in strategic businesses before its rivals can get to them. Therefore, a firm with products that are successful in a particular foreign country would have a strong incentive to set up operations, or expand existing ones, in that country.

2.5.2 Data

From the previous section, we have a dataset that distinguishes acquirers from non-acquirers over the sample period 1986-1997. In order to estimate the second level of the decision tree, i.e. the choice between acquiring at home or abroad, we here focus only on the observations that contain acquisitions and analyse the factors that influence the decision to acquire a foreign or domestic subsidiary. Hence, we retain the earlier dataset but eliminate the non-acquisition observations. With this new sample of 6677 observations, the next step entails identifying whether the acquisitions are located in foreign or domestic markets. Information on foreign acquisitions is obtained from the *Acquisitions Monthly* journal, which publishes monthly rosters of mergers and acquisitions transactions involving UK companies. Specifically, the sections on "UK acquisitions in North America," "UK acquisitions in Europe," and "UK acquisitions in the rest of the world" provide a record of UK companies that have acquired subsidiaries abroad. Companies that are listed in these sections are designated foreign acquirers, with a total of 1701 observations, while the remaining companies in the sample are domestic acquirers. The new dependent variable, which denotes the type of acquisition (foreign or domestic), is set equal to 1 for companies that made foreign acquisitions (some of which may have made domestic acquisitions as well)¹⁸, and 0 for companies that made only domestic acquisitions.

Firms that perform foreign acquisitions every year during the sample period are designated "serial foreign acquirers". The foreign acquisitions undertaken by such firms account for 143 observations, or roughly 8.4 percent of the sample. As in the previous section, we check for the influence of these serial foreign acquirers by estimating the logit model with and without them (re: Section 2.5.4).

¹⁸ Because of data limitations, we cannot distinguish acquirers that have made only foreign acquisitions from those that have made both foreign and domestic acquisitions. *Extel* reports total acquisition expenditures but does not specify the location of the acquired firms. Ideally, if *Acquisitions Monthly* provided information on the amount spent on foreign acquisitions, we could subtract this figure from *Extel*'s total acquisition expenditure to deduce whether a domestic acquisition was also undertaken. However, *Acquisitions Monthly* only gives the name and location of the acquired firms, but does not include comprehensive data on acquisition expenditures.

Data for the new explanatory variables—*Mfg*, *ForeignProd* and *ForeignMkt*—are obtained from the company accounts database in *Extel*. Table 2.9 gives a breakdown of the number of acquisitions by type and by year, while Table 2.10 shows the summary statistics of the explanatory variables used in the analysis.

TABLE 2.9
Number of Foreign and Domestic Acquisitions by Year

Year	Type of Acquisition	
	<i>Foreign</i>	<i>Domestic</i>
1986	94	161
1987	124	232
1988	169	235
1989	161	239
1990	159	376
1991	123	401
1992	108	441
1993	137	486
1994	146	584
1995	149	616
1996	167	643
1997	164	562
Total	1701	4976

TABLE 2.10
Foreign vs. Domestic Acquisition: Summary Statistics

Variable	Mean	Standard deviation
FirmSize (x10 ⁹)	0.7328	2.5946
R&D	0.4113	0.4921
R&Dintensity	0.0321	0.1688
Leverage	0.3144	0.4551
Profitability	0.0496	0.1852
Investment	0.2722	0.7635
Uncertainty	0.0073	0.0416
Mfg	0.5289	0.4992
ForeignProd	0.3116	0.2787
ForeignMkt	0.4100	0.2936

The mean values of *ForeignProd* and *ForeignMkt* suggest that for UK firms engaging in acquisitions nearly one-third of production and two-fifths of sales take place abroad. These high values can probably be attributed to a reporting bias. Because firms without significant production facilities or sales in foreign countries would generally not report geographic segment information (from which *ForeignProd* and *ForeignMkt* are obtained), there are

many missing observations in these two variables. However, we cannot assume that the missing values are zero because missing data was also found for a few firms that were known to have foreign operations. Since observations with missing data are dropped in the subsequent logit regressions, we first estimate a model without *ForeignProd* and *ForeignMkt* which is then compared with alternative specifications that include these variables (re: Table 2.12).

2.5.3 Results

Table 2.11 presents the univariate comparisons between foreign and domestic acquisitions. A *t*-test is used to determine whether the mean of the domestic acquisition group is the same as that of the foreign acquisition group for each explanatory variable, i.e. the null hypothesis being that the difference between the means is zero. The figures in the middle column of Table 2.11 represent the differences obtained by subtracting the means of the foreign acquisition group from the corresponding means of the domestic acquisition group, while the right-hand column gives the relevant *t*-statistics.

TABLE 2.11
Foreign vs. Domestic Acquisition: Univariate Comparisons

Variable	Difference: Domestic – Foreign	<i>t</i> -statistic
FirmSize (x10 ⁹)	-1.1495	-15.75
R&D	-0.2736	-19.99
R&Dintensity	-0.0061	-0.77
Leverage	0.0568	4.36
Profitability	-0.0363	-6.87
Investment	0.0264	1.21
Uncertainty	0.0040	3.14
Mfg	-0.1413	-9.95
ForeignMkt	-0.2092	-16.21
ForeignProd	-0.1786	-16.21

Apart from the *R&Dintensity* and *Investment* variables, the highly significant differences on the remaining variables indicate that foreign acquirers differ systematically from domestic acquirers. The signs on these differences also correspond with the predicted effects for each of the variables. In the previous analysis, we found that relative to non-acquirers, acquiring firms were generally larger, more active in R&D, less highly leveraged, more profitable, and faced less uncertainty. We find parallels between these acquirer-non acquirer comparisons and the foreign-domestic acquirer comparisons shown in Table 2.11.

In addition, foreign acquirers have a larger international presence (whether in terms of foreign market shares or foreign production facilities) than domestic acquirers, as demonstrated by the variables *ForeignMkt* and *ForeignProd*. The variable *Mfg* confirms that being in the manufacturing sector makes a firm more likely to undertake foreign acquisitions. Since these three variables are closely correlated with one another, they are likely to be picking up similar effects, i.e. firms with large foreign market or foreign production shares are also likely to be in the manufacturing sector. Whether these variables exert an independent impact (that is not related to the other two variables) can be ascertained through a multivariate (logit) estimation, the results of which are shown in Table 2.12.

TABLE 2.12
Foreign vs. Domestic Acquisition: Logit Estimation

Explanatory variable	(1)	(2)	(3)	(4)	(5)
FirmSize (x10 ⁹)	1.207 (9.33)	1.127 (5.03)	1.205 (5.56)	1.156 (4.38)	1.192 (5.20)
R&D	2.065 (9.30)	1.748 (4.92)	1.843 (4.87)	1.924 (4.37)	2.297 (5.77)
R&Dintensity	24.009 (4.40)	172.762 (2.94)	14.494 (3.01)	230.319 (2.53)	214.771 (2.50)
Leverage	0.865 (-1.25)	0.841 (-1.14)	0.623 (-1.89)	0.517 (-2.24)	0.784 (-1.07)
Profitability	53.829 (8.17)	37.709 (5.67)	86.988 (5.82)	138.216 (5.34)	108.798 (5.25)
Investment	1.041 (0.77)	0.945 (-0.54)	0.945 (-0.48)	1.003 (0.02)	0.920 (-0.57)
Uncertainty	0.008 (-2.42)	0.025 (-1.53)	0.513 (-0.39)	0.337 (-0.47)	0.138 (-0.83)
Mfg	1.312 (3.57)	1.047 (0.42)	1.096 (0.67)	1.219 (1.19)	1.210 (1.20)
ForeignProd	--	5.414 (8.82)	--	7.170 (4.24)	--
ForeignMkt	--	--	7.600 (9.28)	0.690 (-0.78)	--
No. of obs.	4704	2326	2040	1304	1304
Log likelihood	-2462.7	-1281.0	-1015.3	-751.7	-773.3

Note: z-statistics appear in parentheses

As before, the results are in the form of odds ratios—in this case, the odds ratio of acquiring a foreign subsidiary over a domestic one. The odds ratios for the variables *R&Dintensity* and *Profitability* are rather large because a unit increase in these variables represents a very large change—equivalent to increasing the values of these variables from 0

to 100 percent. For example, the odds ratio on *R&Dintensity* measures the difference between a firm that has no R&D expenditures and one that spends all of its sales revenue on R&D.

In column 1, the estimation is first conducted without *ForeignMkt* and *ForeignProd*, so as not to lose the large number of observations that are missing in these variables. As a result of poor data coverage in these variables, the sample size is drastically reduced when these variables are used—from 4704 (when both variables are excluded) to 1304 observations (when both are included). Because the variables *ForeignMkt* and *ForeignProd* are highly correlated, the results in the second and third columns are obtained by excluding one variable at a time so as to observe the effect of the remaining variable. In column 4, the full set of explanatory variables is used. The other explanatory variables are used in all of the estimations.

These findings generally agree with the predicted effects for each of the variables (apart from *Investment*, which does not have a significant effect on the foreign acquisition choice). They show that foreign acquirers are larger, more active in R&D as well as more R&D-intensive, less indebted, more profitable, face less uncertainty, and more likely to be in the manufacturing sector. The effects of *Leverage*, *Uncertainty* and *Mfg* are, however, less robust than the others (which remain statistically significant in all four specifications). In order to determine whether this is caused by the inclusion of the variables *ForeignProd* and *ForeignMkt* or brought about by systematic differences between the larger and smaller samples, the model is re-estimated without *ForeignProd* and *ForeignMkt* while using the smaller sample of 1304 observations (results in column 5). Even without *ForeignProd* and *ForeignMkt*, the estimated effects of *Uncertainty* and *Mfg* are similar to those obtained in column 4, suggesting that their effects are not robust to switching between a larger sample of 4704 observations and a smaller one of 1304 observations. The effect of *Leverage*, which becomes more significant in column 4, appears to be less affected by altering the sample size than the introduction of *ForeignProd* and *ForeignMkt*.

Both *ForeignMkt* and *ForeignProd* exert strong positive impacts on the probability of a foreign acquisition occurring. Column 3 shows that a firm that sells virtually all its products to foreign markets is roughly 8 times more likely to undertake a foreign acquisition compared to a firm with no sales to foreign markets. Likewise, a firm that produces all of its output abroad is about 5 times more likely to undertake a foreign acquisition than one without foreign production facilities, as shown by column 2. When combined within a single model, only the effect of the variable *ForeignProd* remains (both variables being highly correlated), illustrating that between the two measures of international presence this effect is more robust.

2.5.4 Robustness Checks

Just as for the previous analysis, a series of robustness checks are performed to investigate how sensitive the findings are to changes in the model's specifications. The model against which these subsequent results are compared is the one given in column 1 of Table 2.12. Since the inclusion of *ForeignProd* and *ForeignMkt* leads to a large number of observations being dropped, we chose the specification without these variables in order to preserve the original sample of acquirers.

First, we focus on a group of firms that perform foreign acquisitions every year during the sample period, and designate them as “serial foreign acquirers”. The foreign acquisitions undertaken by such firms account for 143 observations, or roughly 8.4 percent of the sample. In order to examine whether the results are affected by the presence of these serial foreign acquirers, the model is re-estimated after they have been removed from the sample. The results of this re-estimation (given in column 1 of Table 2.13) show that the significance of the variables' effects is not greatly affected by the exclusion of the serial foreign acquirers.

The remaining sensitivity analyses given in Table 2.13 are similar to the investigations that were carried out in the previous section. Alternative measures of firm size (viz. sales revenue) and profitability (viz. net income/sales) are employed in column 2. The effects of the explanatory variables remain virtually unchanged, with the exception of the variables *Leverage* and *Investment*. Although not significant in the original model, *Leverage* now reduces, while *Investment* increases, the probability of a foreign acquisition occurring, both effects being consistent with the theoretical predictions.

As before, we use an additional *Cashflow* term to investigate whether the negative effect of *Uncertainty* may be because of it acting as a proxy for credit constraints. In this case, the positive (albeit weakly significant) odds ratio on *Cashflow* in column 3 suggests a possible role for a firm's access to liquidity in explaining its choice of acquisition. Between a domestic and a foreign acquisition, firms that are credit constrained may opt for the domestic acquisition because they lack the necessary funds to finance the foreign acquisition, which usually requires larger capital outlays. Although the presence of the *Cashflow* variable reduces the odds ratio on the *Uncertainty* variable, the latter remains significant at around the 0.10 level, suggesting that uncertainty has an effect on acquisition choice that is independent of credit constraints.

TABLE 2.13
Foreign vs. Domestic Acquisition: Robustness Checks

Explanatory variable	(1)	(2)	(3)
FirmSize (x10 ⁹)	1.278 (8.58)	1.373 (12.47)	1.183 (8.39)
R&D	2.085 (7.46)	1.947 (8.41)	2.175 (8.47)
R&Dintensity	637.655 (3.96)	17.844 (3.36)	75.568 (3.38)
Leverage	0.889 (-0.90)	0.770 (-2.03)	0.951 (-0.42)
Profitability	59.554 (7.50)	2.790 (3.92)	43.678 (7.18)
Investment	1.050 (0.86)	1.096 (1.84)	0.984 (-0.24)
Uncertainty	0.014 (-2.22)	0.009 (-2.34)	0.062 (-1.60)
Mfg	1.309 (2.99)	1.360 (3.99)	1.420 (3.99)
Cashflow	--	--	1.778 (1.48)
No. of obs.	3827	4619	3869
Log likelihood	-1818.7	-2422.1	-1919.1

Note: z-statistics appear in parentheses

Possible repercussions of year and industry influences are investigated through their respective dummies in Tables 2.14 and 2.16, while the distributions of foreign and domestic acquisitions by year and industry are given in Tables 2.9 and 2.15 respectively. The effects of the explanatory variables remain robust in the presence of year and industry dummies. The statistically significant odds ratios on a number of year and industry variables indicates that there remains substantial variation in the dependent variable that is unaccounted for by the existing set of explanatory variables. As in the previous section, the base category for the year dummies is *Year86*. Since the other year dummies have odds ratios below 1, this indicates a particularly high number of foreign (relative to domestic) acquisitions occurring in 1986. Given that most of these odds ratios are highly significant, it is not surprising that jointly they have more explanatory power than the year dummies in Table 2.6. Here the likelihood ratio test yields a larger chi-squared statistic of 85.61 (11 degrees of freedom).

In the case of the industry dummies (Table 2.16), the base category comprises firms in the industrial sectors 10, 76 and 93. Because each of these 3 sectors has very few foreign acquisitions (in fact *Ind93* has none), they are grouped together in the base category to avoid collinearity problems. Hence, relative to this base category, the other sectors generally have

positive effects on the propensity to undertake a foreign acquisition. In a likelihood ratio test comparing models with and without the industry dummies, the chi-squared statistic is 170.10 (45 degrees of freedom). This is lower than the corresponding statistic in the acquisition vs. no acquisition model (but highly significant nonetheless), suggesting that there is relatively less variation across industries. When a model with both year and industry dummies is compared with the original model (in column 1 of Table 2.12), the likelihood ratio test statistic is also correspondingly lower, at 260.84 (56 degrees of freedom), which suggests that the reduced variation across industries outweighs the increased variation across years.

TABLE 2.14
Foreign vs. Domestic Acquisition: Year Dummies

Explanatory variable	Odds ratios	z-statistic
FirmSize (x10 ⁹)	1.211	9.30
R&D	2.341	10.51
R&Dintensity	21.004	4.20
Leverage	0.923	-0.70
Profitability	40.718	7.58
Investment	0.972	-0.51
Uncertainty	0.005	-2.49
Mfg	1.267	3.08
Year87	0.782	-0.90
Year88	0.944	-0.22
Year89	0.971	-0.12
Year90	0.602	-2.11
Year91	0.433	-3.43
Year92	0.350	-4.28
Year93	0.424	-3.58
Year94	0.387	-4.00
Year95	0.344	-4.53
Year96	0.375	-4.20
Year97	0.409	-3.81
No. of obs.	4704	
Log likelihood	-2417.3	

Therefore, beyond the set of explanatory variables, acquisition activity can also be influenced by non-firm specific factors, such as fads for conducting certain types of acquisitions. This could translate into years in which foreign acquisition activity could be unusually high/low, or industrial sectors in which firms are particularly active in undertaking foreign acquisitions. It is also likely that within some sectors the competition for foreign investment opportunities is more intense, or the nature of their businesses makes foreign direct investment more lucrative for these firms. Hence, we observe different propensities for undertaking foreign acquisitions across industrial sectors.

TABLE 2.15
Industry Distribution of Foreign and Domestic Acquirers
 (grouped by first 2 digits of SIC codes)

	Major Industry Type	Foreign	Domestic
10	Agriculture, forestry and fishing	3	27
11	Coal	3	14
13	Extraction of mineral oil and natural gas	34	63
14	Oil refining	9	5
16	Electricity supply	12	25
17	Water supply industry	6	61
21	Extraction, preparation of metalliferous ores	5	40
22	Iron and steel	47	68
23	Quarrying and mining	20	31
24	Building materials	69	129
25	Chemicals	157	230
31	Metal manufacture	47	129
32	Capital good manufacture	116	315
33	Electronic equipment manufacture	15	48
34	Electrical manufacture	146	312
35	Motor vehicle manufacture	36	72
36	Other transport equipment manufacture	37	38
37	Scientific instruments	17	66
41	Food manufacture	66	139
42	Sugar and sugar by-products	73	164
43	Spinning and weaving	27	109
45	Clothing and footwear	19	100
46	Wood	16	76
47	Paper and printing	106	285
48	Rubber and plastic	75	120
49	Miscellaneous manufacture	6	40
50	General construction and demolition work	38	188
61	Wholesaling	101	400
62	Scrap metal dealers	1	13
64	General retailing	28	91
65	Specialised retailing	18	181
66	Catering and entertainment	20	110
67	Repair	2	9
72	Land transport	18	53
74	Sea transport	14	26
75	Air transport	4	7
76	Transport support services	2	33
77	Miscellaneous transport services and storage	17	57
79	Post and telecommunications	19	16
83	Miscellaneous services	133	484
84	Equipment hire	7	83
85	Owning and dealing in real estate	16	184
92	Cleansing services	20	49
93	Education	0	25
94	Research and development	14	10
95	Health care	2	58
97	Leisure services	56	169
98	Services	4	24
	Total:	1701	4976

TABLE 2.16
Foreign vs. Domestic Acquisition: Industry Dummies

Explanatory variable	Odds ratios	z-statistic
FirmSize (x10 ⁹)	1.221	8.60
R&D	2.237	9.07
R&Dintensity	13.735	3.49
Leverage	0.887	-1.01
Profitability	49.858	7.73
Investment	1.032	0.60
Uncertainty	0.007	-2.43
Mfg	2.007	3.33
Ind11	10.968	2.60
Ind13	6.323	2.67
Ind14	29.251	3.40
Ind16	1.796	0.76
Ind17	0.628	-0.58
Ind21	0.590	-0.60
Ind22	4.564	2.27
Ind23	3.949	1.91
Ind24	3.864	2.07
Ind25	3.022	1.71
Ind31	3.007	1.66
Ind32	2.071	1.13
Ind33	1.513	0.57
Ind34	2.637	1.51
Ind35	4.028	2.05
Ind36	5.456	2.44
Ind37	1.548	0.61
Ind41	3.611	1.98
Ind42	1.636	0.75
Ind43	2.378	1.28
Ind45	1.694	0.76
Ind46	2.632	1.40
Ind47	3.875	2.11
Ind48	4.352	2.23
Ind49	1.402	0.38
Ind50	3.706	2.06
Ind61	5.297	2.73
Ind62	1.534	0.35
Ind64	6.100	2.81
Ind65	2.367	1.32
Ind66	6.907	2.96
Ind67	6.764	1.89
Ind72	10.266	3.43
Ind74	11.016	3.39
Ind75	5.341	1.66
Ind77	8.364	3.09
Ind79	12.554	3.17
Ind83	4.751	2.56
Ind84	2.375	1.18
Ind85	2.489	1.37
Ind92	7.147	2.96
Ind94	22.625	3.81
Ind95	0.644	-0.37
Ind97	6.209	2.90
Ind98	4.934	1.96
No. of obs.	4704	
Log likelihood	-2375.0	

2.6 Choice of Foreign Location

We proceed to the lowest level of the decision tree, which involves comparing various countries in which the sample of UK acquirers have chosen to locate their subsidiaries. The countries considered are the six destinations with the highest number of acquisitions observed during the sample period. The countries are (starting with the highest number of acquisitions): the US, France, Germany, the Netherlands, Australia and Spain (further detail on acquisition activity is given in Section 2.6.2).

2.6.1 Explanatory Variables

When the firm considers an acquisition in a particular foreign location, country-specific factors can potentially alter the value that the firm derives from the investment. Corresponding to the previous sections, the explanatory variables can be grouped into two broad categories; the first represents various aspects of the host country's macroeconomy, while the second relates specifically to measurements of uncertainty. In order to capture the prevailing conditions at the time when the acquisition decision is made, each explanatory variable is measured in the year of the acquisition.¹⁹

A country with a better-developed infrastructure is likely to be a more attractive target for foreign direct investment, especially to the extent that these provisions are not (fully) priced. Infrastructure in the form of highways and other transport links aid in the movement of raw materials and manufactured goods to and from the acquired subsidiary. Multinational networks are often closely interconnected, with the subsidiary forming one node of the production process. Multinational firms would thus prefer to establish subsidiaries in locations which are served by efficient transport links, so as to avoid the inconvenience of dealing with a slowdown, or even breakdown, of vital transport systems. As a proxy for the efficiency of a country's infrastructural systems, we employ the proportion of output devoted to infrastructure- or public goods-related expenditures, denoted *GovSpending*, which represents government expenditures as a percentage of GDP.

A firm that wishes to sell its product in a foreign country can achieve this either through exports to or local production in that country. Trade and foreign direct investment are thus often closely linked. An open economy that has been importing foreign goods is likely to

¹⁹ The use of explanatory variables from the same year as that of the acquisition is unlikely to give rise to endogeneity problems, since the variables in this section are country (and not firm) specific. For example, while a firm's share price moves in response to the firm making an acquisition, the stock market volatility in a target country (such as the US) is not likely to be affected by an acquisition undertaken by a foreign investor (i.e. a UK firm). In any case, subsequent findings are generally unchanged when the explanatory variables from year $t-1$ are used in place of those from year t .

be receptive towards the output from subsidiaries of multinational firms, providing multinationals with a ready market for their goods. Having secured a market for their goods, foreign investors would be more willing to invest in local production facilities, which represent a longer-term commitment to the foreign market (relative to exports). Well-established trade routes also enhance the flow of information across countries, so that firms would be better informed about the economic or business conditions in a country with which they trade. With better information, external investors are more likely to be aware of good investment opportunities should they arise. For these reasons, we would expect acquisition activity to increase with a country's openness to trade. The importance of trade to the economy is measured by the variable *Trade*, which is the sum of merchandise exports and imports as a share of GDP. Given that the variable also varies across time, within the same country we expect that periods of high trade flows, a result of favourable trade policies or higher demand for foreign goods, could be associated with more vigorous acquisition activity.

The next variable, *DomInvt*, is a measure of the intensity of investment activity in the economy of the host country. A high level of domestic investment suggests that the country's economic outlook is positive, which encourages firms (including foreign investors) to make heavy investment commitments. To the extent that this variable serves as an indicator for the attractiveness of investment opportunities in a country, we would expect domestic investment to have a positive impact on the probability of an acquisition being observed in that country.

When analysing the firm's choices in the upper nodes of the decision tree, we found that involvement in R&D had a positive influence on the acquisition choice, i.e. firms were more likely to acquire (relative to not acquire), as well as to undertake foreign acquisitions (relative to domestic acquisitions). This finding was attributed to the proprietary assets theory, since R&D activities often provide the firm with knowledge-based proprietary assets. Firms that are active in R&D may be drawn to countries with well-developed R&D facilities because of potential positive spillover effects, i.e. there could be advantages gained from the proximity of R&D activities of a similar nature. As a measure of the R&D activities present in a host country, we look at the proportion of goods that is produced by industries that are highly R&D intensive. Defining high-technology goods as the goods produced by industries that rank in the top 10 according to R&D expenditures, the *World Development Indicators* provides information on high-technology exports as a share of exports of manufactured goods, which we label *HiTech* for this study. A higher value of *HiTech* therefore indicates that the host country is more R&D intensive.

We now look at conditions in a host country that translate to investment uncertainty. One source of uncertainty is the volatility of the exchange rate. In terms of the real options model, higher volatility increases the dispersion of returns from the investment—but while the potential for gain on the upside is unlimited, the downside risk can be avoided if the firm chooses not to exercise the option. In this way, the option becomes more valuable under circumstances of high volatility, making the firm more inclined to keep the option alive (Siegel, 1983; Campa, 1993). The critical value at which it is viable to exercise the option increases with exchange rate volatility, so that we would observe fewer acquisitions in a country with exchange rates that fluctuate excessively. In order to capture the impact of exchange rate movements on potential acquirers based in the UK, we measure the daily percentage changes in the exchange rate of the country in which the acquired firm is located, relative to the UK£. The variable *ERvolatility* is the average of the absolute values of these daily changes for each year and for each country.

Similarly, other disturbances to the economy of the host country also impart volatility to the investment option. As there can be diverse and numerous sources of such uncertainty, it is difficult to measure each variant individually. Instead, we use the stock market performance as an indicator of the overall level of stability, since the stock market to a large extent reflects the economic conditions prevailing in the country. With data on the daily movements of the major stock market indices in each country, we calculate the variable *StockVolatility* by taking the average of the absolute values of the daily percentage changes over a one-year period.

In addition, the country dummies *US*, *France*, *Germany*, *Netherlands*, *Australia* and *Spain* are included (*Spain* serves as the base category and hence does not appear in the following tables), so as to capture the influence of unobserved country-specific (time-invariant) factors.

2.6.2 Data & Econometric Method

In order to examine the factors that determine the firm's choice of location, we gather data on the specific location of foreign acquisitions undertaken by publicly traded UK firms over the same 12-year period 1986-1997. The source of information for these transactions is the *Acquisitions Monthly* journal. In addition to the US, with 1710 acquisitions, the next five countries with the highest number of acquisitions are also included. These countries (and their respective number of acquisitions) are France (390), Germany²⁰ (322), the Netherlands

²⁰ Acquisitions in the pre-1991 period refer to West Germany.

(243), Australia (186) and Spain (146), giving a total of 2997 acquisitions. The breakdown of acquisitions by year and country is presented in Table 2.17.

Information on daily movements of the exchange rates and stock market indices required in the calculation of the variables *ERvolatility* and *StockVolatility* are obtained from the *Financial Times' Prices* database. The remaining country-specific variables are from the *World Development Indicators*, published by the World Bank. A description of these variables is given in the Data Appendix (Section 2.10). The summary statistics (by country) of these explanatory variables are provided in Table 2.18.

TABLE 2.17
Distribution of Acquisitions by Country and Year

	US	France	Germany	Netherlands	Australia	Spain
1986	178	13	13	5	15	7
1987	221	23	28	18	22	12
1988	293	51	34	35	39	26
1989	225	51	39	41	26	26
1990	139	44	33	28	20	17
1991	91	23	29	13	8	12
1992	67	28	17	16	6	5
1993	84	29	27	12	7	6
1994	95	38	23	14	5	11
1995	99	23	26	13	11	5
1996	105	32	27	23	19	8
1997	113	35	26	25	8	11
Total	1710	390	322	243	186	146

TABLE 2.18
Means and Standard Deviations of Explanatory Variables by Country

	US	Fra	Ger	Net	Aus	Spa
ERvolatility ($\times 10^{-3}$)	4.566 (1.118)	3.500 (0.8403)	3.619 (0.8366)	3.628 (0.8832)	5.826 (1.029)	3.756 (0.9158)
StockVolatility ($\times 10^{-3}$)	7.294 (1.634)	7.822 (1.254)	8.348 (2.127)	6.886 (2.071)	8.267 (1.504)	8.310 (2.374)
GovSpending	17.03 (0.8460)	18.82 (0.5722)	19.62 (0.5352)	14.73 (0.6013)	17.77 (0.6934)	16.05 (0.9957)
Trade	16.66 (2.063)	40.91 (4.041)	53.88 (4.249)	98.92 (8.738)	29.95 (3.380)	28.79 (5.872)
DomInvt	17.54 (1.257)	19.62 (1.974)	21.50 (1.389)	20.51 (1.287)	22.22 (2.224)	22.15 (2.053)
HiTech	45.02 (1.077)	29.07 (1.595)	23.84 (1.233)	36.96 (3.722)	37.54 (5.641)	16.78 (0.8120)

Notes: Means are across the years for each country.
Standard deviations are in parentheses.

Given the choice-specific nature of the explanatory variables, the conditional logit model (also known as McFadden's choice model) is used to estimate the firm's choice of location. We first consider a general form of the model.

Suppose that a firm faces m choices. We can define an underlying latent variable Y_{ij}^* to denote the level of indirect utility associated with the j^{th} choice. The observed variables Y_{ij} are defined as $Y_{ij} = 1$ if $Y_{ij}^* = \text{Max}(Y_{i1}^*, Y_{i2}^*, \dots, Y_{im}^*)$, and $Y_{ij} = 0$ otherwise. In other words, only the qualitative information on which component of the latent vector is largest is observed. The latent variable can be written as $Y_{ij}^* = \beta'X_{ij} + \alpha_j'Z_i + \varepsilon_{ij}$, where X_{ij} is the vector of attributes for the j^{th} choice as perceived by the i^{th} firm and Z_i are firm-specific variables (and are therefore identical for all choices). The residuals ε_{ij} capture unobserved variations in the attributes of alternatives, or errors in the perception and optimisation of the firm. If the residuals ε_{ij} are independently and identically distributed with the type I extreme value distribution, it can be shown (re: Maddala, 1983) that

$$P(Y_{ij} = 1) = \frac{\exp(\beta'X_{ij} + \alpha_j'Z_i)}{\sum_{j=1}^m \exp(\beta'X_{ij} + \alpha_j'Z_i)} \quad (2.1)$$

for $j = 1, \dots, m$. When the explanatory variables are only choice-specific, the model simplifies to the conditional logit model, given by

$$P(Y_{ij} = 1) = \frac{\exp(\beta'X_{ij})}{\sum_{j=1}^m \exp(\beta'X_{ij})}$$

The vector of explanatory variables X_{ij} can be interpreted as attributes of alternative j . The term $\alpha_j'Z_i$ cancels out of the above formula as there is no variation across the individual firms; hence the parameter vector α_j' cannot be identified from observing the discrete responses. In the model, β' is equivalent to the vector of implicit prices for the characteristics, i.e. the coefficients tell us the relative valuations of the country-specific characteristics.

In order to estimate this model, we generate a dependent variable, named *Choice*, which is equal to 1 if an acquisition is undertaken in the country and 0 otherwise. The explanatory variables take on their respective values for the year in which the acquisition takes place. For example, if the acquired firm is in the US, one row of data consists of the relevant explanatory variables for the US. In addition, 5 more rows of data are created in the same way for each of the other 5 locations that are not selected. Table 2.19 provides an illustration of how the dataset is constructed. The first item, *ID*, is a unique number assigned to each acquisition and serves as an identifier variable for the matched groups i.e. the data

associated with the same acquisition bear the same number. The next variable, *Choice*, is the dependent variable that indicates the country that is chosen by the acquirer. Columns 3-8 contain a series of dummy variables, one for each of the 6 locations, denoting the country to which the country-specific variables in that row belong. These explanatory variables, X_{ij} , follow in the subsequent columns (only one of which is shown). Based on the information provided by the country dummies and the *Choice* variable in the data extract, we can tell that the acquisitions #1164 and #2277 were conducted in the US and Germany respectively.

TABLE 2.19
Raw Data for Observations #1164 & #2277

ID	Choice	US	Fra	Ger	Net	Aus	Spa	Exp. vars.
1164	1	1	0	0	0	0	0	X_{ij}
1164	0	0	1	0	0	0	0	X_{ij}
1164	0	0	0	1	0	0	0	X_{ij}
1164	0	0	0	0	1	0	0	X_{ij}
1164	0	0	0	0	0	1	0	X_{ij}
1164	0	0	0	0	0	0	1	X_{ij}

2277	0	1	0	0	0	0	0	X_{ij}
2277	0	0	1	0	0	0	0	X_{ij}
2277	1	0	0	1	0	0	0	X_{ij}
2277	0	0	0	0	1	0	0	X_{ij}
2277	0	0	0	0	0	1	0	X_{ij}
2277	0	0	0	0	0	0	1	X_{ij}

2.6.3 Results

The results of the conditional logit estimation (obtained using the “clogit” command in *Stata 6.0*) are reported in Table 2.20. The coefficients represent the odds ratio of a location being selected (relative to not being selected) by the acquiring firm. We first investigate the influence of *ERvolatility*, *StockVolatility*, *GovSpending* and *HiTech* on the firm’s choice of location. As shown by the estimated coefficients in column 1, the variables representing uncertainty, namely *ERvolatility* and *StockVolatility*, have significant negative effects on the probability of an acquisition being observed in a particular country. As we have expected, when a firm perceives greater volatility in the returns of its potential investment, the value of the option goes up, making the option more valuable alive than dead. Therefore in countries, or during periods, of increased uncertainty (as manifested by greater price movements in the stock market or exchange rate), fewer acquisitions are observed.

We find that an increase in the variable *GovSpending* (which indicates the amount of funds that are channelled toward developing and maintaining infrastructure) makes a host country more attractive to foreign investors. Also consistent with our predictions is the positive impact of the variable *HiTech*, which demonstrates that R&D agglomeration effects could play a role in determining the choice of location.

That these four variables perform fairly well at explaining the locational distribution of acquisitions in the sample is justified by the country variables: *US*, *France*, *Germany*, *Netherlands*, and *Australia*. Only the variable *US* has a large and highly significant coefficient, indicating that UK acquirers show a predilection for US firms that cannot be sufficiently explained by the existing explanatory variables. This could be motivated by reasons that extend beyond economic factors, and is perhaps a reflection of the historical links that exist between the two countries.

TABLE 2.20
Choice of Acquisition Location

Explanatory variable	(1)	(2)
ERvolatility ($\times 10^{-3}$)	0.889 (-3.10)	0.975 (-0.61)
StockVolatility ($\times 10^{-3}$)	0.939 (-2.69)	0.968 (-1.28)
GovSpending	1.123 (2.91)	1.173 (3.81)
HiTech	1.036 (3.18)	1.027 (2.34)
Trade	--	1.017 (2.44)
DomInvt	--	1.113 (5.44)
US	3.962 (4.52)	9.436 (6.38)
France	1.207 (1.01)	1.321 (1.34)
Germany	1.145 (0.74)	0.720 (-1.14)
Netherlands	0.880 (-0.51)	0.422 (-1.69)
Australia	0.645 (-1.89)	0.568 (-2.44)
No. of observations	17982	17982
Log likelihood	-4024.8	-4009.0
Pseudo R ²	0.251	0.253

Note: z-statistics appear in parentheses

In the second conditional logit estimation (given in column 2), the set of explanatory variables is expanded to include the remaining two variables described in Section 2.6.1: *Trade* and *DomInvt*. Both variables exert a positive and highly significant influence on the firm's locational decision. In other words, countries that are open to trade and have good investment prospects are more likely to be selected by UK acquirers. The effects of the variables *GovSpending* and *HiTech* remain robust to the inclusion of *Trade* and *DomInvt*. Because of the strong influence exerted by these two variables (especially *DomInvt*), the effects of *ERvolatility* and *StockVolatility* are considerably weaker. Although their negative effects still exist, they have dwindled in magnitude and significance. To the extent that this is caused by the presence of *DomInvt*, we can infer that uncertainty affects domestic investment (e.g. Leahy and Whited, 1996; Guiso and Parigi, 1999) in a similar way that it affects cross-border investment. Hence, the role of uncertainty in lowering investment, consistent with the real options approach, has already been captured by the *DomInvt* variable.

2.6.4 Robustness Checks

In the preceding conditional logit models, the explanatory variables vary across locations as well as across time. Hence, the models explain not only differences in observed acquisition behaviour across countries, but also differences across time for the same country. By estimating one coefficient for each variable, we are effectively imposing the restriction that the effect of the variable is the same for all six countries in the sample. In this section, we test the validity of imposing this restriction by comparing the restricted model with a completely unrestricted (or saturated) model, in which each country is assigned its own coefficient for each explanatory variable. For example, while government spending may be positively correlated with acquisition choice in one country, is it also the case for the other five countries? It is possible that the variable could have a negative effect in other countries, or even no effect at all. However, given the construction of the previous models, we would not be able to isolate these within-country effects because we have imposed the restriction that all countries have the same coefficient.

In the saturated model, the original explanatory variables are interacted with the dummy variables representing the countries, so that in the column 2 specification, for example, instead of 6 explanatory variables we now have 36 explanatory variables excluding the original (uninteracted) country dummies. Having obtained the estimates of the saturated model, the two models are compared by means of a likelihood ratio test. If the restriction is valid, imposing it should not lead to a large reduction in the log-likelihood function. The

likelihood ratio statistic is $LR = -2[\ln L_r - \ln L_u]$, where L_r and L_u are the log-likelihood functions evaluated at the restricted and unrestricted estimates, respectively. The large sample distribution of LR is chi-squared, with degrees of freedom equal to the number of restrictions imposed. The null hypothesis, that the two models are not significantly different from each other, is rejected if the value of LR exceeds the appropriate critical value.

Comparing the model in column 1 of Table 2.20 with the saturated model, we obtain a chi-squared statistic of 71.96 (with 20 degrees of freedom). The null hypothesis is thus rejected at a high level of significance, which indicates that constraining all countries to have the same coefficient on each explanatory variable is too restrictive a requirement to impose on the sample. Nevertheless, given that the effects of certain variables are similar for two (or more) countries, we could arrive at a more concise specification of the model (relative to the fully saturated model) without violating the null hypothesis. Instead of using one coefficient for every country, we group together the countries that share similar effects in each explanatory variable, and reduce the number of coefficients to the extent where the restricted model remains consistent with the saturated model.

In this way, we obtain the models shown in Table 2.21, where the models in Panels A and B correspond to the expanded forms of the models in columns 1 and 2 (of Table 2.20) respectively. As before, the coefficients are in the form of odds ratios, where an odds ratio below (above) one indicates that the relevant explanatory variable is negatively (positively) related to the probability of a country being selected by a UK acquirer. The letters that appear in brackets beside the name of the explanatory variable indicate the country (or group of countries) represented by that particular coefficient, where the US, France, Germany, the Netherlands, Australia and Spain are denoted U , F , G , N , A and S respectively. For example, two coefficients are used to capture the effect of *GovSpending*—the first, denoted $FGNS$, represents France, Germany, the Netherlands and Spain, while the second, denoted UA , represents the US and Australia.

Based on the explanatory variables *ERvolatility*, *StockVolatility*, *GovSpending* and *HiTech*, the model shown in Panel A represents the most concise specification that can be achieved without violating the null hypothesis. The likelihood ratio test yields a chi-squared statistic of 18.87 (with 17 degrees of freedom), which corresponds to a p -value of 0.336.

The single coefficient on the variable *ERvolatility* indicates that its effect was fairly uniform for all countries in the sample, so it justifies the use of one coefficient to represent all six countries in the original specification. This also confirms that exchange rate volatility is negatively correlated with acquisition choice (the dependent variable).

The effects of the remaining explanatory variables are, however, less uniform. In the case of stock market volatility, the negative effect that was detected earlier is revealed to be associated primarily with Australia. Although the estimated effect is still negative for the other five countries, it is not significant, suggesting that UK acquirers are only sensitive to within-country volatility in the Australian stock market. Similarly, the coefficients on *HiTech* demonstrate that the positive effect of the variable occurs only for France, Germany and Spain.

TABLE 2.21
Choice of Acquisition Location: less restricted model specifications

Panel A: 4 Principal Explanatory Variables

Explanatory variable	Odds ratio	z-statistic
ERvolatility	0.866	-3.65
StockVolatility (A)	0.851	-2.73
StockVolatility (UFGNS)	0.993	-0.27
GovSpending (FGNS)	0.827	-3.02
GovSpending (UA)	1.172	2.18
HiTech (FGS)	1.272	5.27
HiTech (UNA)	1.011	0.83
US	1.518	0.26
France	0.248	-2.68
Germany	0.848	-0.49
Netherlands	52.10	4.91
Australia	0.681	-0.24
Log likelihood/Pseudo R ²	-3998.3	0.255

Panel B: 6 Principal Explanatory Variables

Explanatory variable	Odds ratio	z-statistic
ERvolatility (FGNA)	0.899	-1.90
ERvolatility (US)	0.962	-0.75
StockVolatility (A)	0.899	-1.71
StockVolatility (UFGNS)	0.972	-1.09
GovSpending (FGNS)	0.906	-1.35
GovSpending (UA)	1.309	3.74
HiTech (FGNS)	1.067	2.68
HiTech (UA)	0.996	-0.26
Trade	0.995	-0.71
DomInvt (UNA)	1.185	5.76
DomInvt (FGS)	1.005	0.16
US	0.005	-2.12
France	2.181	1.79
Germany	3.058	2.30
Netherlands	0.024	-3.87
Australia	0.001	-2.80
Log likelihood/Pseudo R ²	-3988.0	0.257

In the case of *GovSpending*, its effect on acquisition choice is positive for the US and Australia, but negative for the four European countries. In other words, more acquisitions occur in the US and Australia in years when government spending is relatively high, whereas the opposite is true for France, Germany, the Netherlands, and Spain. The latter effect is, however, less robust, as shown by the specification in Panel B. With the additional variables involving trade and domestic investment, only the positive coefficient on *GovSpending* (in the US and Australia) remains significant. Also robust are the results for the variables relating to *StockVolatility* and *HiTech*. However, the negative effect of *ERvolatility* is now found to be significant only for France, Germany, the Netherlands and Australia.

With the specification in Panel B, the positive effect of domestic investment is significant only in the US, the Netherlands and Australia. While remaining positive, the coefficient on domestic investment in the other countries is insignificant. The variable *Trade* is found not to have a significant influence on the acquisition choice for all six countries.

We confirm the validity of specifying the coefficients in this way through the likelihood ratio test, from which we obtain a chi-squared statistic of 31.20. Given that the number of coefficients was reduced by 25, the statistic has 25 degrees of freedom, yielding a *p*-value of 0.182. In other words, we can accept the null hypothesis that the restricted model is still consistent with the fully saturated model.

The findings of this section confirm that certain characteristics, such as high-tech domestic industries, high domestic investment and high government spending tend to make locations more attractive to UK acquirers, whilst uncertainty (especially exchange rate volatility) tends to make them less attractive. Although the effects of some variables may not be common to all 6 countries, these results indicate that country-specific factors play a significant role in influencing the locational decision of UK acquirers.

2.7 Alternative Specifications

Having examined the effects of the explanatory variables at the individual levels of the decision tree outlined in Figure 2.1, we take a step toward expanding the firm's choice set by combining the choices from different decision nodes. First, we look at what happens when the choices from the top two levels of the firm's decision tree are pooled in a single estimation model. Next, we consider integrating the second and third levels, so that acquisitions within the UK are regarded as part of the menu of location choices available to the potential acquirer. It was suggested earlier that the MNL model (and its variant, the conditional logit model) could not provide appropriate representations of the firm's entire

decision tree because the choices are unlikely to fulfil the IIA restriction. In this section, evidence is provided for this claim.

2.7.1 *The Multinomial Logit (MNL) Model*

We first begin by combining the top two branches of the decision tree. In other words, the firm's decision node involves three choices, viz. acquiring a foreign subsidiary, acquiring a domestic subsidiary, or not acquiring at all. Because the explanatory variables are firm-specific rather than country-specific, the estimation is conducted using a MNL model.

In the previous section, a conditional logit model was used to analyse the choice of location. From the general form of the model given in Equation 2.1, the conditional logit was derived by eliminating the part (represented by the term $\alpha_j'Z_i$) that accounted for variation across individual firms because the variation was purely across choices. In the event that the variation is across individual firms and not across choices, the MNL model can be obtained from the same general form (Equation 2.1)²¹, to give:

$$P_{ij} = P(Y_{ij} = 1) = \frac{\exp(\alpha_j'Z_i)}{\sum_{j=1}^m \exp(\alpha_j'Z_i)}$$

for $j = 1, \dots, m$. In this instance, the term $\alpha_j'Z_i$ is retained while the term that represents variation across choices ($\beta'X_{ij}$) drops out. The main difference between the two is that the conditional logit considers the effects of choice characteristics on the determinants of choice probabilities, whereas the MNL model makes the choice probabilities dependent on individual characteristics only. The questions answered by these models are also different. In the case of the MNL model, we estimate the parameters; then, given a new firm with specified characteristics, we can predict the probability that the firm will choose one of the choices considered. On the other hand, the conditional logit model allows us to predict the probability of choice for a category not considered in the estimation procedure but for which we are given the vector of characteristics X_{ij} . Therefore, the MNL model is more relevant in the context of the firm's current set of choices, since we have variation across individual firms and no variation across choices.

The model implies that we can compute log-odds ratios of the form:

$$\ln \left[\frac{P_{ij}}{P_{ik}} \right] = (\alpha_j - \alpha_k)Z_i'$$

²¹ The description of the MNL model is based on Maddala (1983) and Greene (1997).

This expression shows that the odds ratio does not depend on the other choices, i.e. it does not depend on the attributes of alternatives other than j and k . The MNL model thus has the independence of irrelevant alternatives (IIA) property. Unfortunately, this is not often characteristic of events in the real world.

A standard critique of the IIA property is the red bus-blue bus problem. Consider a group of commuters faced with three modes of transport—a red bus, a blue bus, and a car, denoted by 1, 2, and 3 respectively. Initially, only options 1 and 3 are available, each being selected with equal probability of 0.5. The odds ratio between red buses and cars is thus $(0.5/0.5) = 1$. Subsequently, option 2 is introduced. Apart from their colours, the red and blue buses are identical, so the probability of taking a red bus equals that of taking a blue bus, or 0.25, since the probability of taking a car remains unchanged. This changes the odds ratio between red buses and cars to $(0.25/0.5) = 0.5$, thereby violating the IIA property.

A corollary of the IIA restriction is that the model structure and parameters are unchanged when choice is analysed conditional on a restricted subset of the full choice set. Based on this property, the specification test for the MNL model can be constructed to test the validity of the IIA assumption. The test statistic is

$$\chi^2 = (\alpha_D' - \alpha_C')' (V_D' - V_C')^{-1} (\alpha_D' - \alpha_C'),$$

where C denotes the full choice set, D is a proper subset of C , α_C' and α_D' are the parameter estimates obtained by maximum likelihood on the sets C and D respectively, while V_C' and V_D' are the associated estimates of the covariance matrices of the estimated parameters. Under the null hypothesis that $\alpha_D' = \alpha_C'$, the difference $\alpha_D' - \alpha_C'$ has an estimated covariance matrix $V_D' - V_C'$. The test statistic is asymptotically chi-squared with degrees of freedom equal to the rank of $V_D' - V_C'$. This test is based on Hausman and McFadden's (1984) observation that if the IIA property holds, then removing one alternative should not bring about a significant difference to the estimates obtained with the remaining choices.

In order to estimate the MNL model, we construct a dependent variable which reflects the three discrete choices: 0 for no acquisition, 1 for a domestic acquisition, and 2 for a foreign acquisition. Since these choices are unordered, 0, 1, and 2 essentially serve as labels for each of the three choices. The MNL model is then used to examine the factors that influence the firm's choice. The explanatory variables, *FirmSize*, *R&D*, *R&Dintensity*, *Leverage*, *Profitability*, *Investment* and *Uncertainty*, are retained from Section 2.4.

Table 2.22 presents the results of the MNL estimation (obtained using the “mlogit” command in *Stata 6.0*), where the base category adopted is group 1, i.e. the domestic acquisition option. Note that the results are not affected by the choice of base category—

group 1 was selected for ease of comparison across groups, since it represents the intermediate option. Hence, the “No acquisition” and “Foreign acquisition” columns in Table 2.22 report the effects of a unit increase in the explanatory variable on the odds ratios P_0/P_1 and P_2/P_1 respectively.

TABLE 2.22
Multinomial Logit Model

Explanatory variable	No acquisition	Foreign acquisition
FirmSize ($\times 10^9$)	-0.0579 (-3.34)	0.0750 (5.96)
R&D	-0.5736 (-10.23)	0.9036 (12.29)
R&Dintensity	2.1824 (2.76)	2.1229 (2.58)
Leverage	0.1106 (2.32)	-0.2716 (-2.30)
Profitability	-1.0919 (-6.28)	3.0180 (7.53)
Investment	-0.1862 (-5.64)	0.0348 (0.77)
Uncertainty	1.5534 (3.07)	-15.5978 (-4.55)
Constant	0.6248 (18.81)	-1.5074 (-21.51)
No. of obs.	10246	
Log likelihood	-9226.9	

Note: z-statistics appear in parentheses

These findings are essentially similar to those obtained from the simple logit estimations,²² in terms of the direction and significance of the effects of the explanatory variables. Relative to firms that conduct domestic acquisitions, non-acquirers are smaller, not active in R&D, more highly leveraged, less profitable, less active investors and experience more uncertainty (as found in Section 2.4). Similarly, foreign acquirers are generally larger, active in R&D, less indebted, more profitable and experience less uncertainty (as found in Section 2.5).

In order to carry out the Hausman specification test, we drop one of the choices, viz. Group 0, and re-estimate the model with the remaining two choices. This yields a chi-squared statistic of 47.04 (with 7 degrees of freedom), which strongly rejects the null hypothesis that

²² Specifically, these results are compared against those in Table 2.4, which presented a binary logit in which choices 1 and 2 were grouped, and Table 2.12, which presented a binary logit in which choice 0 was omitted.

the difference in coefficients is not systematic. These findings demonstrate, not surprisingly, that the IIA assumption does not hold in this context. Although the IIA property is theoretically implausible in many applications, empirical studies have shown the MNL model to be relatively robust (as measured by goodness of fit or prediction accuracy) in many cases even where the IIA property fails to hold (McFadden 1984). Despite the failings of the MNL model, these results still provide a useful insight to the factors that influence the firm's acquisition decision.

2.7.2 *The Conditional Logit Model*

The analysis in this section is similar to the location choice model estimated in Section 2.6, except that we now include an additional location, the UK, since domestic acquisitions can also be regarded as another choice in the location decision. In order to examine whether the inclusion of UK acquisitions has a significant effect on the earlier set of results, we use the same set of country-specific factors from Section 2.6. This is with the exception of *ERvolatility* since this variable was calculated relative to the UK£, and the UK£ would have no volatility relative to itself. We rely instead on *StockVolatility* as our measure of uncertainty.²³ Table 2.23 gives the summary statistics of these UK variables.

TABLE 2.23
Means and Standard Deviations of UK Variables

Explanatory variable	Mean	Standard deviation
StockVolatility ($\times 10^{-3}$)	6.521	1.555
GovSpending	21.05	0.7243
Trade	40.92	4.344
DomInvt	17.21	1.799
HiTech	37.82	2.753

Note: Means are across the years 1986-1997.

As before, the dependent variable *Choice* takes on a value of 1 when the location is selected and 0 otherwise. Each observation is accompanied by 7 rows of data, where each row contains data pertaining to one country. For example, for an acquisition occurring in Germany, *Choice* = 1 for that row and 0 for the other 6 rows. The method of setting up the data is similar to the description given in Section 2.6.2, except that in this case an additional

²³ Alternatively, we could attribute zero exchange rate volatility (against the UK£) to the UK location. While exchange rate volatility is found to be negatively correlated with the propensity to acquire, this does not alter the effects of the other explanatory variables (presented in Table 2.24).

row representing the UK is inserted for each observation. With a total of 8490 acquisitions (2997 foreign acquisitions + 5493 domestic, or UK, acquisitions), we have $8490 \times 7 = 59430$ rows of data.

The results of the conditional logit estimation, with UK being one of the locations, are presented in Table 2.24.

TABLE 2.24
Choice of Acquisition Location (including UK)

Explanatory variable	Odds ratio
StockVolatility ($\times 10^{-3}$)	0.8748 (-7.39)
GovSpending	1.630 (14.89)
HiTech	1.027 (2.80)
Trade	1.044 (6.97)
DomInvt	1.046 (3.18)
UK	1.234 (1.20)
US	6.802 (6.19)
France	0.3521 (-7.46)
Germany	0.1112 (-10.44)
Netherlands	0.09313 (-5.19)
Australia	0.3490 (-4.95)
No. of observations	59430
Log likelihood	-9170.3
Pseudo R^2	0.4449

Note: z-statistics appear in parentheses

Again we find resonance between this set of results and the earlier conditional logit model estimated in Section 2.6.3. The probability of a country being selected is found to be influenced by the volatility of the investment option, so decreasing *StockVolatility* serves to enhance the attractiveness of the host country. The directions of the effects of the remaining variables also agree with the non-UK version of the conditional logit model, although the magnitudes of these effects differ. Whether the IIA restriction holds will depend on the significance of these differences. Table 2.25 compares the estimated coefficients obtained

from the two models, where they are labelled (1) and (2) respectively for the models without and with the UK. For this purpose, these coefficients are not expressed as odds ratios. Based on these calculations, the chi-squared statistic is 54.27 with 10 degrees of freedom. As before, we reject the hypothesis that the difference between the coefficients is not systematic, and infer that introducing the UK as an additional location leads to a violation of the IIA assumption.

TABLE 2.25
Comparison of Conditional Logit Estimates

Explanatory variable	(1)	(2)	Difference: (1) – (2)	Standard error
StockVolatility	-0.03231	-0.1338	0.1015	0.01747
GovSpending	0.1593	0.4888	-0.3295	0.02586
HiTech	0.02639	0.02653	-0.00014	0.00611
Trade	0.01708	0.04279	-0.02571	0.00338
DomInvt	0.1074	0.04508	0.06229	0.01377
US	2.245	1.9173	0.3273	0.1675
France	0.2785	-1.044	1.322	0.1538
Germany	-0.3279	-2.196	1.868	0.1947
Netherlands	-0.8630	-2.374	1.511	0.2288
Australia	-0.5651	-1.053	0.4876	0.09127

2.8 The Nested Multinomial Logit (NMNL) Model

In Section 2.7, we find that grouping together choices from different nodes in the decision tree (Figure 2.1) leads to a violation of the IIA assumption. Clearly, the multinomial and conditional logit models are not appropriate for the firm's acquisition decision when faced with a diverse range of choices, some more closely related than others. In this section, we re-estimate models of the firm's complete set of acquisition choices using the NMNL model, since this does not impose the IIA assumption. Section 2.8.1 first explains how the NMNL model is estimated, while Section 2.8.2 presents the results.

2.8.1 Theoretical Background²⁴

The firm's choices are estimated in the form of an NMNL model. The (unobserved) value to the firm of choosing each strategy can be expressed as:

$$V_{afc} = \alpha X_{afc} + \beta Y_{af} + \gamma Z_a + \varepsilon_{afc}$$

where Z_a , Y_{af} and X_{afc} refer to vectors of explanatory variables that determine respectively (i) whether or not the firm makes an acquisition, (ii) whether the firm makes the acquisition in a

²⁴ The theory of the NMNL model was obtained from McFadden (1981) and Maddala (1983).

foreign or domestic market, and (iii) the location of the foreign acquisition. The explanatory variables Z_a and Y_{af} vary across firms, while X_{afc} varies across countries (for simplicity of exposition firm and country subscripts are not included). Although V_{afc} is unobservable, it can be regarded as a latent variable that is manifested through an indicator, u_j , denoting a firm's choice of a particular outcome j , such that:

$$u_j = 1 \quad \text{if } V_j = \max (V_1, V_2, \dots, V_J)$$

$$u_j = 0 \quad \text{otherwise.}$$

In this case, $J = 8$ (the choices being *no acquisition, domestic, US, France, Germany, Netherlands, Australia* and *Spain*), corresponding to the 8 outcomes in Figure 2.1. McFadden (1981, 1984) shows that if the residuals ε_j are independently and identically distributed with the type I extreme value distribution, applying the multinomial logit formula yields the following probability of outcome j being selected:

$$P_{afc} = \frac{\exp(V_{afc})}{\sum_{l=1}^2 \sum_{m=1}^2 \sum_{n=1}^6 \exp(V_{lmn})}$$

This can be rewritten as the product of the conditional probabilities of each choice:

$$P_{afc} = P_{c|a,f} \times P_{f|a} \times P_a$$

Since the conditional probability $P_{c|a,f}$ only involves the parameter α , it can be expressed as:

$$P_{c|a,f} = \frac{\exp(\alpha'X_{afc})}{\sum_{n=1}^6 \exp(\alpha'X_{afn})}$$

Define the inclusive value as

$$I_{af} = \log \left[\sum_{n=1}^6 \exp(\alpha'X_{afn}) \right]$$

Then using this definition we obtain the following expression for $P_{f|a}$:

$$P_{f|a} = \frac{\exp(\beta'Y_{af} + I_{af}\lambda_{af})}{\sum_{m=1}^2 \exp(\beta'Y_{am} + I_{am}\lambda_{am})}$$

λ_{af} and λ_a (below) are parameters to be estimated on the constructed inclusive values, along with the parameters α , β , and γ on the other explanatory variables. In other words, the inclusive values I_{af} and I_a are regarded as additional explanatory variables in the model. We define another set of inclusive values as

$$I_a = \log \left[\sum_{m=1}^2 \sum_{n=1}^6 \exp(\alpha'X_{amn} + \beta'Y_{am}) \right] = \log \left[\sum_{m=1}^2 \exp(\beta'Y_{am} + I_{am}\lambda_{am}) \right]$$

Then the probability P_a is given by

$$P_a = \frac{\exp(\gamma Z_a + I_a \lambda_a)}{\sum_{l=1}^2 \exp(\gamma Z_l + I_l \lambda_l)}.$$

Each stage in the tree is thus described by a logit model that we have encountered previously (top two stages are binary logits, whilst bottom stage is a conditional logit) with one of the explanatory variables being an “inclusive value” which summarises the attributes of alternatives below a node. The inclusive value terms I_{af} and I_a measure the expected aggregate value of each subset while their coefficients λ_{af} and λ_a are measures of the independence of alternatives belonging to a particular subset. The “nested” aspect of the model arises when these parameters differ from 1. If $\lambda_{af} = \lambda_a = 1$, the error terms are independently and identically distributed with the Type I extreme value, i.e. the unconditional probability reduces to the probability for a one-level model. Hence, IIA holds for all choices in the model.

Relative to the multinomial or conditional logit models, the NMNL model incorporates greater flexibility in the decision-making process by relaxing the IIA assumption, thereby avoiding the red bus-blue bus problem described previously. Consider, for example, the choice between making an acquisition in the US and acquiring a domestic firm. It seems implausible that the probability of acquiring a US firm relative to acquiring a domestic firm is independent of the option of acquiring a firm in France. The NMNL model is thus more appropriate in this context, where the assumption of IIA is required only at each level of the decision tree.²⁵ Moreover, the NMNL model allows for a different set of explanatory variables at each level. Given the nature of the acquisition choices, we therefore require country-specific attributes at the bottom level and firm-specific attributes at the top two levels of the decision tree. Interesting recent applications of the NMNL structure include the modelling of consumer demand in the US automobile industry (Goldberg, 1995) and locational decisions of US multinationals (Devereux and Griffith, 1998).

2.8.2 Results

The three nodes of the decision model that were previously studied individually (in Sections 2.4-2.6) are now combined and estimated as a single NMNL model according to the

²⁵ While it would be possible to extend the decision tree (in Figure 2.1) beyond three levels (e.g. by introducing an additional node where the firm decides between acquiring within or outside Europe), initial experiments reveal that such alternative configurations do not perform significantly better than the three-level decision tree employed in these analyses.

specification in Figure 2.1. The sample comprises 10480 observations, just over half of which (52.6 percent) choose no acquisition and 32.5 percent choose domestic acquisitions. Foreign acquisitions in the US, France, Germany, the Netherlands, Australia and Spain make up 8.0, 2.2, 1.8, 1.3, 0.9 and 0.8 percent of the sample respectively. The results presented in Table 2.26 are obtained with the “nlogit” command in *Limdep 7.0*. Because the choices *no acquisition* and *domestic* do not give rise to further choices while their corresponding alternatives (*acquisition* and *foreign*) do, we have two degenerate branches in the model, for which inclusive values cannot be calculated. The normalisation method involves fixing their inclusive value parameters to be equal to zero. Full information maximum likelihood (FIML) estimation can be applied to the NMNL model, provided that the number of parameters and the size of the choice set are not too large. The parameters of this model are thus selected to incorporate as many of the explanatory variables (that have been used in the previous sections) as this constraint would allow, beyond which convergence of the numerical optimisation procedure is not possible.

The models in columns 1-4 of Table 2.26 differ in terms of how their inclusive value parameters are computed. In column 1, both inclusive value parameters, λ_{af} and λ_a , are estimated along with the other coefficients, according to the NMNL procedure described above. Columns 2-4 investigate what happens when we deviate from this fully nested structure by fixing the inclusive value parameters at certain values, i.e. 0 or 1 (described further in this section). For example, in column 4, the inclusive value parameter for I_a is set equal to 1, which effectively collapses the top two levels of the decision tree into a single level. This also imposes the IIA restriction on the choices within this level—comparing it with the original NMNL model (in column 1) thus allows us to examine how the restriction affects the estimates obtained.

McFadden (1984) shows that for a nested structure to be consistent with random utility maximisation, the coefficients of the inclusive value terms (λ_{af} and λ_a) must lie within the unit interval. Values of λ_{af} and λ_a outside the unit interval imply that one of the expected magnitude rankings is violated, which could be the result of a mis-specified hierarchical structure. The coefficients on the relevant inclusive values, denoted I_{af} and I_a , confirm that the model presented in column 1 of Table 2.26 satisfies this requirement. The coefficients on the firm- and country-specific explanatory variables also show that the relationships between these variables and their respective acquisition choices are generally consistent with the earlier findings.

At the bottom level of the decision tree, the firm's choice of foreign location is negatively associated with the location's volatility, represented by the country's exchange rate (with the UK currency) and movements in its stock market index. At the next level, firms that acquire abroad are generally larger, more active in R&D, less indebted, more profitable, and subject to less share price volatility (at the firm-level) relative to firms that acquire domestically, all of which are similar to the results obtained from analysing each decision node separately. Likewise, the choice between acquiring and not acquiring at the top level is positively correlated with R&D activity, profitability and past investment, and negatively correlated with R&D intensity (earlier found to be driven by acquirers with high R&D intensities), leverage and uncertainty.²⁶

As a means of demonstrating how the firm-specific variables influence the choice of acquisition, the estimates obtained in column 1 of Table 2.26 are used to compute predicted probabilities for a representative firm. The representative firm's characteristics are set equal to the sample mean for each variable. The coefficient vector produced by the initial estimation is used to calculate the predicted probabilities. Next, the value of *FirmSize* is increased from its mean value by 10 percent, and the predicted probabilities are recalculated. The changes in predicted probabilities can thus be obtained by subtracting the first prediction from the second prediction. The *FirmSize* value is then restored to its original mean value before conducting the same procedure on another explanatory variable. In this way, the changes in predicted probabilities are computed for each of the variables in turn. In all cases, the variables are increased by 10 percent (from their respective mean values), except *R&D* which, being a dummy variable, is set initially at 1 and then changed to 0.

The resulting changes in predicted probabilities are reported in Table 2.27. Because there are essentially three choices that are represented by the top and middle levels, a change in each variable is accompanied by changes in three predicted probabilities—the no-acquisition choice, the domestic acquisition choice, and the foreign acquisition choice. Breaking up the effects of each variable in this way provides a clearer picture of how changes in their values translate into changes in the probability of a particular acquisition choice being made. For example, we have found that at the top level of the decision tree, uncertainty reduces the propensity to make an acquisition (relative to not making an acquisition). Table 2.27 shows that an increase in uncertainty actually increases the probability of a domestic

²⁶ *FirmSize* is absent from the acquisition vs. no acquisition node because its inclusion at this level would result in a mis-specified hierarchical structure (indicated by a negative inclusive value parameter). This suggests that there is no effect of *FirmSize* on this level of the acquisition decision beyond that which has already been captured by the inclusive value term.

acquisition being undertaken. In other words, the negative impact of uncertainty that was found previously was entirely driven by its effect on foreign acquisitions.

Given that most of the variables included in the middle level are also present in the top level, we study whether imposing the nested structure alters the effects of these variables. Since the two levels are linked via the inclusive term (denoted I_a), we sever this link by restricting the parameter of I_a to be 0, which effectively converts the top level into a binary logit model. The results of the re-estimated model are in column 2 of Table 2.26.²⁷ The estimates from columns 1 and 2 are very similar, which is not surprising considering that the estimated inclusive value parameter for I_a (in column 1) was 0.009 and not significantly different from zero. Hence, these findings are fairly robust to the choice of model specification—specifically, either the NMNL or the binary logit model. Their robustness to other specifications is tested in columns 3 and 4.

While the inclusive value parameter obtained for I_a was close to zero, the value of 0.63 (t -statistic = 14) on the other inclusive value parameter I_{af} indicates that the choice of foreign location contributes significantly to the foreign vs. domestic acquisition decision. In order to study the effect of removing the link between the middle and bottom levels, we set the inclusive value parameter for I_{af} to zero.²⁸ This means that the middle level is estimated independently from the bottom level. The results in column 3 of Table 2.26 show that the estimated effects of some variables on the foreign vs. domestic acquisition choice differ from what was found previously (in column 1). In particular, the negative effects of *Leverage* and *Uncertainty* have become much more pronounced, while the positive effect of *Profitability* is no longer present.

²⁷ Because there is no longer an inclusive value to capture the effect of *FirmSize* from the middle level, the variable *FirmSize* is reintroduced at the top level as a proxy for the inclusive value term. Otherwise, the optimisation procedure fails to converge. *FirmSize* has a positive effect on the acquisition (relative to no acquisition) choice, with an estimated coefficient of 0.1025 (z -statistic = 6.92). Based on the results from column 1, this is likely to be carried over from its effect on the foreign vs. domestic acquisition choice.

²⁸ With the parameter on I_{af} fixed at 0, a negative parameter on I_a was initially obtained. Since previous estimates have shown that this parameter was almost zero, and negative inclusive value parameters are not consistent with the utility maximisation paradigm, the parameter for I_a was set equal to zero and the model re-estimated without the inclusive value term.

TABLE 2.26
Nested Multinomial Logit (NMNL) Estimates

Explanatory var.	(1)	(2)	(3)	(4)
Choice of foreign location				
ERvolatility (x10 ⁻³)	-0.1858 (-5.68)	-0.1857 (-5.67)	0.0183 (0.48)	0.0183 (0.48)
StockVolatility (x10 ⁻³)	-0.4003 (-18.60)	-0.4002 (-18.60)	-0.0640 (-2.08)	-0.0640 (-2.08)
US	1.4078 (16.06)	1.4086 (16.08)	2.2844 (18.52)	2.2844 (18.52)
France	0.1496 (1.50)	0.1503 (1.51)	1.0470 (8.04)	1.0470 (8.04)
Germany	0.0373 (0.35)	0.0383 (0.36)	0.8822 (6.60)	0.8822 (6.60)
Netherlands	-0.8120 (-7.41)	-0.8109 (-7.41)	0.4769 (3.30)	0.4769 (3.30)
Australia	-0.1612 (-1.11)	-0.1610 (-1.11)	0.1564 (0.93)	0.1564 (0.93)
Foreign vs. domestic acquisition				
FirmSize (x10 ⁹)	0.2149 (10.16)	0.2130 (10.92)	0.1942 (10.51)	0.1323 (10.14)
R&D	0.4626 (6.22)	0.4617 (6.22)	0.1501 (2.15)	0.3763 (5.72)
R&Dintensity	6.4309 (4.16)	6.4145 (4.16)	5.5643 (3.51)	5.1213 (3.77)
Leverage	-0.6512 (-5.09)	-0.6518 (-5.10)	-2.0871 (-17.85)	-2.3712 (-21.58)
Profitability	2.1703 (5.55)	2.1627 (5.55)	0.1833 (0.67)	0.5347 (2.05)
Investment	0.0120 (0.26)	0.0112 (0.25)	-0.0720 (-1.51)	-0.0059 (-0.13)
Uncertainty	-14.1497 (-4.47)	-14.0253 (-4.53)	-34.8685 (-7.92)	-73.7125 (-13.43)
<i>I_{af}</i> (incl. value)	0.6312 (13.99)	0.6301 (14.07)	0 (Fixed)	0 (Fixed)
Acquisition vs. no acquisition				
R&D	0.7358 (13.83)	0.6281 (12.71)	0.7410 (15.51)	0.2691 (4.83)
R&Dintensity	-2.4823 (-2.80)	-2.2208 (-2.53)	-2.4631 (-2.79)	-4.6864 (-3.90)
Leverage	-0.4692 (-10.70)	-0.5096 (-11.66)	-0.4669 (-10.98)	-0.7180 (-14.62)
Profitability	1.1995 (7.81)	1.1224 (7.70)	1.2082 (8.13)	0.5003 (3.88)
Investment	0.1267 (4.28)	0.1296 (4.39)	0.1271 (4.30)	0.0725 (2.39)
Uncertainty	-4.2274 (-6.64)	-4.1245 (-6.55)	-4.2289 (-6.64)	-3.8465 (-6.18)
<i>I_a</i> (incl. value)	0.0092 (0.22)	0 (Fixed)	0 (Fixed)	1 (Fixed)
Log likelihood	-12188.7	-12152.2	-12218.7	-12489.13

Note: z-statistics appear in parentheses

TABLE 2.27
Changes in Predicted Probabilities of Acquisition Choices
 (based on Estimates from Table 2.26, column 1)

Explanatory variable	No acquisition	Domestic	Foreign
FirmSize (x10 ⁹)	-0.00001	-0.00223	0.00225
R&D	0.17596	-0.04317	-0.13278
R&Dintensity	0.00041	-0.00096	0.00055
Leverage	0.00380	0.00143	-0.00523
Profitability	-0.00075	-0.00050	0.00125
Investment	-0.00058	0.00029	0.00029
Uncertainty	0.00095	0.00162	-0.00257

As we have done in Table 2.27, predicted probabilities are calculated for a representative firm with characteristics set equal to the mean values of the respective explanatory variables. The probability of a domestic acquisition occurring at these values is 0.43, as compared with 0.36 in model (1). Conversely, the probability of a foreign acquisition occurring falls from 0.28 (in model 1) to 0.21. In other words, when country choices at the bottom level are not taken into consideration in the estimation of the foreign vs. domestic acquisition choice, a firm (with mean characteristics) is found to be less likely to acquire abroad, and hence more likely to undertake a domestic acquisition. Therefore, consideration of the availability of alternative country locations is found to enhance the attractiveness of the foreign acquisition choice.

In the last column of Table 2.26, the parameter on I_a is fixed at the value of 1, so that the top two levels of the decision tree are jointly estimated as a one-level multinomial logit model.²⁹ Therefore, this model assumes that IIA holds for the *no acquisition*, *domestic*, and *foreign* choices. Relative to the results in column 3 (which is identically specified except for the parameter on I_a), the effects of the variables are distinctly different when the model is estimated in this way. In the foreign vs. domestic acquisition choice, the positive effect of *Profitability* has become significant (where it was not previously), the negative effect of *Investment* has lost its significance, while the effects of *R&D* and *Uncertainty* have more than doubled in magnitude. In the acquisition vs. no acquisition choice, the effects of *R&D* and *Profitability* are much weaker (though still significant), while the effects of *R&Dintensity* and *Leverage* are significantly stronger. In this instance, the choice of model specification crucially affects the values of the parameter estimates.

²⁹ To compensate for this restriction that we impose, the parameter on the other inclusive value I_{af} has to be fixed at 0, i.e. to allow the top two levels to be estimated independently of the bottom level. Otherwise, convergence is not possible, suggesting that the specification is inconsistent with random utility maximisation.

2.9 Conclusion

The acquisition choice model was founded upon the rationale that a study of acquisition behaviour could not be confined to one particular type of acquisition, because a firm was likely to encounter various investment opportunities which could influence its eventual decision. In consideration of potential IIA violations, the menu of choices available to a potential acquirer was represented by a decision tree, in which closely related alternatives were assigned to the same decision node. We subsequently confirmed that the IIA assumption failed to hold across choices from different levels of the decision tree. For example, the foreign vs. domestic acquisition decision was affected by the foreign location choices that were available. We also found that violating the IIA assumption could significantly alter the effects of explanatory variables in models, such as the multinomial logit, that relied on the validity of the IIA assumption.

Using the decision tree framework, we examined the influence of various factors on acquisition decisions of UK firms over the period 1986-1997. At the first decision node which involved choosing between acquiring and not acquiring, larger and more profitable firms were more likely to undertake an acquisition. This indicates that a firm's experience in managing a diverse network of operations predisposes it toward making acquisitions. Firms with relatively low leverage ratios were also more likely to undertake acquisitions, a result that is consistent with the free cash flow hypothesis, as well as the view that the higher cost of external funding deters firms from spending on acquisitions.

In the analysis of the foreign vs. domestic acquisition choice, experience was again found to be a crucial determinant—in this case foreign acquirers were more likely to be the firms with more experience, as measured by firm size and profitability. Apart from organisational experience, firms that had established their presence in overseas markets were also more likely to undertake foreign acquisitions. This was confirmed by variables that measured the proportion of a firm's output that was produced, as well as sold, outside the UK. In corroboration with the internalisation theory, foreign acquirers were also more active in R&D and more R&D-intensive, R&D being a proxy for knowledge-based proprietary assets.

In the choice of foreign location, host countries with more conducive business environments (which could be attributed to well-developed infrastructure or positive externalities from agglomeration of industries) were better at attracting foreign investors. Another factor that enhanced the attractiveness of the host country was its openness to trade, which served as an indication of its demand for foreign products.

A further question that we sought to address was the way in which uncertainty influenced the acquisition decision. At each of the three decision nodes, the role of uncertainty was examined through one or more proxy variables, such as the volatility of the firm's share price, or the volatility of a country's stock market index. In all of these cases, uncertainty was found to deter an acquisition from being undertaken, consistent with the theory of real options.

These results have shown that a firm's acquisition decision is influenced by various firm-specific characteristics, as well as attributes of the acquisition choices that are available. Based on these observations, can we conclude that firms exhibiting a preference for a particular type of acquisition would necessarily fare better in such acquisitions? For example, since foreign acquirers are more likely to be large firms (rather than smaller ones), does this mean that large firms benefit more from foreign acquisitions? The underlying concern that motivates these questions is whether firms have made the right choice, in terms of choosing acquisitions to enhance their firm value. In order for this to be true, we would have to assume that all firms had perfect information about an acquisition's prospects and sought to maximise the value of the firm. Given that these assumptions are often violated, a firm's preference for a certain type of acquisition may not translate to how it eventually performs. We take a step towards assessing the merits of a firm's acquisition decision by first examining its acquisition performance. This is pursued in the following two chapters, each of which employs one means of evaluating the performance of a group of firms that have undertaken foreign acquisitions.

2.10 Data Appendix

This appendix describes the variables used in the analyses and the sources from which they were obtained.

Cashflow: Cash flow divided by total assets. Source: *Extel*.

DomInvt: Gross domestic investment (% of GDP), where gross domestic investment consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential dwellings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales. Source: *World Development Indicators*.

ERvolatility: Average of the absolute values of daily returns (over a one-year period) in the exchange rate of a country, relative to the UK£. Source: *FT Prices*.

FirmSize: The total net book value of all assets. Source: *Extel*.

ForeignMkt: Share of a firm's sales that is earned from sales in foreign markets. Source: *Extel*.

ForeignProd: Share of a firm's sales that is produced outside the UK. Source: *Extel*.

GovSpending: General government consumption (% of GDP), where general government consumption includes all current expenditures for purchases of goods and services by all levels of government, excluding most government enterprises. It also includes capital expenditure on national defence and security. Source: *World Development Indicators*.

HiTech: High-technology exports (% of manufactured exports), where high-technology goods are goods produced by industries (based on US industries) that rank in the top 10 according to R&D intensities. Manufactured exports are the commodities in the SITC, revision 1, sections 5-9 (chemicals and related products, basic manufactures, manufactured articles, machinery and transport equipment, and other manufactured articles and goods not elsewhere classified), excluding division 68 (nonferrous metals). Source: *World Development Indicators*.

Ind10-Ind98: Industry dummies for each 2-digit SIC sector. Source: *Extel*.

Investment: Expenditure on tangible assets as a fraction of the existing stock of tangible fixed assets. Source: *Extel*.

Leverage: Total debt divided by total assets. Source: *Extel*.

Mfg: Dummy variable set equal to 1 for manufacturing firms (based on primary SIC codes beginning with 2, 3 or 4), and 0 otherwise. Source: *Extel*.

Profitability: Net income divided by total assets. Source: *Extel*.

R&D: Dummy variable set equal to 1 for firms that report expenditures on R&D, and 0 otherwise. Source: *Extel*.

R&Dintensity: R&D expenditure divided by sales revenue. Source: *Extel*.

StockVolatility: Average of the absolute values of daily returns (over a one-year period) in the stock market index. Source: *FT Prices*.

Trade: Trade (% of GDP, PPP), i.e. the sum of merchandise exports and imports measured in current U.S. dollars divided by the value of GDP converted to international dollars using purchasing power parity conversion factors. Source: *World Development Indicators*.

Uncertainty: Variance of daily stock returns over a one-year period, scaled by the debt/equity ratio. Sources: *FT Prices* (for share price data) and *Extel* (for debt and equity data).

US, France, Germany, Netherlands, Australia, Spain: Country dummies for each foreign acquisition location. Source: *Acquisitions Monthly*.

Year86-Year97: Dummy variables for each year in which the acquisition choice is observed, from 1986 to 1997. Sources: *Extel* and *Acquisitions Monthly*.

3. EVALUATING THE PERFORMANCE OF FOREIGN ACQUISITIONS: POST-ACQUISITION PROFITABILITY

3.1 Introduction

In this chapter, we evaluate the impact of a foreign acquisition on the acquiring firm by measuring changes in profitability that occur around the acquisition period. Profitability provides a good indication of a firm's performance, whether in terms of its operating efficiency or market power. An improvement in the efficiency of a firm (defined as a reduction in the resources required to produce a given output) will lead to an improvement in profitability. Similarly, profit gains can arise from improved bargaining power (at the expense of the firm's suppliers), or from improved market power within an imperfectly competitive industry. Hence, regardless of whether acquisitions are motivated to achieve efficiency gains or to strengthen market power, they should, provided that their managers are seeking to maximise profits, result in an increase in the firm's profitability.

Nevertheless, a failure to detect improvements in profitability should not immediately suggest that managers are pursuing non-profit maximising objectives. Given the immense uncertainties involved in foreign direct investment, it is possible to have returns that differ greatly from expectations—firms often discover that investments deemed profitable *ex ante* could turn out otherwise *ex post*. Since cost-benefit evaluations are heavily dependent on various assumptions (e.g. about host country conditions) that have yet to be realised, we would expect a large variation in the set of possible outcomes resulting from alterations to these assumptions. Perhaps the existence of numerous failed acquisitions lends sufficient testimony to the difficulties faced by acquirers in forecasting the returns of their investments. The consequences of forecasting errors are further magnified for large acquisitions that command significant premia over their underlying values. While the cashflows of a potential target firm may be fairly easy to value, the acquirer pays a premium upon purchasing the firm in the hope of realising higher returns. Furthermore, companies have been found to pay significantly higher mean takeover premia for foreign investments than for domestic ones (Harris and Ravenscraft, 1991; Cebenoyan et al., 1992; Swenson, 1993). Whether or not these high premia can be justified by subsequent gains in profitability remains questionable. While we expect a distribution of post-acquisition outcomes, this chapter will explore how the

specific conditions pertaining to each acquisition influence where the outcome is located within the distribution. Therefore, apart from evaluating whether foreign acquisitions have been successful per se, we seek a clearer understanding of the structural conditions that influence the post-acquisition performance of the acquiring firm.

Given that acquisitions may not necessarily be undertaken with profit-maximising objectives in mind, the desired outcome of an acquisition may not always be an increase in the acquiring firm's future stream of earnings. Instead, a manager whose job security is linked to the survival of the firm may attempt to reduce the volatility of the firm's earnings through acquisitions, even at the expense of overall profits. In order to capture either of these outcomes, we adopt two performance criteria. The first measures the impact of an acquisition on the acquirer's profit levels, while the second measures the variability of the acquirer's post-acquisition earnings stream.

In the previous chapter, we tested the viability of various theories in the literature using pre-acquisition characteristics that were observed in the acquiring firms. The post-acquisition performance of these firms provides another means of assessing the applicability of these theories in explaining acquisition behaviour. Hence, from these results we can determine whether the predictions of the theoretical models are borne out in the performance outcomes.

3.2 Sample Selection

To examine the factors affecting the acquirer's post-acquisition performance, we gather data on foreign acquisitions undertaken by publicly traded UK firms for the five-year period from 1989 to 1993. Acquisitions of foreign subsidiaries as going concerns are used as our primary indicator of investment activity because these constitute a large proportion of overseas investment relative to greenfield investment. Moreover, there has been a clear trend over time that foreign direct investment is shifting away from greenfield and toward acquisition (Graham and Krugman, 1993). For example, the proportion of inward FDI to the US from major investors—viz. Canada, France, Germany, Netherlands, UK and Japan—accounted for by acquisition expenditures has risen from 81 percent in 1980 to 88 percent in 1990 (Swenson, 1993).

By treating acquisitions as specific events in the history of the acquiring companies, we study the impact of these investments on the performance of the acquirer in the years after these acquisitions are made. The source of information for these foreign transactions is the *Acquisitions Monthly* journal, which publishes monthly rosters of mergers and acquisitions

transactions involving UK companies. From these rosters, the transactions are selected according to the following criteria¹:

- i) The size of the acquired company has to be at least 5 percent that of its acquirer. Since the analysis is concerned with the impact that acquisitions would have on the acquirer, a 5 percent cut-off is chosen as larger acquisitions are more likely to generate a significant impact.² The relative size is computed by taking the ratio of the sales revenue of the acquired to the acquiring company. If these figures are not available for the acquired firm (which happens for about one-third of the acquired firms), its purchase price is compared to the market value of the acquiring firm instead. Sales revenue and market capitalisation data for acquiring firms are obtained from *Acquisitions Monthly* and the Financial Times' *Extel* database, while corresponding data for acquired firms are from *Acquisitions Monthly*.
- ii) The acquisition has to give the acquiring company a controlling stake, i.e. acquisitions of or increases in partial interests are omitted.
- iii) The acquirer has to be a single public company and not a consortium or investor group.

Based on these procedures a sample of 284 acquiring firms was obtained. However, company accounts data (which is required in the analysis that follows) was not available for 28 of these firms, possibly because some of the acquirers themselves disappeared through merger or otherwise, resulting in a final sample of 256 firms.³ Since the second outcome variable (described below) requires observations that span over a longer time period, the lack of data in the later years for some acquirers reduces the sample to 214. This is because the probability of the acquirer disappearing through merger, takeover or bankruptcy is higher over the longer time horizon.

The figures 256 and 214 reflect the number of firms that made acquisitions, not the number of acquisitions that occurred, in the time period being studied. The difference arises because some firms made more than one large foreign acquisition, and in cases where the acquisitions are closely related (i.e. in terms of region, time, and line of business), they are grouped as a single observation. Of the 256 acquiring firms in the sample, 82 firms are

¹ The sample selection criteria and data analysis method are similar to those employed in Lee and Caves (1998) in order that the results obtained here can be compared with that study (re: Section 3.8).

² Although a 10-percent threshold was initially employed, that cut-off yielded too small a sample. In the investigation that follows tests are carried out to detect whether acquisitions of varying sizes perform differently.

³ Given that there may be systematic differences between surviving and non-surviving acquirers which would not be detected when they are analysed together, we study each group of acquirers separately in a subsequent section on robustness checks (re: Section 3.7.2).

multiple acquirers, i.e. they have conducted two or more acquisitions.⁴ For the purpose of calculating the relative size variable, the size of the combined acquisition is thus taken to be the sum of its individual components. In other cases where the acquirer engaged in unrelated acquisitions (e.g. if the acquisitions were more than a year apart), only the latest acquisition that appears in the sample period is considered.⁵ This is based on the rationale that the last acquisition is likely to exert the strongest influence over the post-acquisition performance when measured from its acquisition date.

Information on the performance and characteristics of the acquiring firms is derived from the Financial Times' *Extel* database, where information on company accounts resides in the section entitled *Company Analysis*. For the purpose of constructing the profitability measure (described in the following section), data is collected from 1986 (three years prior to the year of the first acquisition) to 1999 (six years after the year of the last acquisition). Each acquirer's primary SIC code is also noted so that characteristics of the acquirers can be compared with data (over the same time period) for a control group comprising other publicly traded UK companies in the same industry. These industry categories are defined according to their 2-digit SIC codes, which in turn are used to generate a list of companies that report the same primary 2-digit industry in *Extel's* database. *Extel* is also used to compute the (unweighted) average values of the required variables for all the companies that are listed under each 2-digit industry.

3.3 Constructing the Measure of Profitability

The challenge in assessing the performance of the acquirer is to avoid the effects of confounding disturbances and other changes in the firm's opportunities. Since variations over time in the acquirer's profits are closely linked with shocks to its domestic industry, these shocks are controlled for using a differences-in-differences approach, which gives a measure of the change (over time) in the company's profitability relative to other firms in the same industry. The first set of differences yields the change in the acquirer's (unadjusted) profitability, which is calculated by subtracting its pre-acquisition profitability from its post-acquisition profitability.⁶ The second level of differences is generated by subtracting the

⁴ Since we found no systematic differences (whether in terms of pre-acquisition characteristics or post-acquisition performances) between multiple acquirers and one-time acquirers, in the analyses that follow the sample comprises both types of acquirers.

⁵ There are 15 such cases, which constitutes a small percentage of the acquiring firms. We nonetheless conduct some sensitivity analyses, and find that the results are robust to different ways of treating this group of acquirers, which includes omitting them entirely as well as treating each acquisition as a separate observation.

⁶ While it would have been more accurate to use the combined profitability of the acquired and acquiring firms as the measure of pre-acquisition profitability, data on acquired foreign firms is largely unavailable. Moreover,

change in the (unweighted) average profitability of firms in a control group over a corresponding period of time. (The selection of the control group, comprising other publicly listed UK firms that operate in the acquirer's primary 2-digit SIC industry, was described in the previous section.) This differences-in-differences measure purges the estimates of bias that may result from omitted variables specific to a particular industry. For example, an improvement in the acquiring firm's profitability could be due to a sudden fall in the price of one of its inputs. Since the ramifications of such exogenous shocks are likely to be experienced by other companies operating in the same industry, the differences-in-differences technique allows them to be differenced away as we are only concerned with profitability effects attributable to the acquisition.

Profitability is here defined as net income⁷ divided by sales. This is akin to the profit margin on sales measure that has been used in estimates of a firm's market power. A purely competitive industry can realise economic profits (i.e. the surplus of revenue over cost) under short-run disequilibrium conditions but not over the long run where firms should expect to earn a normal rate of return. In industries where barriers to entry prevent new firms from entering and eroding supra-normal profits, incumbent firms may be able to enjoy such profits for a long time or even indefinitely. Since most firms produce multiple products, the ratio of excess profit to normal cost (i.e. sales revenue) is regarded as a good proxy for the Lerner index, signalling the ability of a firm to elevate price above average cost (Schmalensee, 1989; Scherer and Ross, 1990). Although sales revenue can be replaced with assets or equity in the denominator, asset values are often beset by problems in measuring capital stocks, while increases in leverage make the residual return to equity more variable. Subsequent findings are also checked for robustness to alternative definitions of profitability other than the ratio of net income to sales (results of which are presented in Section 3.7.3).

The year in which the acquisition occurs is normalised as $t = 0$. π_{it} represents the profitability of firm i in year t , while π_{ct} is the equivalent measure for the industry control group c . The pre-acquisition profitability is the average profitability over the three years (i.e. $t-3$, $t-2$ and $t-1$) before the acquisition. The post-acquisition years are divided into two time periods, the first representing a short-run adjustment period s (from $t+1$ to $t+3$) and the second over a longer-term l (from $t+4$ to $t+6$) to investigate possible sustained effects as a

it is not possible to obtain a consistent measure of profitability, given the different accounting conventions used across countries. In reviewing the results, we should bear in mind that if acquired firms have systematically lower profitability relative to their acquirers, estimated changes in profitability would be more negative (or less positive) than their true values.

result of the acquisition. Hence, data from the year of the acquisition (i.e. year t) is not used, since it is likely to be particularly affected by variations in the treatment of acquisitions under different accounting practices.

For the first time-period s , the industry-adjusted change in firm i 's profitability after the acquisition is thus given by:

$$\begin{aligned} \Delta\pi_{is} = & (1/3)(\pi_{i,t+1} + \pi_{i,t+2} + \pi_{i,t+3}) - (1/3)(\pi_{i,t-3} + \pi_{i,t-2} + \pi_{i,t-1}) \\ & - [(1/3)(\pi_{c,t+1} + \pi_{c,t+2} + \pi_{c,t+3}) - (1/3)(\pi_{c,t-3} + \pi_{c,t-2} + \pi_{c,t-1})] \end{aligned}$$

Similarly, for the second time period, the corresponding adjusted profitability measure is:

$$\begin{aligned} \Delta\pi_{i2} = & (1/3)(\pi_{i,t+4} + \pi_{i,t+5} + \pi_{i,t+6}) - (1/3)(\pi_{i,t-3} + \pi_{i,t-2} + \pi_{i,t-1}) \\ & - [(1/3)(\pi_{c,t+4} + \pi_{c,t+5} + \pi_{c,t+6}) - (1/3)(\pi_{c,t-3} + \pi_{c,t-2} + \pi_{c,t-1})] \end{aligned}$$

In either case where data is unavailable for the entire three-year period, the profitability measure is calculated based on the years for which there is reported data.

In addition to the change in adjusted profit levels, we also look at the variability of these profit changes in the following analyses. Profit variability is represented by the absolute values of the residuals from the regression of adjusted profit changes on a set of acquirer and acquisition characteristics (re: Section 3.6). This provides us with a means of assessing whether foreign acquisitions have desired outcomes other than improving profitability levels.

3.4 Determinants of Post-Acquisition Performance

In our earlier discussion of the factors motivating foreign investment, we recognised that a firm was able to reduce the level of risk in its earnings stream by investing abroad. Provided that economic fluctuations in foreign countries are less than perfectly correlated with those in the home country, MNEs can experience more stable earnings than comparable firms operating solely in the domestic market. While firms that access foreign markets via exports are also able to benefit from product-market diversification, the firm that establishes foreign production bases can enjoy additional risk-reduction opportunities through factor-market diversification. In such cases where the primary objective of the investment is a reduction of risk rather than an increase in returns, the foreign acquisition may not necessarily enhance the profitability of the acquiring firm.

Bearing in mind that we cannot evaluate returns independently of their associated risks, we focus on both the level and the variability of profitability, our performance indicator. We then consider what factors are likely to influence either one or both of these

⁷ *Extel*, from which the data is derived, defines net income to be the total income (i.e. the excess of revenues over trading, interest, and other expenses) for the year after tax and extraordinary items, but before any dividend

moments of the profitability distribution. The theoretical priors upon which these determinant factors are selected are derived from the hypotheses discussed in the preceding chapter. Apart from providing us with an additional opportunity to test the validity of these hypotheses, an analysis of these determinants also demonstrates how firm-, sector-, or acquisition-specific conditions can affect the post-acquisition outcome.

3.4.1 *RelSize and RelSize²*

The acquisition of foreign subsidiaries can be regarded as a means for the acquiring firm to achieve geographic diversification (Doukas and Travlos, 1988). With the foreign acquisition, the acquirer's operations in the home country have now become a smaller fraction of its total operations, and hence home-specific risks are less significant. In order to test the hypothesis of risk diversification, we construct the variable *RelSize* to denote the size of the acquired subsidiary relative to the parent company (measured from their respective sales revenues), i.e. *RelSize* represents the additional degree of geographic diversification that the acquirer achieves through the acquisition. Taking into consideration the risk-return relationship suggested by the hypothesis on risk diversification, we expect that firms would tolerate higher risks only if they can achieve commensurately higher returns. Conversely, firms would settle for lower returns if the acquisition enabled them to reduce their risks. In certain instances, MNEs have also been able to discover an attractive niche of investments offering high returns coupled with low risks (Hissey and Caves, 1985; Kim et al., 1993).

If the objectives of firm managers are aligned with those of shareholders in maximising firm value, risk diversification may appear to be a less compelling reason for making foreign acquisitions since shareholders can presumably achieve geographic diversification through holding shares in foreign companies. Nevertheless, previous studies (Agmon and Lessard, 1977) have shown that under conditions where the free flow of financial capital was prevented by institutional or other barriers, investors purchased shares in MNEs as a means of diversifying their portfolios. While earlier studies may have found that holding the shares of MNEs were an attractive mechanism for diversification, it is probably less applicable in the present context where capital markets across many countries (apart from some developing countries⁸) are readily accessible and well integrated. The risk diversification motive pursued by firms in making foreign acquisitions is thus likely to be

distribution is made.

⁸ To the extent that the economies of developing countries are not closely correlated with that of the UK (i.e. the home market of the acquirers in the sample), risk diversification remains a viable motive for such acquisitions. This is explored through the dummy variables *US* and *Europe* in Section 3.4.3.

driven by managers' personal objectives rather than their concern for shareholders' preferences. Since managers generally have invested a substantial amount of their human capital with the firm, their concern for reducing risk could lead them to sacrifice return in order to ensure the long-term survival of the firm. Whether or not the risk diversification hypothesis holds would thus provide a reflection on the validity of managerial motives in explaining foreign acquisitions.

In addition to these longer-term effects, we also expect that in the short run large acquisitions could increase the variance of profit outcomes, not only because of their "weight" in the combined firm but also because of greater uncertainties about the quality and fungibility of assets purchased in large bundles. In order to distinguish between short- and longer-term effects, we have constructed two realisations of the profitability variable— $\Delta\pi_{is}$ and $\Delta\pi_{it}$ respectively (as described in Section 3.3).

$RelSize^2$, representing the squared values of $RelSize$, is used in certain specifications of the regression model (re: Section 3.6) to test for the existence of a non-linear relationship between $RelSize$ and the outcome variable, which could arise from acquisitions of different sizes being driven by different motives. For example, extremely large acquisitions, especially those that exceed the size of the acquiring company, could stem from motives that are radically different from the rest of the sample. (Table 3.1 reports the distribution of acquisitions in terms of their relative sizes.) Since a firm is unlikely to undertake an acquisition of such magnitude unless it has a strong belief in its viability, the firm would be willing to invest substantially more to obtain information (and hence reduce the uncertainties) about the acquisition's prospects. Alternatively, the opportunity to undertake such large acquisitions could stem from serendipitous circumstances encountered by the firm, which are unlikely to be repeated on a systematic basis. As a result, the trends that occur for the smaller acquisitions might not extend to the extreme $RelSize$ values.

TABLE 3.1
Sample Distribution by Relative Size of Acquisition

Relative Size	Number	Percentage
0.05 $RelSize > 0.1$	77	30.01
0.1 $RelSize > 0.15$	42	16.41
0.15 $RelSize > 0.2$	30	11.72
0.2 $RelSize > 0.25$	25	9.77
0.25 $RelSize > 0.5$	44	17.19
0.5 $RelSize > 1$	19	7.42
1 $RelSize$ 4.16	19	7.42
Total:	256	100

3.4.2 *ProdDiv*

Nearly half of the sample acquirers (114 of 256) were already highly diversified conglomerates with operations across a number of product lines. One explanation for the prevalence of conglomerate acquirers arises from the internalisation theory proposed in the multinational literature (re: Section 2.1). In the case of conglomerate acquisitions, the MNE is endowed with a proprietary asset which can take the form of special skills in marketing and promotion, or managerial expertise in coordinating and controlling large organisations. Given the difficulties that are often associated with transferring and contracting in proprietary assets, MNEs often prefer to retain control over these assets by integrating them within their worldwide internal markets.

Another means of explaining conglomerate acquisitions is related to the risk diversification hypothesis mentioned earlier (re: Section 3.4.1). The potential for spreading risk can be realised not only from diversification in geographical terms, but also through diversified product lines, both of which avail themselves to managers as opportunities for reducing the company's risk exposure. Empirical studies have confirmed that the two avenues are often regarded as substitute methods for achieving diversification, i.e. companies either diversify into different product lines within the home market or invest abroad within the same product range (Caves, 1975; Wolf, 1977). Where the MNE is able to overcome the costs imposed by organisational constraints, as in the case of larger and more mature firms, the potential for risk spreading is thus greatest for firms that are able to diversify along both lines. For a manager intent on seeking risk diversification opportunities, it is thus likely that he would explore both options of diversifying across geographic as well as product space. We therefore observe a significant proportion of foreign acquisitions being undertaken by firms that are already well diversified in terms of their business activity.

While the proprietary assets explanation is consistent with the profit-maximising objectives of shareholders, the risk diversification hypothesis may not necessarily be desirable from the shareholders' perspective. In order to distinguish between these motivations, we construct the variable *ProdDiv* to evaluate the performance of conglomerate acquirers. *ProdDiv*, which serves as a measure of distance in product space, makes use of the branching-tree structure of the standard industrial classification (as used in earlier studies, e.g. Wolf, 1977) by assuming that industries on nearer branches are typically closer in technologies, distribution channels, and the like. The *Extel* database contains the four-digit SIC codes of the primary lines of business in which each firm operates, and from this information we derive the extent to which the relevant acquirer is diversified. *ProdDiv* hence

is a discrete variable which is set equal to 0 when the acquirer is active in only one line of business, i.e. only one four-digit SIC code is reported. *ProdDiv* takes a value of 1 when the first three digits of the SIC codes are shared by all lines, 2 when the first two only, 3 when the first only, and 4 when the first digit is not shared (i.e. when the first digit is different for at least two of the sectors). Hence, a higher value of *ProdDiv* indicates that the acquirer has more diversified lines of business. Apart from the most-diversified category (*ProdDiv* = 4) which forms nearly half of the sample, the other acquirers are fairly evenly distributed across the range of *ProdDiv* variables—there are 43, 12, 37, 50 and 114 acquirers in the groups corresponding to *ProdDiv* values of 0, 1, 2, 3, and 4 respectively.⁹

Should the risk diversification hypothesis hold, we would expect firms diversifying along product lines to be sensitive to the risk-return tradeoff that it entails. While conglomerate acquisitions have typically been found to yield lower returns to the acquirer, it is possible that the acquirer had sought to diversify its business portfolio rather than increase its returns at the expense of higher risk. Examined separately, the direction of *ProdDiv*'s effect on either return or risk is ambiguous because of the conflicting predictions stemming from different theories.

From the perspective of managerial motive theories, conglomerates are perceived to engage in wasteful acquisition programmes that are predicated less on profit-maximising objectives than on empire-building ambitions, and hence detrimental to firm value. On the other hand, as suggested by the internalisation theory, a successful conglomerate with more experience in diversifying into new business activities is likely to perform better than non-conglomerates that have previously operated in a limited number of markets. The conglomerate's versatile management team or its flexible organisational structure can be regarded as proprietary assets which enable a smoother (and less costly) integration of its newly acquired subsidiary. This latter effect would perhaps be more significant during the adjustment period. The *ProdDiv* variable thus enables us to test the relative importance of these acquisition theories. Since we observe both the short- and long-term realisations of the outcome variable, we can refine our analysis further by separating the permanent effects of product diversification from the transitory ones.

⁹ Alternatively, the variable *ProdDiv* can be replaced by a series of binary variables corresponding to each value of *ProdDiv* from 0 through 4. While this specification avoids imposing the assumption that the distance in product space increases equally for each unit increase in the *ProdDiv* variable, it is difficult to obtain reliable estimates given the small number of acquirers in a few of the sub-categories (e.g. only 12 firms in the group with *ProdDiv* = 1). Nevertheless, we consider this alternative specification in Section 3.6.2 to check the robustness of the *ProdDiv* effect.

3.4.3 *First, US and Europe*

In running a foreign subsidiary, MNEs often encounter a learning curve associated with developing organisational expertise or sharpening their responsiveness towards uncertain foreign environments. Not surprisingly, in these aspects a first-time investor is disadvantaged relative to its more experienced counterparts, and it has been found that uncertainty about the performance of international acquisitions decreases with the acquirer's international experience (Barkema et al., 1996). Our sample of acquirers comprises established MNEs as well as novice foreign investors, the latter being designated by a dummy variable set equal to 1. This information is obtained from the "Overseas Tax" item within the *Extel* database, which reports the annual amount of taxes paid by firms to overseas tax authorities. Since overseas taxes paid by firms are likely to result from their foreign-based operations, we consider firms that were paying overseas taxes (prior to the acquisition) to be established MNEs, while those that were not paying overseas taxes previously are designated as novice investors. In our sample of 256 acquirers, 196 are established MNEs while 60 are first-time investors.

Apart from the acquirer's previous experience, host countries can also play a role in creating uncertainty for the acquirer. Factors such as the stability of the host country's economic or political environment can affect the level of uncertainty that the acquirer encounters when investing in that country. The country distribution of the acquired firms in our sample is given in Table 3.2. The table shows that nearly half of the acquired companies were in the US, while the remaining companies were predominantly based in Europe. Given the stability of these regions, as well as their accessibility (such as in terms of market openness and communication links) to UK investors, it is not surprising to find a high concentration of UK foreign direct investment in these regions. However, whether or not these factors translate into higher (or less risky) returns for UK investors remains debatable. In order to examine if host country factors exert a systematic influence on their acquirers' subsequent performance, we introduce two dummy variables to represent acquisitions in each of these regions, i.e. the variables *US* and *Europe* are set equal to 1 for acquisitions in the US and Europe respectively.

TABLE 3.2
Country Distribution of Acquired Firms

Country	Number	Percentage
US	112	43.75
France	27	10.55
Germany	26	10.16
Netherlands	20	7.81
Belgium	11	4.30
Australia	8	3.13
Sweden	8	3.13
Denmark	7	2.73
Eire	7	2.73
Canada	6	2.34
Hong Kong	3	1.17
Italy	3	1.17
Norway	3	1.17
Spain	3	1.17
Switzerland	2	0.78
Austria	1	0.39
Bermuda	1	0.39
Chile	1	0.39
Finland	1	0.39
Hungary	1	0.39
Malaysia	1	0.39
Poland	1	0.39
Portugal	1	0.39
Singapore	1	0.39
Venezuela	1	0.39
= 25 countries	256	100

3.4.4 *Mfg*

Since the manufacturing sector generally has a longer experience with foreign investment than the services sector, manufacturing firms could have acquired expertise that enabled them to reap greater benefits from their foreign investments. In particular, manufacturing firms that have learnt to overcome some of the teething (or other longer-term organisational) problems associated with acquiring a foreign subsidiary are in a better position to realise higher returns from their investment. In order to test this hypothesis, we employ a dummy variable *Mfg* that is set equal to 1 for acquirers that operate in the manufacturing sector. The *Extel* database provides the primary SIC codes reported by each company, where SIC codes beginning with 2, 3, and 4 represent the manufacturing industries. Approximately two-thirds (172 of 256) of the acquirers in the sample are classified under the *Mfg* category. Table 3.3 provides a breakdown of the primary industries in which the acquiring firms operate.

TABLE 3.3
Industry Distribution of Acquiring Firms
 (grouped by first digit of SIC codes)

	Major Industry Type	Number	Percentage
0	Agriculture, forestry and fishing	0	0
1	Energy and water supply	9	3.52
2	Metal, mineral products and chemicals	41	16.02
3	Metal goods, engineering and vehicles industries	74	28.91
4	Other manufacturing industries (e.g. food, paper and rubber)	57	22.27
5	General construction and demolition work	7	2.73
6	Distribution, hotels and catering	23	8.98
7	Transport and communication	3	1.17
8	Banking, finance and office services	32	12.5
9	Other services (e.g. education, R&D, and health care)	10	3.91
Total:		256	100

3.4.5 R&D

Among the standard explanations for the occurrence of multinational activity is the internalisation theory (re: Section 2.1), which introduces the concept that a firm can benefit from owning plants across countries when it is endowed with certain unique characteristics known as proprietary assets. An asset might represent knowledge about how to produce a better product, or how to produce a given product at a lower cost than competing firms. The proprietary asset might also be a specific property, such as a registered trademark or brand, or simply some new combination of attributes that its rivals cannot quickly or effectively imitate. Because the firm owns these assets, some consumers are willing to pay more for the firm's product than for a rival's comparable variety. Firms therefore seek to perpetuate their proprietary assets across geographical or product markets since these assets contribute toward firm value. Transaction cost theory predicts that firms find it more worthwhile to internalise the allocation of their proprietary assets where the costs of transacting in arms-length markets are high relative to internal organisational costs. Such circumstances give rise to the growth of the MNE, which essentially employs an internal market to monitor and control the use of such firm-specific assets.

The role of proprietary assets in foreign acquisitions is examined through the variable *R&D*, which reflects the proportion of sales revenue that the acquirer spends on research and development relative to other firms in the same industry. Since R&D activities provide a means of generating proprietary assets for the firm, R&D expenditure is often used as a proxy for the importance of proprietary assets to the acquirer. Previous studies (e.g. Horst, 1972; Caves, 1974; Buckley and Casson, 1976) have established the positive relation between

multinationality and these activities. Annual R&D expenses of each acquirer are obtained from *Extel*, and from these figures we calculate the ratio of R&D over firm sales. An average of these ratios is then computed for the three years preceding the foreign acquisition.¹⁰ In order to adjust for industry influences, the same procedure is repeated for the firms in the industry control group—the resulting industry R&D intensity is subtracted from the firm’s R&D intensity to obtain the required *R&D* variable.¹¹ High R&D intensity by the firm relative to its industry should indicate that it has (or believes it has) superior opportunities for product innovation or differentiation, which could predict success in foreign investment. If foreign investment were motivated by the firm’s proprietary assets, uncertainty about how these assets perform abroad would be a main contributor toward the general uncertainty of foreign investment. Firms that depend heavily on these assets are thus likely to experience greater uncertainty in the returns of their foreign investment, i.e. we also expect greater variability in the performance of firms with high R&D expenditures.

3.4.6 FirmSize

The variable *FirmSize* represents the acquirer’s average sales revenue in the three years preceding the foreign acquisition. Since sales figures are measured in current prices, the sales revenues obtained from *Extel* are first expressed in constant prices.¹² The larger firm presumably has accumulated more experience managing bundles of assets or activities that are dispersed in geographic and product space, and hence might achieve more predictable outcomes of its international acquisitions. In addition, large-sized firms could gain rents from access to foreign-investment opportunities that may not be available to smaller firms (Morck and Yeung, 1992). E.g. their easier accessibility to sources of capital gives large firms an edge over their smaller rivals in a field that involves substantial capital outlays. Large firms that can afford to incur higher search costs are also able to make better-informed decisions. For these reasons, we expect that as the firm’s size increases, the post-acquisition prospects are likely to improve, while the variability of the post-acquisition outcome will be reduced.

3.4.7 LaggedProfit

The returns to diversification may vary greatly depending on the initial motivation for acquiring a foreign subsidiary. While one acquisition may represent the expansion of a

¹⁰ Because of a change in R&D reporting requirements in 1989 (re: Section 2.4.2), for acquisitions that were conducted in 1989 we used R&D figures from the same year (instead of from previous years).

¹¹ This method is consistent with the construction of the outcome (adjusted profitability) variable.

successful business empire, another may be an attempt to improve the profitability of an ailing company. Moreover, in the light of Jensen's (1988) free cash flow hypothesis, highly profitable companies could have more free cash flow with which to spend liberally on acquisitions, regardless of whether these investments are truly beneficial to the firm. Such diverse motives would necessarily lead to very different post-acquisition outcomes. One indicator of the company's intentions is the pre-acquisition profitability of the firm. The variable *LaggedProfit* represents the acquiring firm's value of net income divided by sales in the year before the acquisition.¹³ In addition to affecting the level of post-acquisition profitability, *LaggedProfit* also has a potential role in the variance of the outcome variable. High-quality management, which might be indicated by high previous profits, helps the firm reduce the uncertainty of major foreign investments.

LaggedProfit also serves to control for mean reversion in the level of the outcome variable. Should profitability be mean-reverting, and should there be a tendency for acquisitions to be made when profitability is temporarily high (low), then acquisitions would tend to be followed by falling (rising) profitability, even though the acquisition itself might not have caused the changes in profitability. Hence, we control for this possibility by including *LaggedProfit* in the estimated model, so that we can identify the effects of other acquisition-related variables that are not confounded by the *LaggedProfit* effect.

3.4.8 Dividends

The variable *Dividends*, which denotes the acquirer's pre-acquisition dividend payout ratio (i.e. the average of dividends divided by earnings over the three years preceding the acquisition), is included as another means of examining the applicability of managerial motives to foreign acquisition activity. In modern corporations where ownership and control of the firm are distinctly separated, the inability of shareholders to closely monitor the firm's managers gives the latter an opportunity to pursue their personal objectives at the expense of shareholder interests. Managers may therefore decide to engage in acquisition activity regardless of its repercussions on the firm's value. Dividends have been regarded as an effective means of imposing discipline on the firm's managers because the stock market often reacts negatively to reductions in dividend payout rates. For example, Fama et al. (1969) find that when stock splits are accompanied by dividend announcements, there is a decline in

¹² The adjustments are calculated using the Retail Price Index published in the Office of National Statistics' *Economic Trends: Annual Supplement (1997 Edition)*, with 1985 set as the base year.

adjusted share prices for the group that announced dividend decreases. The majority of firms have therefore been observed to abide by a strict dividend policy which is rarely affected even by investment or other requirements for funds.

The payment of dividends can thus be used as an indication of the extent to which managers are committed to channelling the firm's internal funds (not required to finance profitable investment opportunities) to the shareholders instead of hoarding the cash to fulfil their personal motives. Managers who have committed the firm to a high dividend payout rate tend to have less free cash flow at their disposal. Hence, they are more likely to ensure that acquisitions are undertaken in accordance with sound profit-maximising objectives and avoid investing in wasteful acquisitions for empire-building purposes. Although paying out more dividends per se would not necessarily make these firms perform better (relative to other acquirers) after an acquisition, it is possible that a more constrained management would select acquisition targets that would convey less risk to the firm's post-acquisition performance.

3.5 Post-Acquisition Profitability: Exploratory Results

In this section, we conduct a series of exploratory tests to find out how the acquirers in our sample have generally fared against their respective control groups, and how their performances could have been affected by the determinants identified in Section 3.4. The purpose of these tests is to establish some general attributes of our sample which could contribute towards our understanding of how the variables behave, and this in turn would aid in constructing the regression model that follows in the next section. While the results in this section help to shed light on the relative importance of the various hypotheses that have been discussed, they are not intended to provide a definitive assessment as these issues will be revisited later in the cross-sectional regression analysis.

3.5.1 Performance of Acquirers relative to Control Groups

In the construction of the outcome variables, $\Delta\pi_{is}$ and $\Delta\pi_{it}$, changes in profitability brought about by industry-wide effects are subtracted from the firm's change in profitability. Hence, these variables capture the deviations in firm profitability from industry profitability that occurred in the years surrounding the acquisition event. If in general the acquisition had not generated a distinct (short- or long-term) effect on the acquirer's profitability, we would

¹³ While we present the results with the unadjusted lagged profit variable, similar results are obtained using an industry-adjusted lagged profit measure. The unadjusted lagged profit variable is chosen in this case because it

expect that both outcome variables (representing the short- and long-term changes in profitability) would on average have zero deviation from the industry-level profitability. A t -test is thus used to examine if the outcome variables, $\Delta\pi_{is}$ and $\Delta\pi_{il}$, are statistically different from zero. The first row of results in Table 3.4 shows that as a whole, the sample of acquirers performed significantly worse than their respective industry control groups by roughly 3 percent on average over both short- and long-term periods.

In order to investigate whether this trend is affected by acquirer or acquisition-related characteristics, we divide the sample into various categories and as before test each group individually against their respective controls. We first divide the sample into two groups, “large” and “small” acquisitions, where “large” is defined by a *RelSize* value greater than 0.1 (i.e. the acquired subsidiary is at least 10 percent its acquirer’s size), and “small” by a *RelSize* value of less than 0.1. The cut-off value of 10 percent is selected because companies generally consider subsidiaries under 10 percent of their size to represent a small portion of the company’s operations, while those over 10 percent merit separate mention in the company’s records.

The second classification used is based on the *ProdDiv* variable. The highly diversified (or conglomerate) acquirers (i.e. *ProdDiv* values = 4) form nearly half of our sample, suggesting that conglomerates are far more aggressive in undertaking foreign acquisitions than the less-diversified firms. Since conglomerates could be endowed with certain unique qualities that predispose them towards foreign acquisitions, it would be interesting to observe whether the performance of these acquirers differs systematically from that of other acquirers.

We also employ the *R&D* variable as another means of detecting possible differences in acquirer performance. In the construction of this variable, we subtract the industry’s R&D intensity from the individual firm’s R&D intensity to capture the firm’s R&D intensity relative to the rest of its industry. Thus, values of *R&D* below zero indicate that the firm conducts less R&D (relative to sales) than the average firm in its industry, and we classify acquirers in this group as “low R&D” firms. Conversely, acquirers with *R&D* values above zero are classified as “high R&D” firms.

allows for a test of mean reversion (re: Section 3.6.7).

TABLE 3.4
Industry-Normalised Profit Changes of Sample and Sub-samples
(Standard errors in parentheses)

Sample used (number of observations: $\Delta\pi_{is}$; $\Delta\pi_{il}$)	Short-term profit changes, $\Delta\pi_{is}$	Long-term profit changes, $\Delta\pi_{il}$
Entire sample (256; 214)	-0.0343** (0.0122)	-0.0325** (0.0127)
Large acquisitions (<i>RelSize</i> > 0.1) (179; 143)	-0.0411** (0.0168)	-0.0273* (0.0174)
Small acquisitions (<i>RelSize</i> < 0.1) (77; 71)	-0.0185** (0.0104)	-0.0431** (0.0153)
Less diversified acquirers (<i>ProdDiv</i> ≤ 3) (142; 120)	-0.0421** (0.0159)	-0.0584** (0.0176)
More diversified acquirers (<i>ProdDiv</i> = 4) (114; 94)	-0.0247* (0.0189)	0.0006 (0.0175)
First investors (<i>First</i> = 1) (60; 49)	-0.0452** (0.0197)	-0.0365* (0.0237)
Experienced investors (<i>First</i> = 0) (196; 165)	-0.0310** (0.0147)	-0.0313** (0.0149)
US acquisitions (112; 96)	-0.0186 (0.0156)	-0.0272* (0.0185)
Non-US acquisitions (144; 118)	-0.0465** (0.0179)	-0.0368** (0.0174)
Europe acquisitions (122; 99)	-0.0492** (0.0175)	-0.0462** (0.0146)
Non-Europe acquisitions (134; 115)	-0.0208 (0.0169)	-0.0208 (0.0200)
Acquisitions outside US & Europe (22; 19)	-0.0318 (0.0667)	0.0119 (0.0780)
US & Europe acquisitions (234; 195)	-0.0346** (0.0118)	-0.0369** (0.0117)
Manufacturing acquirers (172; 147)	-0.0308** (0.0098)	-0.0216** (0.0103)
Non-manufacturing acquirers (84; 67)	-0.0416* (0.0314)	-0.0565** (0.0335)
High R&D acquirers (<i>R&D</i> > 0) (87; 78)	-0.0353** (0.0134)	-0.0513** (0.0191)
Low R&D acquirers (<i>R&D</i> < 0) (164; 132)	-0.0356** (0.0176)	-0.0219* (0.0171)

* denotes significance at the 10% level

** denotes significance at the 5% level

The remaining variables (*viz.* *First*, *US*, *Europe* and *Mfg*) used to classify the groups were introduced earlier, and the reasons for their inclusion in Table 3.4 were discussed in Section 3.4.

The results in Table 3.4 confirm that acquiring firms generally experience a decline in profitability (by a few percentage points) relative to their industry controls, and this finding is

significant across the majority of the groups. One exception occurs in the group representing highly diversified conglomerates (denoted by *ProdDiv* = 4), which experiences a smaller (and only weakly significant) fall in post-acquisition profitability in the short run and no significant difference (relative to the control group) over the longer term. Bearing in mind the construction of the outcome variable, this could be the result of imperfect matching of control group to acquirers. Because of their wide-ranging activities, conglomerates do not belong to a distinct industry segment. They are thus assigned a 2-digit industry that corresponds to their principal business (from which they receive the most sales revenue). In other words, the control group represents only one of the many industries that the acquirer operates in, so they may not provide as good a control for conglomerate acquirers as they do for other acquirers.

Nevertheless, putting aside these concerns, there are also other reasons to believe that conglomerates would fare better than other acquirers. Perhaps its considerable experience in managing disparate sub-units within the company has given the conglomerate firm an edge over other acquirers when it comes to minimising the costs associated with digesting a new subsidiary. The existence of many diverse business activities carried out by the conglomerate could also make it easier for the newly acquired subsidiary to find a niche within the organisation. Moreover, conglomerates are likely to have undertaken more acquisitions, and hence have learnt how to avoid selecting targets that could be detrimental to the parent company.

In addition, post-acquisition performance is affected by the location of the acquired firm. By comparing the results for three distinct regions (US, Europe and the rest of the world), we observe that firms acquiring in Europe have underperformed relative to acquirers that invested in other regions. This is an interesting finding in the light of the developments in the European markets at the time the acquisitions in the sample were undertaken (1989-1993), which coincides with the introduction of the single European market in 1992. One strategic explanation for merger has been that international economic integration (or its anticipation) can stimulate cross-border merger activity, undertaken either to seize new opportunities or to avert the diversion of profits when rivals seize such opportunities (Caves, 1991). For example, large firms could invest in excess capacity to deter potential entrants or to drive out existing rivals. They may be willing to incur short-term losses in the hope of reaping higher future profits when they have gained a dominant market position. Under such circumstances, the occurrence of acquisitions may be a manifestation of European firms positioning themselves for superior strategic niches in the post-1992 integrated market, rather than for non-strategic value-maximisation objectives. However, even if the returns to such

strategic moves are realisable, they are unlikely to happen immediately. Thus, accounting data that measures returns over the short run is unable to capture this added value, while longer-term measurements are often confounded by the effects of other events that have taken place in the interim period. An alternative approach is to use the stock market's response as a means of assessing the acquisition's value. To the extent that the stock market is efficient and well informed, it should provide a good assessment of the benefits that are expected to accrue to the acquiring firms around the announcement date of the acquisitions. (These issues will be taken up in the following chapter.)

On the other hand, this result could be interpreted as US acquisitions performing relatively better than acquisitions in other parts of the world. Because UK foreign direct investment has traditionally been concentrated in the US, UK acquirers are likely to have better information, and hence to make a more accurate assessment, of investment prospects when buying US companies. Being more familiar with the conditions of the host country also enables acquirers to avoid certain pitfalls, so that these acquirers are not subject to the fall in profitability that besets acquirers investing in other countries.

3.5.2 Effect of Acquirer and Acquisition Characteristics on Performance

In Section 3.5.1, we divided the sample of acquirers into various sub-groups according to characteristics of the acquirer or the acquisition so as to determine whether the principal result (i.e. the poor performance of acquirers relative to their industry controls) prevailed within each of these sub-groups. Instead of comparing their performance against their respective controls, we are also interested in how one sub-group of acquirers performs relative to another. For example, we classify the acquisitions according to the variable *RelSize*, where the acquisition is considered “large” for *RelSize* values above 0.1 (i.e. the size of the acquired subsidiary is more than 10 percent that of its acquirer), and “small” for *RelSize* values below 0.1. Since the effect of the acquisition on the acquirer is likely to depend on the relative size of the acquired firm (as discussed in Section 3.4.1), comparing the performance of acquirers in the “large” and “small” groups allows us to determine the impact of *RelSize* on post-acquisition performance.

In order to compare the performance of acquirers across the various sub-groups, we measure the differences in the (unweighted) averages of the adjusted profit changes between the two relevant sub-groups. Using the example of “large” versus “small” acquisitions, we compute the mean profit changes ($\Delta\pi_{is}$ and $\Delta\pi_{il}$) for the acquirers in the “large” and “small” groups separately. Having obtained the means of both groups, we conduct a *t*-test to ascertain

if the difference between the means is significantly different from zero. Here the null hypothesis tested is that of $\Delta\pi_j = \Delta\pi_k$ for different pairs of j and k , as compared to the previous analysis (Table 3.4) in which the null hypothesis tested was that of $\Delta\pi_j = 0$ for different groups j . Table 3.5 presents the results of this series of tests.

TABLE 3.5
Differences in Profit Levels across Groups
(Standard errors in parentheses)

Group difference	Short-term	Long-term
Large – small acquisitions	–0.0226 (0.0266)	0.0159 (0.0269)
Less diversified – more diversified acquirers	–0.0174 (0.0245)	–0.0590** (0.0253)
First – experienced investors	–0.0142 (0.0288)	–0.0051 (0.0302)
US – non-US acquisitions	0.0280 (0.0245)	0.0096 (0.0255)
Europe – non-Europe acquisitions	–0.0285 (0.0244)	–0.0254 (0.0254)
Non-(US+Europe) – (US+Europe) acquisitions	0.0028 (0.0435)	0.0487 (0.0445)
Mfg – non-mfg firms	0.0108 (0.0260)	0.0349 (0.0273)
High – low R&D firms	0.0004 (0.0261)	–0.0295 (0.0267)

** denotes significance at the 5% level

We find that generally there is no systematic difference in the performance of the groups of acquirers being compared against each other. Although the previous set of results (in Table 3.4) showed that the acquirers performed significantly worse than their respective controls, this poor performance appears to be fairly evenly distributed throughout the sub-groups, i.e. the acquirers' performance is not significantly related to any specific acquirer or acquisition characteristics. The only exception occurs in the sub-groups that account for varying degrees of product diversification in the acquiring firms. When the mean long-term profit change of the more-diversified acquirers ($ProdDiv = 4$) is subtracted from that of the less-diversified acquirers ($ProdDiv \leq 3$), the difference is negative and significant. In other words, over the longer term the change in the adjusted profitability of the less-diversified acquirers is worse than that of the conglomerate acquirers by nearly 6 percent on average. This reinforces the finding from Table 3.4, in which the conglomerate acquirer category was found to be one sub-group that did not perform poorly against its industry control. Thus, in

the field of foreign acquisitions, conglomerate firms appear to have an edge over their less-diversified counterparts in being able to realise higher returns from their foreign investment.

The patterns observed here are investigated further, first in the following section, where a regression model is used to determine whether these findings remain relevant in the multivariate context, and then in Section 3.7.3, where an alternative measure of profitability is used to test if these relationships are robust.

3.6 Post-Acquisition Profitability: Principal Results

As in the earlier analyses, the outcome variable of interest is the industry-normalised change in profitability exhibited by the acquirers in the years following their acquisition of foreign subsidiaries. In order to consider the actual profit change as well as the variance of these profit changes, we employ a two-step regression procedure. In the first stage, the dependent variable ($\Delta\pi_i$) is regressed on the set of explanatory variables that comprises the determinants identified in Section 3.4. This set-up allows us to test the validity of our hypotheses regarding each of the explanatory variables in terms of how they might systematically influence the acquiring firm's profitability, either in transition or permanently. Since two realisations of the outcome variable ($\Delta\pi_{is}$ and $\Delta\pi_{il}$) have been constructed, each is used as a dependent variable in separate regressions, representing short-term and long-term changes respectively. While we cannot expect a period of six years after the acquisition to fully reveal "long-term" effects, it should be long enough to expose both short-run adjustment costs and any substantial sustained effects. Moreover, for the purpose of studying the impact of the acquisition on the acquiring firm, it is difficult to extend the observation period too far beyond the actual year of the acquisition, as other events are likely to occur in the interim and thus obscure the initial effect of the acquisition.

In the second stage of this analysis, we investigate the uncertainty of the firm's post-acquisition profit flow, which is here measured by the residuals from the first stage regression. These residuals, which represent the component of the firm's profits that cannot be explained by the regressors in the first stage regression, can be regarded as unpredictable fluctuations in the firm's profits and hence serve as indicators of the uncertainties brought about by the acquisition. When converted to their absolute values, these residuals form the dependent variables ($|e_{is}|$ and $|e_{il}|$) in the second stage, and are regressed on the same set of explanatory variables that were employed in the first stage. Alternatively, the element of uncertainty can also be captured by using the square of the residuals (e_{is}^2 and e_{il}^2) as the dependent variables for the second stage regression. Since both measures have been found to

yield similar results, for simplicity of exposition we present the results of $|e_{is}|$ and $|e_{il}|$ in this section, and where necessary the results of e_{is}^2 and e_{il}^2 can be referred to in the Appendix at the end of this chapter. The results of the second stage estimation will thus reveal the effects of these acquirer- and acquisition-specific factors on the variability of the post-acquisition outcome. Summary statistics of the variables used in the analysis appear in Table 3.6, while Table 3.7 gives the ordinary least squares estimates for a basic model specification chosen for comparability with a similar study conducted on US (instead of UK) multinational acquirers, that will be discussed in Section 3.8. Section 3.7 describes variations of this basic model employed to test if the findings in Table 3.7 are robust.

TABLE 3.6
Summary Statistics of Variables

Variable	Source	Mean	Std. dev.
Firm's pre-acquisition profits	Extel	0.0553	0.1757
Firm's short-term post-acquisition profits	Extel	0.0148	0.1356
Firm's long-term post-acquisition profits	Extel	0.0410	0.0846
Firm's short-term profit change	Extel	-0.0405	0.2219
Firm's long-term profit change	Extel	-0.0145	0.2000
Industry's pre-acquisition profits	Extel	0.0559	0.0323
Industry's short-term post-acquisition profits	Extel	0.0497	0.0924
Industry's long-term post-acquisition profits	Extel	0.0746	0.0979
Industry's short-term profit change	Extel	-0.0062	0.0788
Industry's long-term profit change	Extel	0.0186	0.0810
Short-term profit change, $\Delta\pi_s$	Extel	-0.0343	0.1948
Long-term profit change, $\Delta\pi_l$	Extel	-0.0325	0.1853
RelSize	A.M.	0.3330	0.5460
ProdDiv	Extel	2.7031	1.4865
First	Extel, A.M.	0.2344	0.4244
US	A.M.	0.4375	0.4971
Europe	A.M.	0.4766	0.5004
Mfg	Extel	0.6719	0.4705
R&D	Extel	0.0008	0.0278
FirmSize ($\times 10^9$)	Extel	0.4094	1.2283
LaggedProfit	Extel	0.0592	0.1922
Dividends	Extel	0.5055	0.3283

Note: Extel = *Financial Times' Extel Database*; A.M. = *Acquisitions Monthly*

TABLE 3.7
Determinants of Industry-Normalised Profit Changes and Absolute Residuals
Original Model

Explanatory variable	Dependent variable			
	$\Delta\pi_{is}$	$ e_{is} $	$\Delta\pi_{il}$	$ e_{il} $
RelSize	0.0220 (0.40)	0.0561 (1.31)	0.1419 (2.56)	0.1428 (3.84)
RelSize ²	-0.0111 (-0.66)	0.0009 (0.07)	-0.0310 (-1.88)	-0.0331 (-2.99)
ProdDiv	0.0080 (1.02)	0.0087 (1.41)	0.0265 (3.39)	-0.0007 (-0.14)
First	-0.0074 (-0.26)	-0.0355 (-1.61)	-0.0194 (-0.68)	-0.0432 (-2.26)
US	-0.0178 (-0.44)	-0.0391 (-1.23)	-0.0659 (-1.69)	-0.0639 (-2.45)
Europe	-0.0337 (-0.85)	-0.0374 (-1.20)	-0.0607 (-1.58)	-0.0829 (-3.22)
Mfg	0.0070 (0.29)	-0.0250 (-1.31)	0.0427 (1.78)	-0.0442 (-2.75)
R&D	0.3116 (0.78)	-0.0275 (-0.09)	0.2306 (0.62)	0.2876 (1.16)
ln(FirmSize)	0.0016 (0.21)	-0.0174 (-2.94)	-0.0009 (-0.12)	-0.0098 (-1.96)
LaggedProfit	-0.5232 (-8.78)	0.0387 (0.83)	-0.4330 (-7.93)	-0.0013 (-0.04)
Dividends	-0.0191 (-0.55)	-0.0468 (-1.73)	-0.0638 (-1.83)	-0.0327 (-1.40)
Constant	0.0064 (0.12)	0.0834 (2.01)	-0.0466 (-0.89)	0.1653 (4.72)
R ²	0.271	0.151	0.366	0.247

Note: *t*-statistics appear in parentheses

3.6.1 *RelSize* and *RelSize*²

In order to evaluate how subsidiaries of varying sizes influence post-acquisition performance, we consider the effects of *RelSize* in conjunction with its related squared term, *RelSize*². In the first stage regression with $\Delta\pi_{il}$ as the dependent variable, the coefficient on *RelSize* is positive while that on *RelSize*² is negative, both of which are significant at the 10 percent level or better. Their combined effect on (industry-adjusted) profitability can be represented by a quadratic function with a maximum point that occurs at a *RelSize* value of roughly 2.29, i.e. below this value, *RelSize* is positively correlated with profitability. The *RelSize* value at which the maximum occurs lies almost at the extreme upper end of the range of *RelSize* observations (in fact, only 5 acquisitions register *RelSize* values above 2.29). We recognised earlier that the outliers representing extremely large acquisitions might not conform to the general trends present in the rest of the sample, given that the conditions

leading to such large acquisitions were often unusual to begin with. These findings reveal that over most of the relevant range, acquiring a larger target (relative to the size of the acquiring firm) is associated with a smaller decline in profitability.

Relative to the longer-term results, the effect of size on performance is less distinct in the short run, as demonstrated by the results obtained with $\Delta\pi_{is}$ as the dependent variable. The coefficients on *RelSize* and *RelSize*² retain the same signs but are smaller in magnitude and are not statistically significant. These results suggest that the effects of relative size on the acquirer, though weak in the immediate post-acquisition phase, become stronger with time. The presence of other influences during the adjustment period could have obscured the relative size effects, which become more readily observable over the long run when these transitory effects have worn off. While the acquirer might enjoy more benefits from acquiring a larger subsidiary, these benefits could be realised only after an adjustment period necessary for the subsidiary to be integrated with the rest of the firm.

In the light of the diversification hypothesis, the effect of *RelSize* on the acquirer's post-acquisition performance has to take into account its influence on risk as well as return. The issue of risk is addressed by the second stage regressions involving $|e_{is}|$ and $|e_{it}|$ as the dependent variables. The result is rather similar to the first set of regressions in terms of the coefficients obtained on the *RelSize* and *RelSize*² variables. We only obtain significant coefficients for *RelSize* and *RelSize*² in the regression with the long term dependent variable $|e_{it}|$. As before, the coefficients on *RelSize* and *RelSize*² are positive and negative respectively. In this case, the maximum point of the quadratic function occurs at a *RelSize* value of 2.16 (fairly close to the value obtained in the first stage regression). The occurrence of the maximum at this extreme value suggests that relative size exerts a positive effect on the dependent variables for a wide range of *RelSize* values, which includes all acquisitions where the subsidiary's size is smaller than its acquirer's. Therefore, while an increase in the relative size of the acquisition leads to greater risks (in terms of profit variability) for the acquirer, the latter is compensated through higher returns. This finding supports the prediction that acquirers face a risk-return tradeoff when deciding on how large an acquisition to undertake. Both the risk and return effects are less apparent in the short run, which could be the result of confounding influences from other factors such as adjustment costs.

3.6.2 *ProdDiv*

In our exploratory tests, we found that conglomerate acquirers (*ProdDiv* = 4) exhibited higher profitability than less-diversified acquirers (*ProdDiv* ≤ 3) in the longer-term

post-acquisition period. We obtain a similar result in the regression with $\Delta\pi_{it}$ as the dependent variable, the positive coefficient indicating that acquirers that are more diversified enjoy higher post-acquisition profitability. In other words, a conglomerate acquirer is likely to report higher post-acquisition profitability than one that specialises in one line of business. The model with $\Delta\pi_{it}$ also yields a positive coefficient, though weaker in magnitude and significance. As in the case of relative size, the benefits associated with diversified lines of business are barely detectable in the short term, but become more evident over the long term. In the second stage regression, the coefficients on *ProdDiv* are close to zero and statistically insignificant over the short and long term, suggesting that product diversification has little, if any, effect on the variability of the acquirer's profits.

As a robustness check, we employ alternative methods of representing product diversification which are not dependent on the assumption that the distance in product space increases equally for each unit increase in the *ProdDiv* variable. In a separate regression, a binary dummy variable is assigned to each value of *ProdDiv* from 0 through 4. The results (given in the Appendix Table 3A.1) are consistent with those obtained using the original *ProdDiv* variable. Specifically, over the long term, greater diversification brings about a larger improvement in profitability, as illustrated by the more positive and significant coefficients on *ProdDiv4* and *ProdDiv3* relative to the coefficients on *ProdDiv2* and *ProdDiv1*. Similar to the original model with only one *ProdDiv* variable, the second stage regressions here yield coefficients that are not significantly different from zero, confirming that product diversification does not have a systematic effect on the variability component of the profit outcome.

These results suggest that diversified acquirers are in a better position to undertake acquisitions than their less diversified counterparts, in the sense that they will enjoy higher post-acquisition profitability without incurring higher risk. This corroborates the hypothesis that well-diversified acquirers are endowed with proprietary assets in the form of flexible organisational structures or managerial capabilities that enable them to realise the potential of their newly acquired subsidiaries, such as through effective deployment of the subsidiaries' assets. Moreover, these firms could also be more adept in the selection of targets for acquisition.

The acquisition can be regarded as a disturbance to the firm's operations that causes its profitability to decline. While all firms experience this disturbance, the ability of the firm to cope with it (and hence to arrest the decline in profits) depends on the extent to which it is diversified. With a broader portfolio of businesses, diversified acquirers have more tools at

their disposal with which to counteract the negative effects of the acquisition. By having highly-diversified product lines, acquirers are thus able to defy the general finding that acquisitions bring about a decline in the acquirers' profitability.

3.6.3 *First, US and Europe*

The variables *First*, *US* and *Europe* represent different ways of accounting for the acquirer's past experience with international forays, and serve to determine whether such experience has any bearing on the post-acquisition outcome. The *First* variable, which is an indicator for the acquirer's first overseas venture, has a negative but statistically insignificant coefficient in both first stage regressions, suggesting that established MNEs do not necessarily fare better than novice investors. In the short-term second stage regression with $|e_{is}|$ as the dependent variable, we observe a negative coefficient for *First* which becomes larger in magnitude and more significant in the long-term regression with $|e_{it}|$. The result that first-time investors experience less profit variability than experienced MNEs is rather counterintuitive since we would expect uncertainties associated with foreign acquisitions to decrease with the acquirer's international experience. Perhaps first-time investors were more cautious in selecting their targets and hence only engaged in "safe" acquisitions relative to experienced MNEs which were more confident about taking on potentially risky acquisitions.

Experience can also be defined in terms of the acquirer's familiarity with the host country environment. Since UK companies undoubtedly have more experience with markets in the US and Europe than in the rest of the world, the variables *US* and *Europe* allow us to observe whether acquisitions undertaken in these markets differ systematically from others. Over the longer post-acquisition period, acquisitions in the US and Europe both exert negative effects (albeit of weak significance) on their acquirers' profit levels. As for profit dispersion, both variables have weak (but discernible) negative effects in the short run. These effects are more clearly revealed when the squared residual is used in place of the absolute residual as the dependent variable (re: Appendix Table 3A.2). Furthermore, the negative coefficients become larger in magnitude and more significant over the longer term, suggesting that an acquisition undertaken in either of these regions reduces the variability of the acquirer's profitability over the long run.

Given that UK companies are more familiar with these regions, they would be in a better position to obtain information about their target company or assess potential demand for their products. Increased accessibility to these regions would thus translate into reduced uncertainty about the acquisition's prospects, which would in turn result in a more predictable

(and stable) stream of returns. In view of the risk-return tradeoff, it is then not surprising that US and European acquisitions have been found to underperform acquisitions in other regions in terms of profit levels. Since subsidiaries in regions outside the US and Europe generate more risk for their acquirers, the latter would demand higher returns from these investments so as to compensate for the higher risk that they have to absorb. The reduced uncertainty brought about by US and European acquisitions is thus achieved at the expense of the acquirers' returns.

3.6.4 *Mfg*

Since manufacturing firms have traditionally been more experienced and active in the field of foreign direct investment, we explore whether this group of firms performs better than other acquirers. In explaining short run changes in profitability, the *Mfg* coefficient is positive but not significantly different from zero, suggesting that acquirers in the manufacturing sector do not necessarily fare better than non-manufacturing acquirers in the immediate post-acquisition years. However, in the longer-term regression the coefficient of *Mfg* becomes more positive (from 0.7 percent to 4 percent) and is significant at the 10-percent level. In other words, over the long term acquirers based in the manufacturing sector are on average 4 percent more profitable than acquirers in other sectors.

In addition, manufacturing firms also achieve less variability in their profits, as demonstrated by the second stage regressions. The negative coefficient on *Mfg* in the short term becomes larger in magnitude (from -2 percent to -4 percent) and significant over the longer term. Manufacturing firms thus demonstrate that they have put their considerable experience to good use by being able to generate higher returns while achieving lower risk after acquiring foreign subsidiaries. Alternatively, manufacturing firms could be endowed with certain advantages (such as the transferability of their assets between markets) that make them more suited for foreign investment.

3.6.5 *R&D*

In the regression with $|e_{it}|$ as the dependent variable, there is weak evidence of R&D expenditure having a positive effect on the variability in post-acquisition returns, i.e. increasing R&D expenditure leads to greater profit variability.¹⁴ Knowledge-based proprietary assets, for which R&D spending is a good indicator, are often a motivation for

¹⁴ Although the effect of R&D expenditure on the dependent variable is not particularly distinct from the results given in Table 3.7, R&D expenditure exhibits a more significant effect in other variants of the regression model, one of which will be discussed in Section 3.7.1.

foreign investment. Given the intangible nature of such assets, firms that depend on these proprietary assets are likely to encounter more uncertainty when attempting to transfer them to a new market. This is in contrast to the uncertainties generated by other types of assets, such as managerial skills or logistic systems, which are more readily applied to new environments. The results therefore support the prediction that international acquirers with high R&D expenditures are likely to exhibit greater dispersions in their post-acquisition performance.

3.6.6 *FirmSize*

Since larger firms are likely to have accumulated more experience in managing diverse asset bundles, we expect these firms to be better at avoiding some of the uncertainties associated with acquiring a new subsidiary. In the models with $|e_{is}|$ and $|e_{il}|$ as dependent variables, the coefficients on *FirmSize* in both cases are negative and significant at the 5-percent level, i.e. larger firms enjoy lower variability in their profits after an acquisition. On the other hand, the regressions with $\Delta\pi_{is}$ and $\Delta\pi_{il}$ as the dependent variables yield coefficients on *FirmSize* that are not significantly different from zero, showing that larger firms do not perform any worse than smaller acquirers. These results lend support to the prediction that larger firms are better off making foreign acquisitions in the sense that they are less vulnerable to the uncertainties associated with acquiring a new subsidiary. This is manifested in their ability to maintain lower risk without forgoing their returns in the post-acquisition years.

Between the two regressions, the coefficient in the short-term regression is larger in magnitude and substantially more significant, suggesting that the effect of firm size on profit variability may be stronger in the short term. This could imply that the uncertainties with which large firms are more adept at coping are generally of a transitory nature; as other firms learn to get around these uncertainties, the risk differential enjoyed by large firms in the initial post-acquisition years becomes eroded with time.

3.6.7 *LaggedProfit*

With $\Delta\pi_{is}$ and $\Delta\pi_{il}$ as the dependent variables, the variable *LaggedProfit* takes a significant negative coefficient. The extent to which this can be attributed to mean reversion is explored by comparing the result to that obtained with a separate sample of non-acquiring firms selected over the same period 1989-1993. Since there is no acquisition year, we set $t = 0$ for each of the years 1989 through 1993 in turn and calculate the profitability measures in

the same way. With this sample of 838 observations, regressing short- and long-term changes in industry-adjusted profitability on year $t-1$ profitability yields estimates of -0.26 (t -statistic = -7.4) and -0.34 (t -statistic = -8.4) respectively. While these coefficients are also negative, their magnitudes are less than that of the coefficients obtained for the sample of foreign acquirers. In order to verify whether this difference is significant, we combine non-acquirers with foreign acquirers and introduce a new explanatory variable, *LaggedProfitForeign* (i.e. *LaggedProfit* \times *Foreign*, where *Foreign* = 1 for a foreign acquirer and 0 for a non-acquirer), to test if the effect of *LaggedProfit* on foreign acquirers differs significantly from that on non-acquirers. With short-term profitability as the dependent variable, the resulting estimates on *LaggedProfit* and *LaggedProfitForeign* are -0.27 (t -statistic = -7.7) and -0.21 (t -statistic = -3.0) respectively, while the corresponding estimates for long-term profitability are -0.33 (t -statistic = -8.7) and -0.29 (t -statistic = -3.8).

The significance of the negative coefficient on *LaggedProfitForeign* suggests an additional negative effect of *LaggedProfit* on foreign acquirers beyond that on non-acquiring firms. If the effect of *LaggedProfit* on non-acquiring firms is taken to represent mean reversion, it suggests that mean reversion can only partially explain the negative relationship that was found between *LaggedProfit* and the post-acquisition profitability of foreign acquirers. Hence, this allows for the possibility of foreign acquisitions being driven by managerial motives. The free cash flow hypothesis predicts that managers with excess funds at their disposal (i.e. the more profitable firms) are likely to splurge on non profit-maximising acquisitions. Hence, such acquisitions are likely to have negative repercussions on the acquiring company. These results are also consistent with the “hubris” hypothesis (Roll, 1986), which proposes that managers of companies that are performing well become overoptimistic about their ability to transfer their managerial assets across markets. In assessing the prospects of an acquisition, these managers are likely to predict expected returns that are higher than their true values, and hence undertake acquisitions that could be detrimental to the company. Since managers of highly profitable firms are most likely to be infected by hubris, firms with higher pre-acquisition profits are likely to perform worse in the post-acquisition period.

Since *LaggedProfit* is highly correlated with both dependent variables in the first stage regression, including *LaggedProfit* as an explanatory variable in the first stage regression leaves less variance for the second stage regression. Given that the terms $|e_{is}|$ and $|e_{it}|$ are generated from the residuals of the first stage regression, there is relatively little unexplained variance left for the second stage estimation when a regressor in the first stage is

highly significant. We thus re-estimate the first stage model without *LaggedProfit*, and only introduce this term as an explanatory variable in the second stage. The results of this alternative specification are discussed in Section 3.7.1.

3.6.8 *Dividends*

Among the explanatory variables that we have studied thus far, a number of them have shown evidence of a risk-return tradeoff in terms of their impact on post-acquisition performance. Likewise, we find that the variable *Dividends* exerts a similar influence on the acquirer's performance. We obtain a negative coefficient on *Dividends* in both models with $\Delta\pi_{is}$ and $\Delta\pi_{il}$ as dependent variables, suggesting that acquisitions made by firms with higher dividend payout rates are less profitable than those made by firms with lower dividend payout rates. In the second stage regressions, the coefficient on *Dividends* remains negative over the short and long terms. Thus, while high dividend-paying firms make less profitable acquisitions, they also exhibit less variability in their profits relative to low dividend-paying acquirers. The variable *Dividends*, which represents the proportion of the acquirer's earnings that are paid out as dividends, is a proxy for the amount of free cash flow available to the firm. Companies with higher dividend payout ratios have distributed a larger proportion of their earnings to their shareholders, and hence are likely to have less internal funds for financing investment projects. Since dividend distributions serve as a monitoring mechanism, the firm's managers are likely to be more cautious in choosing their investments, i.e. they would prefer less risky targets so that the firm would not be unduly exposed to large fluctuations in its earnings stream. This prediction is corroborated by the results, which demonstrate that acquirers with higher dividend payout ratios achieve less variability in their profits. Not surprisingly, less risky projects are also likely to have correspondingly lower returns, which accounts for the lower profit levels exhibited by high dividend-paying firms.

3.7 Robustness to Alternative Specifications

In order to establish the generality of these findings, we conduct a series of sensitivity analyses to test the robustness of the relationships between the explanatory and dependent variables. By varying the model specifications or employing different ways of expressing certain variables, we investigate how the relationships respond to these changes. The results of these tests are presented below.

3.7.1 *Dropping LaggedProfit from the First Stage Regression*

In the previous section, we found that the regressor *LaggedProfit* had a very strong effect (with a *t*-statistic of about -8) on the dependent variables $\Delta\pi_{is}$ and $\Delta\pi_{il}$ in the first stage regression. While a substantial portion of the effect was simply a result of mean reversion, this could have affected the impact of other regressors in the first stage as well as the second stage of the regression. In order to check how the other explanatory variables perform in the absence of *LaggedProfit*, we re-estimate the model without *LaggedProfit* while keeping the other variables unchanged.

Table 3.8 presents the results obtained by dropping *LaggedProfit* from the first stage regression. These findings are generally similar to the earlier set of results in terms of the magnitudes and directions of the effects. Some effects are stronger and others weaker, but in most cases the variations in the *t*-statistics are not substantial. In the first stage regressions, the effects of *ProdDiv*, *First*, *Mfg*, *FirmSize* and *Dividends* have become larger in magnitude and significance, while those of *US* and *Europe* have become smaller. In particular, the coefficients on *First* and *FirmSize* are considerably more significant relative to the previous set of results where they were negligible. For example, over the long-term, first-time foreign investors perform worse (in terms of profit levels) than experienced MNEs by -4.8 percent (*t*-statistic = -1.49) on average. Previously, the differential between first-time and experienced investors was -1.9 percent (*t*-statistic = -0.68), i.e. not significantly different from zero. As revealed in the previous model (re: Section 3.6.3), novice investors experienced less variability in their profits during the post-acquisition years, possibly because they were more cautious in choosing their acquisition targets, and hence opted for less risky investments. Since less risk is usually associated with lower returns, it is not surprising to find that novice investors underperform experienced MNEs in terms of their post-acquisition returns.

Similarly, over the long term the effect of *FirmSize* increases from -0.1 percent to -1.1 percent, while the corresponding *t*-statistic rises from -0.12 to -1.35 . The previous set of results revealed that larger firms were in a better position to undertake foreign acquisitions because they could achieve lower risk without sacrificing their returns. However, these results show that the reduction in risk might not have been obtained completely without cost, i.e. large firms also suffered from poorer returns. Nevertheless, while the effect of firm size on risk is highly significant, its effect on the level of returns is much weaker, suggesting that in general larger firms could still have an edge over their smaller counterparts when making acquisitions.¹⁵

¹⁵ While the effects of other variables have also altered in significance, their changes are relatively modest.

TABLE 3.8
Determinants of Industry-Normalised Profit Changes and Absolute Residuals
Dropping LaggedProfit from the First Stage Model

Explanatory variable	Dependent variable			
	$\Delta\pi_{is}$	$ e_{is} $	$\Delta\pi_{il}$	$ e_{il} $
RelSize	-0.0112 (-0.18)	0.0912 (1.98)	0.1269 (2.01)	0.1450 (3.76)
RelSize ²	0.0141 (0.74)	-0.0065 (-0.46)	-0.0099 (-0.53)	-0.0287 (-2.49)
ProdDiv	0.0134 (1.48)	0.0088 (1.33)	0.0320 (3.59)	0.0054 (0.99)
First	-0.0296 (-0.92)	-0.0517 (-2.17)	-0.0481 (-1.49)	-0.0559 (-2.82)
US	0.0100 (0.22)	-0.0391 (-1.14)	-0.0466 (-1.05)	-0.0544 (-2.01)
Europe	-0.0146 (-0.32)	-0.0243 (-0.72)	-0.0448 (-1.02)	-0.0708 (-2.65)
Mfg	0.0199 (0.71)	-0.0369 (-1.79)	0.0561 (2.05)	-0.0500 (-3.00)
R&D	0.4362 (0.96)	0.0699 (0.21)	0.2848 (0.68)	0.7199 (2.80)
ln(FirmSize)	-0.0087 (-1.02)	-0.0171 (-2.69)	-0.0113 (-1.35)	-0.0160 (-3.09)
LaggedProfit	-	-0.1882 (-3.74)	-	-0.1108 (-2.92)
Dividends	-0.0523 (-1.33)	-0.0373 (-1.28)	-0.0934 (-2.36)	-0.0345 (-1.42)
Constant	-0.0720 (-1.20)	0.1023 (2.28)	-0.1174 (-2.00)	0.1516 (4.18)
R ²	0.041	0.247	0.169	0.361

Note: *t*-statistics appear in parentheses

A similar pattern emerges in the second stage regressions, i.e. the variables that demonstrate stronger effects in the long-term regression are *ProdDiv*, *First*, *Mfg*, *FirmSize* and *Dividends*, while those that become weaker are *US* and *Europe*. In addition, the variables *R&D* and *LaggedProfit* become significant at the 5-percent level (which they were not previously). As mentioned in Section 3.6.5, we expect that increasing R&D expenditure would raise profit variability since firms that depend on knowledge-based proprietary assets (which are often generated by R&D activities) are likely to encounter more uncertainty when attempting to transfer them to new markets. In the case of *LaggedProfit*, its coefficient rises dramatically from -0.1 percent (*t*-statistic = -0.04) to -11.1 percent (*t*-statistic = -2.92). An inspection of the previous model reveals that the result we obtain in this new model is essentially generated from the same effect. By dropping the *LaggedProfit* term from the first stage regression, the component of the variance in the first stage dependent variable that was

previously explained by *LaggedProfit* has been carried over to the second stage dependent variable (which is the residual from the first stage). In other words, after the effect of *LaggedProfit* on the first stage dependent variable has been accounted for, there is little, if any, remaining effect on the second stage dependent variable. This is confirmed by the previous set of results, in which *LaggedProfit* is found to have a negligible influence in the second stage regression after removing its effect in the first stage.

In comparing these results with those generated by the previous model, we find that excluding the *LaggedProfit* term from the first stage regression does not bring about a crucial change in the effects of the other explanatory variables. Despite the highly significant effect of *LaggedProfit* on the dependent variable, these results remain robust to the inclusion of the *LaggedProfit* term.

3.7.2 *Surviving vs. Dead Acquirers*

Among our sample of acquirers, a number of them (55 of 256) were reported as “dead” within a few years of the acquisition because they were themselves taken over by other companies, or they became bankrupt. These acquirers could have differed from the surviving acquirers in terms of certain firm-specific characteristics that were not captured by the model. The explanatory variables could thus exert different effects on the acquirers depending on whether they survived through the post-acquisition years. We search for possible differences between these two groups of acquirers by separating them and re-estimating the original model for each group. Tables 3.9 and 3.10 present the results for the surviving and dead acquirers respectively. There were 201 acquirers that survived through the six-year post-acquisition observation period. Of the 55 acquirers that disappeared, only 13 survived beyond the third post-acquisition year. Since the long-term period spans the fourth to sixth year, these 13 firms were the only remaining observations left in the long-term regression. Given this small sample, the long-term results may not provide a true representation of this group of firms, and hence we will focus mainly on their short-term results.

Since the surviving acquirers form the majority (201 of 256) of the original sample, it is not surprising that the results in Table 3.9, obtained using surviving acquirers only, are very similar to those in the original model (re: Table 3.7). Over the long term, the effects of *RelSize*, *ProdDiv*, *LaggedProfit* and *Dividends* in the first stage regression have become weaker, though they still retain their significance at the 5 percent level (with the exception of *Dividends*). In the second stage regression, *RelSize*, *First*, *Mfg* and *FirmSize* also become

slightly weaker. The weaker effects are probably a result of removing the dead acquirers, and hence suggest that these variables have a similar effect on the dead acquirers.

TABLE 3.9
Determinants of Industry-Normalised Profit Changes and Absolute Residuals
Sample of Surviving Acquirers only

Explanatory variable	Dependent variable			
	$\Delta\pi_{is}$	$ e_{is} $	$\Delta\pi_{il}$	$ e_{il} $
RelSize	0.0131 (0.21)	0.1481 (2.92)	0.1240 (2.10)	0.1422 (3.49)
RelSize ²	0.0070 (0.38)	-0.0377 (-2.52)	-0.0249 (-1.43)	-0.0358 (-2.97)
ProdDiv	0.0114 (1.31)	0.0016 (0.22)	0.0265 (3.24)	-0.0023 (-0.40)
First	-0.0109 (-0.34)	-0.0305 (-1.20)	-0.0188 (-0.63)	-0.0452 (-2.20)
US	-0.0134 (-0.33)	-0.0417 (-1.26)	-0.0612 (-1.58)	-0.0659 (-2.47)
Europe	-0.0364 (-0.90)	-0.0393 (-1.20)	-0.0694 (-1.83)	-0.0877 (-3.34)
Mfg	0.0215 (0.83)	-0.0292 (-1.39)	0.0499 (2.05)	-0.0424 (-2.51)
R&D	-0.0143 (-0.04)	-0.1286 (-0.41)	0.2712 (0.74)	0.3591 (1.42)
ln(FirmSize)	-0.0034 (-0.42)	-0.0079 (-1.19)	0.0004 (0.05)	-0.0099 (-1.85)
LaggedProfit	-0.4004 (-6.73)	0.0444 (0.92)	-0.3944 (-7.05)	0.0254 (0.66)
Dividends	-0.0301 (-0.76)	-0.0700 (-2.19)	-0.0515 (-1.38)	-0.0463 (-1.80)
Constant	-0.0168 (-0.30)	0.1245 (2.77)	-0.0533 (-1.02)	0.1755 (4.85)
R ²	0.275	0.127	0.335	0.238

Note: *t*-statistics appear in parentheses

On the other hand, the variables that demonstrate stronger effects after excluding the dead acquirers (such as *Europe* and *Mfg* in the first stage regression, as well as *US*, *Europe*, *R&D* and *Dividends* in the second stage regression) may have different effects on the dead acquirers, i.e. their effects are either working in the opposite direction or weaker (or even non-existent). This is confirmed by the corresponding set of results for the dead acquirers. For example, comparing the second-stage results for long-term profitability, the effect of *FirmSize* is more significant in Table 3.10 than in Table 3.9, while the effect of *Dividends* works in the opposite direction. In comparing these results with those generated from the

mixed sample of 256 acquirers, we find that in most cases there is no significant difference between the effects of these variables on surviving and dead acquirers.

TABLE 3.10
Determinants of Industry-Normalised Profit Changes and Absolute Residuals
Sample of Dead Acquirers only

Explanatory variable	Dependent variable			
	$\Delta\pi_{is}$	$ e_{is} $	$\Delta\pi_{il}$	$ e_{il} $
RelSize	0.1959 (1.82)	-0.1118 (-1.66)	-1.0931 (-0.53)	0.7886 (2.95)
RelSize ²	-0.1091 (-2.90)	0.0283 (1.20)	0.8125 (0.49)	-0.6874 (-3.14)
ProdDiv	-0.0038 (-0.24)	0.0118 (1.21)	-0.0763 (-0.42)	0.0873 (3.67)
First	-0.0207 (-0.38)	-0.0136 (-0.40)	-0.1656 (-0.96)	-0.0067 (-0.30)
US	-0.0184 (-0.16)	-0.1060 (-1.45)	-0.2839 (-1.02)	-0.0806 (-2.21)
Europe	0.0074 (0.06)	-0.1022 (-1.38)	-	-
Mfg	-0.0289 (-0.51)	0.0324 (0.92)	0.0641 (0.22)	-0.0653 (-1.69)
R&D	1.7774 (1.22)	-0.1448 (-0.16)	-6.8851 (-1.02)	1.8327 (2.07)
ln(FirmSize)	0.0136 (0.72)	-0.0218 (-1.84)	0.1821 (0.94)	-0.0908 (-3.59)
LaggedProfit	-1.1683 (-5.75)	-0.0064 (-0.05)	-1.4513 (-1.71)	0.4066 (3.67)
Dividends	-0.0007 (-0.01)	-0.0194 (-0.51)	-0.5142 (-1.49)	0.0819 (1.82)
Constant	0.0371 (0.23)	0.1248 (1.24)	1.4910 (1.13)	-0.5933 (-3.45)
R ²	0.620	0.231	0.952	0.954

Note: *t*-statistics appear in parentheses

3.7.3 *Alternative Measures of Profitability*

In the previous models, we adopted the ratio of net income over sales as the dependent variable in the first stage regression. This is one of the many diverse measures of profitability that researchers have used as indicators of performance. As a means of checking the robustness of the earlier results, we employ alternative profitability measures as the dependent variable in our model. These measures include net income over assets, net income over shareholders' equity, net income plus interest payments over sales, and net income plus interest payments over assets. The effects of the explanatory variables that were found previously are generally weaker when these alternative measures are used. Nevertheless,

there are a number of effects that remain fairly constant regardless of the profitability measure employed. An illustration of these results is provided in Tables 3.11 and 3.12, which conduct the same analyses as those in Tables 3.5 and 3.7, except for net income over assets being used in place of net income over sales as the measure of profitability. The first row of Table 3.11 shows that foreign acquirers are on average 3 percent less profitable (over both short- and long-term periods) than their respective industry controls, a result that was also found in the original analysis.

TABLE 3.11
Differences in Profit Levels across Groups
Using Net Income/Total Assets as Measure of Profitability
 (Standard errors in parentheses)

Group difference	Short-term	Long-term
Entire sample	-0.0338** (0.0123)	-0.0328** (0.0130)
Large – small acquisitions	-0.0172 (0.0269)	-0.0052 (0.0277)
Less diversified – more diversified acquirers	0.0125 (0.0248)	-0.0234 (0.0262)
First – experienced investors	-0.0682** (0.0288)	-0.0147 (0.0310)
US – non-US acquisitions	0.0342 (0.0248)	0.0339 (0.0261)
Europe – non-Europe acquisitions	-0.0334 (0.0246)	-0.0422 (0.0260)
Non-(US+Europe) – (US+Europe) acquisitions	-0.0012 (0.0441)	0.0258 (0.0458)
Mfg – non-mfg firms	-0.0362 (0.0262)	-0.0074 (0.0281)
High – low R&D firms	-0.0028 (0.0264)	-0.0387 (0.0274)

** denotes significance at the 5% level

Corresponding to Table 3.5, we compare the differences between sub-samples on a univariate basis. Table 3.5 highlighted the difference in the long-term profitability of less diversified acquirers relative to more diversified acquirers. In Table 3.11, while more diversified acquirers are again found to have higher profitability on average, this difference is no longer significant. Table 3.11 also shows that first-time foreign acquirers are less profitable than their experienced counterparts, supporting the proposition that MNEs progress along a learning curve as they undertake more foreign acquisitions. Hence, first-time acquirers are more vulnerable to the fall in profitability following an acquisition than

experienced acquirers, though it should be noted that the difference between the two groups is significant only for the short-term measure, suggesting that the effects on profitability are likely to be transitory.

Table 3.12 presents the results obtained with the first stage dependent variable defined using the ratio of net income over assets. In the original model (re: Table 3.7), acquirers that were more diversified exhibited higher post-acquisition profitability, particularly in the long term. Likewise, product diversification retains its positive, albeit weaker, impact on profitability in this model. Lagged profit also remains highly influential on profit levels, supporting the earlier finding that firms with higher pre-acquisition profitability perform relatively poorly after the acquisition.

TABLE 3.12
Determinants of Industry-Normalised Profit Changes and Absolute Residuals
Using Net Income/Total Assets as Measure of Profitability

Explanatory variable	Dependent variable			
	$\Delta\pi_{is}$	$ e_{is} $	$\Delta\pi_{il}$	$ e_{il} $
RelSize	0.0111 (0.21)	-0.0315 (-0.74)	-0.0211 (-0.41)	0.0335 (0.79)
RelSize ²	-0.0048 (-0.30)	0.0125 (0.96)	0.0075 (0.49)	-0.0104 (-0.83)
ProdDiv	-0.0069 (-0.92)	0.0109 (1.77)	0.0111 (1.52)	-0.0071 (-1.18)
First	-0.0259 (-0.96)	0.0269 (1.22)	0.0169 (0.64)	-0.0283 (-1.30)
US	-0.0094 (-0.24)	-0.0019 (-0.06)	-0.0236 (-0.65)	0.0053 (0.18)
Europe	-0.0195 (-0.51)	-0.0109 (-0.35)	-0.0376 (-1.05)	0.0030 (0.10)
Mfg	-0.0225 (-0.97)	0.0036 (0.19)	0.0079 (0.35)	-0.0262 (-1.43)
R&D	-0.0936 (-0.25)	-0.0290 (-0.09)	-0.1190 (-0.34)	-0.0387 (-0.14)
ln(FirmSize)	0.0147 (2.06)	-0.0197 (-3.39)	0.0045 (0.65)	-0.0119 (-2.11)
LaggedProfit	-0.3885 (-10.66)	0.0255 (0.86)	-0.4161 (-13.01)	0.0333 (1.27)
Dividends	-0.0042 (-0.13)	-0.0380 (-1.41)	-0.0409 (-1.26)	0.0126 (0.47)
Constant	0.0815 (1.63)	0.0214 (0.53)	0.0186 (0.39)	0.0688 (1.75)
R ²	0.352	0.105	0.478	0.069

Note: *t*-statistics appear in parentheses

In the second stage regression involving long-term profitability, the negative effect of *First* is still evident, though it drops slightly from -4.3 percent to -2.8 percent. Similarly, manufacturing firms experience less post-acquisition profit variability relative to non-manufacturing firms, but this differential is reduced from -4.4 percent to -2.6 percent. Since manufacturing firms have traditionally been more active foreign investors, they have better access to information, or have developed the managerial skills, necessary to reduce the risks brought about by foreign acquisitions. The negative effect of firm size on profit variability remains constant at around -1 percent, confirming that larger firms are better at avoiding some of the uncertainties associated with acquiring new subsidiaries since they are likely to have accumulated more experience in managing diverse asset bundles.

3.8 UK Acquisitions vs. US Acquisitions

The acquisitions studied in this analysis are derived from the purchases of foreign firms by UK-based acquirers. Since the acquirer's domestic business environment could also play a part in the acquirer's response to a foreign investment, the results obtained for UK acquirers may not necessarily apply to acquirers based in other countries. A similar investigation carried out using acquisitions undertaken by US firms (Lee and Caves, 1998) provides for a useful comparison of post-acquisition performance between UK and US acquirers.

In the US sample, acquirers that were more profitable before the acquisition were more likely to perform badly after the acquisition. This finding is consistent with the effect of the *LaggedProfit* term used in the UK sample. There is also evidence from both samples that novice investors suffered from lower profit levels than experienced multinational investors. The finding that larger firms' profit changes exhibit significantly smaller dispersions is also common to both samples. The US model contains a variable *Location* which is a dummy variable set equal to 1 when the acquirer already owns existing operations in the region where the acquired firm is located. To the extent that *Location* provides an indication of the acquirer's experience with running subsidiaries in a certain region, it serves a similar function to that of the variables *US* and *Europe* used in the UK model. Just as acquisitions in the US and Europe led to less variable profits, acquirers with existing operations (i.e. when *Location* = 1) were also found to exhibit lower profit variability in the US study. In other words, acquirers that had amassed more experience with a particular foreign market were able to reduce the uncertainties associated with acquiring a new subsidiary in that market. Both models also revealed that R&D intensity, indicating the existence of the proprietary assets

believed to be an important impetus for expanding abroad, increased the dispersion of profit changes. Whether or not these assets, which are intangible in nature, can be transferred successfully to new markets is highly uncertain, and hence acquisitions founded on the existence of such assets are likely to be more risky. Manufacturing acquirers in both countries demonstrate that their traditionally active role in overseas investment has enabled them to enjoy significantly reduced dispersions of profit changes, possibly because they have learnt how to cope with the uncertainties that foreign acquisitions engender.

Although the results from both groups of acquirers agree on most counts, there are a few instances where discrepancies arise. One such example concerns the performance of novice investors. Novice investors in both countries report a significant decline in profits (relative to experienced investors), but those in the UK exhibit less dispersion in their profits while novice US acquirers report larger profit dispersions. In theory novice investors, not having learnt to manage overseas investments judiciously, are more likely to encounter unexpected risks that could lead to large profit fluctuations, as observed in the US sample. However, novice investors in the UK could have been more cautious in selecting their acquisition targets and hence were predisposed toward less risky investments. In contrast, experienced MNEs, having gained confidence from their previous investments, could be more willing to take on potentially risky acquisitions. In addition, relative size has a more complex effect on UK acquirers. For the sample of US acquirers, profit variability increased with relative size. Although relative size was also found to have a positive effect on the variability of UK acquirers' profit outcomes, it had an additional effect on return, i.e. relative size presented UK acquirers with a risk-return tradeoff. While its effect on US acquirers was not sustained beyond the third year after the acquisition, the relative size effect on UK acquirers was present only in the long-term model. Thus, the US results could have picked up the transitional effect arising from adjustment costs while the UK results suggest the longer-term significance of relative size.

3.9 Foreign vs. Domestic Acquisitions

The principal finding of this study, that firms undertaking acquisitions suffer a fall in profitability, finds resonance among similar studies of post-acquisition performance (e.g. Meeks, 1977; Ravenscraft and Scherer, 1987 and 1989), albeit in the context of domestic acquisitions. Since the negative repercussions from an acquisition have been established, a logical extension of these studies would be to find out how the performance of a foreign acquirer compares with that of a domestic acquirer. This issue is addressed in two ways: first

by a direct comparison of post-acquisition profitability between the two groups of acquirers, then followed by a multivariate analysis in which the type of acquisition (i.e. foreign or domestic) enters as an additional explanatory variable. In the latter analysis, the type of acquisition can be regarded as another characteristic of the acquisition which can potentially affect the post-acquisition outcome.

The sample of foreign acquirers is retained from the previous analysis. For the purpose of this exercise we select a sample of publicly listed UK firms that have undertaken only domestic acquisitions in the years 1989-1993, corresponding to the sample period of foreign acquisitions. The *Extel* database reports a firm's acquisition expenditure, so where a non-zero figure appears, the firm is designated an acquirer. If the firm does not appear in the roster of foreign acquirers published by the *Acquisitions Monthly* journal, it is deemed to be a domestic acquirer. In order to ensure that this sample of domestic acquirers is comparable with the sample of foreign acquirers, we also impose a 5 percent minimum restriction on the relative size of the domestic acquisition. In this way, we obtain a sample of 337 domestic acquirers, of which 307 remain in the long-term post-acquisition period (i.e. company accounts data was not available for 30 firms beyond the third post-acquisition year).

Comparing the post-acquisition profitability of the two samples, we find that domestic acquirers outperform foreign acquirers by 0.029 (t -statistic = 1.49) and 0.015 (t -statistic = 0.75) in the short- and long-term periods respectively, although these differences are barely significant in the short-term and insignificant over the long-term. Hence, there appears to be little difference between the effects of foreign and domestic acquisitions on the acquiring firm's post-acquisition profitability. Further evidence of this is provided by the extreme right-hand column of Table 3.13, which presents the results of a regression analysis similar to that in Table 3.7, except for the inclusion of a new explanatory variable *Foreign*, which equals 1 for a foreign acquisition and 0 for a domestic acquisition.¹⁶ The sample used for this regression combines both foreign and domestic acquirers. For all four formulations of the dependent variable (Panels A through D), the coefficient on *Foreign* is not significantly different from zero, indicating that the type of acquisition, be it foreign or domestic, does not influence the post-acquisition outcome.¹⁷

¹⁶ The other aspect by which this regression differs from that in Table 3.7 is the absence of the variables *First*, *US* and *Europe*, which are dropped in this regression because by definition they have no corresponding values in the domestic context.

¹⁷ By estimating domestic and foreign acquisitions in a pooled regression, we are imposing the restriction that the explanatory variables have the same effects on both domestic and foreign acquirers. When this restriction is relaxed by allowing explanatory variables to have different coefficients for domestic and foreign acquisitions (i.e. interacting each explanatory variable with the dummy variable *Foreign*), the coefficient on *Foreign* is unaffected by this change.

Although these results reveal no distinguishable effect of acquisition type on post-acquisition profitability, this does not mean that domestic and foreign acquisitions are alike in every aspect. The regression analyses reported in the left-hand and middle columns of Table 3.13 provide a comparison of the effects of the original set of explanatory variables within the two separate groups of acquiring firms. In all four regressions, there are distinct differences in the effects of the variable *RelSize* (and its attendant *RelSize*²) depending on the type of acquisition. For example, in the regression involving short-term profitability (Panel A), the relative size of a foreign acquisition has no bearing on profitability, but the relative size of a domestic acquisition has a negative impact on profitability (for almost the entire range of acquisitions in the sample).

Another variable that exhibits a difference across the two groups is *LaggedProfit*—in both second-stage regressions (Panels B and D) it has a significant negative coefficient for the group of domestic acquirers which is not present for the group of foreign acquirers. This suggests that more profitable firms are better at avoiding the uncertainties that arise from acquisitions, but only if the acquisition undertaken is a domestic one, i.e. they are no better at reducing the risk of foreign acquisitions than less profitable firms.

One other discernible difference occurs in the *ProdDiv* variable—specifically, its positive and significant correlation with long-term profitability (Panel C) for the group of foreign acquirers is not found for the sample of domestic acquirers. Therefore, the advantage that diversified firms have in the field of foreign acquisitions does not translate to acquisitions in the domestic market. When establishing a subsidiary in a foreign market, it is difficult to assess product demand in a relatively unfamiliar market (compared with the home market). The more diversified firms, which are able to offer a variety of products, have a better chance of success in the foreign market. This same attribute is, however, less pertinent to acquisitions within the domestic market, where there are considerably less uncertainties to contend with.

TABLE 3.13
Determinants of Industry-Normalised Profit Changes and Absolute Residuals:
Foreign vs. Domestic Acquisitions

Panel A: Dependent variable = $\Delta\pi_{is}$

Explanatory variable	Sample used in estimation		
	Foreign acquirers	Domestic acquirers	All acquirers
RelSize	0.0244 (0.45)	-0.2022 (-3.75)	-0.1329 (-3.41)
RelSize ²	-0.0115 (-0.68)	0.0794 (4.90)	0.0512 (4.27)
ProdDiv	0.0082 (1.05)	-0.0088 (-0.89)	-0.0001 (-0.02)
Mfg	0.0064 (0.26)	0.0321 (1.20)	0.0214 (1.16)
R&D	0.3328 (0.85)	-0.0927 (-0.12)	0.0152 (0.04)
ln(FirmSize)	0.0030 (0.44)	0.0060 (0.69)	0.0026 (0.48)
LaggedProfit	-0.5236 (-8.90)	-0.5431 (-11.24)	-0.5501 (-13.85)
Dividends	-0.0220 (-0.64)	-0.0033 (-0.35)	-0.0036 (-0.44)
Foreign	--	--	-0.0152 (-0.82)
Constant	-0.0565 (-0.72)	-0.0116 (-0.12)	-0.0034 (-0.06)
R ²	0.268	0.314	0.267

Panel B: Dependent variable = $|e_{is}|$

Explanatory variable	Sample used in estimation		
	Foreign acquirers	Domestic acquirers	All acquirers
RelSize	0.0613 (1.44)	0.1250 (2.98)	0.0988 (3.22)
RelSize ²	0.0001 (0.01)	-0.0336 (-2.66)	-0.0158 (-1.67)
ProdDiv	0.0087 (1.41)	0.0054 (0.71)	0.0055 (1.09)
Mfg	-0.0254 (-1.33)	-0.0443 (-2.12)	-0.0464 (-3.20)
R&D	-0.0654 (-0.21)	0.3126 (0.51)	-0.2030 (-0.65)
ln(FirmSize)	-0.0139 (-2.59)	-0.0283 (-4.24)	-0.0205 (-4.71)
LaggedProfit	0.0405 (0.88)	-0.0704 (-1.88)	-0.0714 (-2.29)
Dividends	-0.0537 (-1.99)	-0.0067 (-0.92)	-0.0075 (-1.16)
Foreign	--	--	-0.0015 (-0.11)
Constant	0.2435 (3.96)	0.4010 (5.48)	0.3217 (6.70)
R ²	0.144	0.154	0.152

Panel C: Dependent variable = $\Delta\pi_{it}$

Explanatory variable	Sample used in estimation		
	Foreign acquirers	Domestic acquirers	All acquirers
RelSize	0.1409 (2.55)	-0.1351 (-2.09)	-0.0479 (-1.05)
RelSize ²	-0.0309 (-1.87)	0.0585 (2.58)	0.0282 (1.88)
ProdDiv	0.0263 (3.37)	0.0008 (0.07)	0.0108 (1.47)
Mfg	0.0406 (1.70)	0.0260 (0.84)	0.0253 (1.23)
R&D	0.1733 (0.48)	0.3783 (0.40)	0.1085 (0.25)
ln(FirmSize)	0.0008 (0.12)	0.0076 (0.79)	0.0036 (0.59)
LaggedProfit	-0.4310 (-7.98)	-0.5142 (-7.99)	-0.5323 (-11.13)
Dividends	-0.0683 (-1.98)	0.0003 (0.02)	-0.0014 (-0.14)
Foreign	--	--	-0.0113 (-0.54)
Constant	-0.1109 (-1.46)	-0.0717 (-0.68)	-0.0700 (-1.04)
R ²	0.356	0.237	0.235

Panel D: Dependent variable = $|e_{it}|$

Explanatory variable	Sample used in estimation		
	Foreign acquirers	Domestic acquirers	All acquirers
RelSize	0.1476 (3.77)	0.0969 (1.92)	0.0852 (2.39)
RelSize ²	-0.0338 (-2.89)	-0.0082 (-0.46)	-0.0072 (-0.62)
ProdDiv	-0.0002 (-0.03)	0.0039 (0.44)	0.0026 (0.45)
Mfg	-0.0440 (-2.60)	-0.0651 (-2.71)	-0.0640 (-4.00)
R&D	0.2805 (1.09)	0.1773 (0.24)	0.1302 (0.38)
ln(FirmSize)	-0.0045 (-0.95)	-0.0241 (-3.19)	-0.0176 (-3.69)
LaggedProfit	-0.0064 (-0.17)	-0.1105 (-2.20)	-0.1190 (-3.19)
Dividends	-0.0430 (-1.75)	-0.0070 (-0.77)	-0.0079 (-1.02)
Foreign	--	--	-0.0004 (-0.03)
Constant	0.1637 (3.05)	0.3773 (4.58)	0.3159 (6.03)
R ²	0.188	0.180	0.177

Note: *t*-statistics appear in parentheses

3.10 Conclusion

In our evaluation of profitability changes around the year of the foreign acquisition, the initial trend that emerges is rather dismal—relative to other firms in the same industry, the profitability of acquiring firms generally declines after an acquisition. Nevertheless, not all acquisitions necessarily lead to declining profit levels. It is thus important to identify the factors that contribute toward the post-acquisition outcome. Furthermore, we find that focusing on the level of profitability alone does not provide a good assessment of acquisition performance. Because acquisitions could stem from a diverse range of motives, improving profitability might not have been the sole objective pursued by all acquirers. For instance, an acquirer seeking to reduce risk may be prepared to tolerate a commensurate reduction in profitability.

In order to account for these considerations, this study extends the conventional analysis of post-acquisition profitability along two dimensions. First, apart from measuring the level of profitability, we also study how profit dispersions (which serve as a proxy for risk) are affected by the acquisition. Second, we explore acquirer- and acquisition-specific characteristics that could influence these post-acquisition outcomes. By examining how these determinants affect the acquirer's performance, we arrive at a better understanding of the possible motivations for acquiring foreign subsidiaries and their attendant consequences.

For this sample of UK acquirers, among the more robust findings is the effect of product diversification—more diversified acquirers enjoy higher profitability (than less diversified acquirers) without incurring higher risk. This could imply that highly diversified acquirers like conglomerates are endowed with certain assets, in the form of a versatile management team or a flexible organisational structure, which enable them to digest newly acquired subsidiaries in a less costly manner. Manufacturing acquirers, with their long history of foreign investment, also fare better (than non-manufacturing acquirers) in being able to achieve less variable profits without compromising the level of profitability. Similarly, larger acquirers' profit changes also exhibit significantly smaller dispersions than that of smaller acquirers. Their larger size indicates that these firms have learnt how to overcome some of the problems that arise from bringing together diverse bundles of assets.

One particularly interesting finding that has been revealed is the risk-return tradeoff encountered by acquiring firms. For example, increasing the relative size of the acquired subsidiary can bring about higher return as well as higher risk. The existence of this tradeoff means that a decline in profitability per se might not signal a failed investment, for it can also be accompanied by a reduction in risk. Nevertheless, from the perspective of the

shareholders, this second outcome may not be any more desirable than the first, since shareholders that are able to achieve portfolio diversification on their own may prefer that the firm's managers focus instead on maximising the firm's value. To the extent that shareholders are unable to access foreign capital markets on an individual basis, holding the shares of a well-diversified MNE could be an attractive avenue for shareholders to diversify their portfolio. However with the rapid integration of global capital markets, whether such portfolio diversification methods remain relevant to shareholders is questionable. (This issue is discussed further in the following chapter.)

In constructing the measure of profit changes, we raised the caveat that should acquired firms be on average less profitable than their acquirers (which agrees with the view that takeovers bring about a more efficient utilisation of resources), the resulting profit changes would be more negative than they actually were. Moreover, improvements in profitability could take time to materialise, so failure to detect positive changes could mean that they occurred after the six-year post-acquisition period used in this study. These considerations highlight drawbacks in the measure of profitability, and provide motivation for using the stock market's response to foreign acquisition announcements as an alternative performance measure (re: Chapter 4).

3.11 Appendix

Data descriptions and sources

Dividends: The acquiring firm's pre-acquisition dividend payout ratio, i.e. the average of dividends divided by earnings over the three years preceding the acquisition. Source: *Extel*.

Europe: Dummy variable set equal to 1 for acquisitions in Europe, and 0 otherwise. Source: *Acquisitions Monthly*.

FirmSize: Average sales revenue of the acquiring firm in the three years preceding the foreign acquisition, expressed in constant prices. Sources: *Extel* (for sales revenues) and the Retail Price Index published in the Office of National Statistics' *Economic Trends: Annual Supplement, 1997 Edition* (for price adjustments).

First: Dummy variable set equal to 1 for first-time foreign investors, and 0 for established MNEs. Firms are classified as established MNEs if they have been paying overseas taxes (i.e. a non-zero figure is reported in the "Overseas Tax" item) prior to the acquisition. Source: *Extel*.

Foreign: Dummy variable set equal to 1 for a foreign acquisition and 0 for a domestic acquisition. Sources: *Acquisitions Monthly* (for foreign acquisitions) and *Extel* (for domestic acquisitions).

LaggedProfit: Net income of acquiring firm divided by its sales revenue in the year before the acquisition. Source: *Extel*.

Mfg: Dummy variable set equal to 1 for acquiring firms based in the manufacturing sector (primary SIC codes beginning with 2, 3 or 4), and 0 otherwise. Source: *Extel*.

ProdDiv: Discrete variable equal to 0 when only one four-digit SIC code is reported by the acquiring firm; 1 when the first three digits are shared by all lines of business; 2 when the first two only; 3 when the first only; and 4 when the first digit is different for at least two of the sectors. Source: *Extel*.

ProdDiv1-ProdDiv4: Dummy variables for each value of *ProdDiv* from 0 through 4.

R&D: An average of the acquiring firm's R&D expenditure divided by its sales revenue is first calculated for the three years preceding the acquisition. The same procedure is then repeated for the firms in the industry control group. The resulting industry R&D intensity is subtracted from the firm's R&D intensity to obtain the *R&D* variable. Source: *Extel*.

RelSize: Sales revenue of acquiring firm divided by sales revenue of acquired firm, or (if not available) purchase price of acquired firm divided by market value of acquiring firm. Sources: *Acquisitions Monthly* (for acquired firms) and *Extel* (for acquiring firms).

US: Dummy variable set equal to 1 for acquisitions in the US, and 0 otherwise. Source: *Acquisitions Monthly*.

Alternative specifications

TABLE 3A.1
Determinants of Industry-Normalised Profit Changes and Absolute Residuals
Alternative Specification of ProdDiv Variable

Explanatory variable	Dependent variable			
	$\Delta\pi_{is}$	$ e_{is} $	$\Delta\pi_{il}$	$ e_{il} $
RelSize	0.0184 (0.34)	0.0560 (1.31)	0.1415 (2.55)	0.1337 (3.60)
RelSize ²	-0.0103 (-0.61)	0.0004 (0.03)	-0.0320 (-1.93)	-0.0315 (-2.84)
ProdDiv1	0.0544 (0.95)	0.0069 (0.16)	0.0166 (0.32)	-0.0252 (-0.72)
ProdDiv2	0.0045 (0.11)	-0.0079 (-0.25)	0.0131 (0.33)	-0.0263 (-1.01)
ProdDiv3	0.0497 (1.28)	0.0169 (0.56)	0.0890 (2.33)	0.0033 (0.13)
ProdDiv4	0.0354 (1.05)	0.0289 (1.10)	0.0947 (2.78)	-0.0124 (-0.55)
First	-0.0082 (-0.29)	-0.0340 (-1.54)	-0.0207 (-0.73)	-0.0398 (-2.08)
US	-0.0205 (-0.50)	-0.0369 (-1.16)	-0.0680 (-1.74)	-0.0690 (-2.64)
Europe	-0.0358 (-0.89)	-0.0356 (-1.14)	-0.0609 (-1.58)	-0.0873 (-3.39)
Mfg	0.0031 (0.13)	-0.0204 (-1.06)	0.0411 (1.70)	-0.0429 (-2.66)
R&D	0.2992 (0.74)	-0.0141 (-0.04)	0.2367 (0.63)	0.3240 (1.29)
ln(FirmSize)	0.0017 (0.23)	-0.0165 (-2.80)	-0.0001 (-0.01)	-0.0085 (-1.70)
LaggedProfit	-0.5224 (-8.74)	0.0396 (0.85)	-0.4335 (-7.92)	-0.0036 (-0.10)
Dividends	-0.0248 (-0.71)	-0.0463 (-1.69)	-0.0697 (-1.96)	-0.0360 (-1.51)
Constant	0.0085 (0.15)	0.0897 (2.09)	-0.0286 (-0.52)	0.1833 (5.02)
R ²	0.277	0.147	0.373	0.247

Note: *t*-statistics appear in parentheses

TABLE 3A.2
Determinants of Squared Residuals from the First Stage Model in Table 3.7
Original Model

Explanatory variable	Dependent variable	
	e_{is}^2	e_{il}^2
RelSize	0.0819 (2.18)	0.1249 (3.81)
RelSize ²	-0.0131 (-1.13)	-0.0277 (-2.83)
ProdDiv	0.0087 (1.61)	0.0049 (1.06)
First	-0.0468 (-2.42)	-0.0438 (-2.60)
US	-0.0646 (-2.31)	-0.0696 (-3.02)
Europe	-0.0553 (-2.02)	-0.0751 (-3.30)
Mfg	-0.0281 (-1.68)	-0.0174 (-1.23)
R&D	-0.0623 (-0.23)	0.0341 (0.16)
ln(FirmSize)	-0.0093 (-1.79)	-0.0078 (-1.76)
LaggedProfit	0.0379 (0.93)	0.0373 (1.15)
Dividends	-0.0367 (-1.54)	-0.0330 (-1.60)
Constant	0.0597 (1.64)	0.0657 (2.13)
R ²	0.133	0.196

Note: *t*-statistics appear in parentheses

4 EVALUATING THE PERFORMANCE OF FOREIGN ACQUISITIONS: THE STOCK MARKET'S PERSPECTIVE

4.1 Introduction

The previous chapter highlighted a number of limitations to using the firm's profitability as a means of assessing the impact of foreign acquisitions on acquiring firms. The fundamental problem arose from uncertainty about the appropriate post-acquisition period to use. Already we observed that dividing the post-acquisition years into short- and long-term periods gave rise to rather different results. Whether or not this six-year post-acquisition window was adequate for observing the change in the firm's performance remains debatable. If the window had been shortened, we would run the risk of missing out on potential long-term benefits of the acquisition. On the other hand, extending the window would make it more difficult to distinguish the effects of a particular acquisition from that of other major events that occurred in the firm during the interim period. Therefore, in addition to measuring the firm's post-acquisition profitability, we also study the stock market's reaction to acquisition announcements. Apart from offering an alternative assessment of the foreign acquisition, the stock market could, more importantly, provide an evaluation of acquisition performance that need not be constrained by the horizon of the observation window. Moreover, market valuations also have the advantage of avoiding the confounding disturbances that affect ex post realisations.

When the firm announces an acquisition, movements in the firm's share price reflect the value that external investors place on the acquisition. While this holds true in theory, whether or not it happens in the real world depends on how efficient stock markets really are. We have to recognise that movements in stock prices can be quite noisy, reflecting not only changes in fundamentals, but also possibly bubbles, fads, and the influence of noise traders. Nevertheless, to the extent that stock prices are able to capture the information available at the time of the acquisition, changes in stock prices provide a good assessment of the value that is conveyed to the firm from the acquisition, regardless of when the increase in future profits is expected to occur. If the market consensus is that the acquisition enhances the acquirer's value, then investors would be willing to pay more for a share in the firm and its share price should rise accordingly.

In this chapter, the event study methodology is used to analyse share price movements of firms that make foreign acquisition announcements. Furthermore, we explore whether the stock market's reaction is contingent upon the type of acquisition, or the type of firm that makes the acquisition announcement. In the last section, we employ alternative estimation techniques to investigate the robustness of the abnormal returns derived from the event study.

4.2 Event Study Methodology

4.2.1 Theory

We begin our empirical tests by estimating the abnormal returns earned by acquiring firms and testing their level of significance. The event date is taken to be the announcement date, while the event window is defined as the n days before and after the announcement date ($t = 0$), i.e. $[-n, +n]$. For a given security i , the abnormal or excess return on day t (within the event window) is defined as

$$AR_{it} = R_{it} - C_{it},$$

where R_{it} is the return for stock i on day t , C_{it} is a control (or counterfactual) return which calculates an estimate of what shareholder returns would have been expected if the event had not occurred, and t measures time (in days) relative to the event date ($t = 0$). The control return can be regarded as a means of adjusting for market-wide factors or risk, and usually employs some variant of the capital asset pricing model (CAPM). The most commonly used empirical version of the CAPM in studies of mergers and acquisitions has been the market model (Fama, 1976), which is an empirical specification of the assumed stochastic process that generates individual security returns. The market model is specified as:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it},$$

where R_{mt} is the return on the market (as proxied by the FTSE all-share index)¹ at time t ; α_i and β_i are the OLS estimates of the intercept and slope coefficients respectively of the market model regression; and ε_{it} , the residual term, is the difference between actual return and predicted return on a particular day t . In this formulation, the differences between actual and predicted returns are due to random processes that even out over time. Important firm-specific events, such as acquisition announcements, alter the set of expectations regarding the firm's future such that temporary deviations between the actual and expected returns occur. The parameters α_i and β_i are estimated during a pre-event equilibrium period, where the underlying risk/return characteristics of the firm are assumed to be not undergoing systematic

¹ Using the FTSE 250 and FTSE 100 share indices as alternative market benchmarks, the results of the event study are checked for sensitivity to the benchmark selected (re: Section 4.5).

change. Subject to the availability of stock price data, for each security this equation is estimated for the 100 days before the event window, i.e. $[-(n+100), -(n+1)]$, by regressing R_{it} on R_{mt} and obtaining the OLS estimates α_i and β_i . With these estimated coefficients we can express the control return as:

$$C_{it} = \alpha_i + \beta_i R_{mt}.$$

Individual company returns are then aggregated to form a portfolio abnormal monthly return (AR_t). For a sample of N firms, the average abnormal return on day t is:

$$AR_t = \frac{1}{N} \sum_{i=1}^N AR_{it}.$$

In order to assess the statistical significance of AR_t , the abnormal return for each security i is first standardised by the square root of its estimated forecast variance for a time period assumed to be unaffected by the event (Dodd and Warner, 1983). The standardised abnormal return is given by $SAR_{it} = AR_{it}/S_{it}$, where S_{it} is calculated from:

$$S_{it} = \left[s_i^2 \left[1 + \frac{1}{L} + \frac{(R_{mt} - \bar{R}_m)^2}{\sum_{t=-(n+100)}^{-(n+1)} (R_{mt} - \bar{R}_m)^2} \right] \right]^{\frac{1}{2}}.$$

In the above expression, $s_i^2 = (1/98) \sum AR_{it}^2$, the residual variance for firm i from the market model regression, L is the number of observations in the estimation period (i.e. 100), and \bar{R}_m is the mean value of R_{mt} over this period. SAR_t is then defined as:

$$SAR_t = \frac{1}{N} \sum_{i=1}^N SAR_{it}.$$

In the absence of abnormal performance, the expected value of AR_t , and hence SAR_t , is zero. A t -test is used to examine if SAR_t is statistically different from zero.²

In order to measure the overall shareholder wealth gain for the days surrounding the event date, we construct firm-specific cumulative abnormal returns ($CARs$) between any two dates designated as the beginning and end of the event window. Firm i 's CAR for an event window of $[-n, +n]$ is given by:

$$CAR_i[-n, +n] = \sum_{t=-n}^{+n} AR_{it}.$$

In measuring CAR values, we explore various alternative window lengths, ranging from $[-3, +3]$ to $[-10, +10]$. While the capital market digests the new information, $CARs$ may be positive or negative depending on whether the market's evaluation is favourable or unfavourable. Positive $CARs$ indicate that the market expects the acquisition to yield net benefits to the shareholders, while negative $CARs$ mean that the acquisition is not expected to

be in the interest of the shareholders. In other words, the *CAR* represents an ex ante valuation of longer-run consequences that could result from the acquisition event.

As in the case of daily abnormal returns, statistical testing is performed on the standardised values of the cumulative abnormal returns. The standardised *CAR* (or *SCAR*) is computed from:

$$SCAR_i[-n,+n] = \sum_{t=-n}^{+n} SAR_{it} \frac{1}{\sqrt{2n+1}}.$$

In a sample of N securities, the average *SCAR* is

$$SCAR[-n,+n] = \frac{1}{N} \sum_{i=1}^N SCAR_i.$$

A t -statistic is used to test the significance of *SCAR*, based on the null hypothesis that the average *SCAR* is equal to 0.

4.2.2 Past Event Studies

Although event studies have generally focused on domestic acquisitions, the methodology has also been applied to cross-border acquisitions. Morck and Yeung (1992) study how the stock market reacts to announcements of foreign acquisitions by US firms. They find a significant positive response to the announcement, which increases with the firm's rate of spending on proprietary assets—R&D (especially for small acquiring firms) and advertising (especially for large ones). This is consistent with the internalisation theory of multinational firms. Smaller firms, which are presumably younger and more dynamic, are more likely to own technology-based proprietary assets, while larger firms, which have amassed experience over the years, have assets in areas such as management and marketing.

The positive response to multinational acquisitions is also present in Fatemi's (1984) study. In addition, both Harris and Ravenscraft (1991) and Swenson (1993) find that foreign acquisitions generated larger target shareholder wealth gains than those in similar domestic acquisitions.

The robustness of Swenson's finding to controls for the method of payment, the competitive environment, and the presence of government or target management resistance indicates that high returns in foreign transactions are not simply caused by the concentration of foreign purchases in high-return sectors. However, she observes that cross-border targets

² With this standardisation procedure, it is possible that the daily average abnormal return (AR_t) and the average standardised abnormal return (SAR_t) can have different signs, thereby giving rise to the possibility of different signs between AR_t values and their corresponding test statistics.

are more rapidly growing than domestic targets. Foreign acquirers are also less likely to encounter competition from other bidding firms or challenge from government agencies.

Analysing a sample of US firms engaged in international acquisitions over the period 1975-83, Doukas and Travlos (1988) find no evidence of abnormal returns for bidding firms. However, disaggregating the sample according to various characteristics of the bidding firm reveals deviations in some sub-samples. The acquisition announcements made by firms not operating in the target firm's country are associated with positive and significant abnormal returns on the event day, indicating that such acquisitions constitute positive news to investors. In contrast, there is no evidence of abnormal returns for stockholders of bidding firms already operating in the target firm's country. This supports the theory that multinationals expand as a means of diversifying risk, since diversifying across geographic space is likely to reap the greatest risk-spreading benefit. Also consistent with this theory is the finding that shareholders of acquiring firms benefit most when the acquired firm is located in less developed countries (which are likely to offer better prospects for diversification in the context of US acquirers). For the group of firms that expand into new geographic markets, diversifying across industry space (where the first two SIC digits of the target's business segment is different from that of the acquirer) also generates positive abnormal returns.

Studies on foreign acquisitions have consistently found evidence of their positive impact on acquired as well as acquiring firms, albeit only on certain sub-samples of firms in some instances (e.g. the Doukas and Travlos study cited above). With regard to the specific factors that contribute toward the positive result, the position within the multinational literature, however, remains ambiguous. In addition to verifying whether the benefits of acquiring abroad extend to UK acquirers, this study furthers the investigation of the characteristics that drive the stock market's response to foreign acquisitions.

4.3 Data

The sample analysed in this study contains UK publicly listed firms that engaged in international acquisitions over the twelve-year period from 1986 through 1997. The acquiring firms were identified from the *Acquisitions Monthly* journal, which publishes rosters of acquisitions conducted by UK firms. For each reported transaction, information on the announcement date of the acquisition (which is taken as the event date) is also provided. Data on share prices and market benchmarks are obtained from the *FT Prices* database. In order to ensure that the event is sufficiently large to have a significant impact on the acquiring firm's

value, only major acquisitions are included. These are defined as transactions in which the size of the acquired firm (measured in terms of sales revenue) is more than 1 percent of its acquirer's. Although it is impossible to eliminate all extraneous influences apart from the event itself, an attempt is made to reduce the confounding effects of other events near the actual event date. Hence, a major acquisition that occurs within two months of another by the same firm is dropped from the sample. Based on the above selection criteria, we obtain a sample of 1370 foreign-acquisition announcements.³

Table 4.1 displays the distribution of these acquisitions by time and region. Looking at the "Row Total" column, the acquisition pattern appears to be in line with the UK business cycle. The frequency of acquisitions was high during the late 1980s, then collapsed in 1991-1992 when the economy was experiencing a downturn. Acquisition activity began to pick up after 1993 and increased steadily in the following years until 1997 (the final year in the period being studied). Furthermore, relative to acquisitions in the US and the rest of the world, acquisitions in Europe became more important in the 1990s, in the wake of legislation on the single European market. Whether the timing or location of the acquisition had a bearing on the stock market's response is subsequently investigated.

TABLE 4.1
Distribution of Acquired Firms by Year and by Region

Year	US	Europe	Rest of the World	Row Total
1986	64	10	10	84
1987	63	32	12	107
1988	83	53	16	152
1989	78	53	15	146
1990	51	48	14	113
1991	30	31	5	66
1992	28	32	6	66
1993	38	49	6	93
1994	51	59	12	122
1995	51	55	16	122
1996	61	68	20	149
1997	66	66	18	150
Column Total	664	556	150	1370

In addition to examining how the stock market reacts to announcements of foreign acquisitions, we are also interested in whether the market's evaluation is influenced by

³ The sample used in Chapter 3 was smaller because it had a shorter sample period and a higher relative size cut-off of 5 percent. This was a result of different data requirements in the pre- and post-acquisition years, as well as

characteristics pertaining to the acquirer or the acquisition concerned. We focus on similar determinants that were used in the previous chapter, since the only difference here is that the stock market's reaction, instead of subsequent profitability, is employed as our indicator of acquisition performance. The size of the acquired firm relative to its acquirer (*RelSize*), the time variable *Hot*, as well as the location variables *US* and *Europe* represent characteristics of the acquisition, while the acquirer's pre-acquisition characteristics are captured by the variables *Profit*, *ProdDiv*⁴, *R&D*, *FirmSize*, and *Mfg*⁵. A description of these variables is given in the Data Appendix (Section 4.7).

The new variable introduced here is *Hot*, which is a dummy variable that denotes periods of intense acquisition activity (taken to be the years in which more than 100 acquisitions are observed). Therefore, *Hot* has a value of 1 in the years 1987-1989 as well as 1994-1997, and 0 in the remaining years.⁶

These variables are drawn from two principal sources. The size and location of the acquired firm are disclosed as part of the transaction information in the *Acquisitions Monthly* rosters. Data on the remaining variables are extracted from *Extel's Company Analysis* database. Apart from *R&D* (explained in the Data Appendix), the other accounting variables are based on an average of the three years preceding the acquisition announcement so as to reflect the acquiring firm's characteristics present at the time the acquisition is being considered. Table 4.2 shows summary statistics for these variables.

TABLE 4.2
Summary Statistics

Variable	Mean	Standard Deviation
RelSize	0.1941	0.4619
Hot	0.6899	0.4627
US	0.4809	0.4998
Europe	0.4135	0.4926
Profit	0.0590	0.3133
ProdDiv	2.372	1.247
R&D (%)	1.909	7.483
FirmSize (x10 ⁶)	955	5998
Mfg	0.6921	0.4618

differing sensitivities of the performance measures.

⁴ The acquiring firms that fall within the *ProdDiv* categories 0, 1, 2, 3 and 4 number 166, 148, 342, 449 and 261 respectively.

⁵ Manufacturing firms outnumber non-manufacturing firms by approximately two to one (940: 427).

⁶ Although the number of acquisitions in 1990 exceeds 100, the year is not included in the *Hot* variable because the relatively sharp decline in acquisition activity between 1989 and 1990 suggests that the factors causing the "hot" period to cool off have begun to take effect from 1990.

The large standard deviation of the *R&D* variable arises from a small number of firms that have very high R&D intensities, such as biotech or medical research firms (the highest *R&D* value is in fact 193 percent, indicating that the firm's expenditure on R&D is nearly double that of its sales revenue). In contrast, the majority of firms in the sample have R&D intensities that are close to zero or zero, as indicated by an *R&D* value of 6 percent at the 95th percentile. Because the outlying values are likely to exert a disproportionately large influence on the estimated coefficient on *R&D* (in an OLS regression), this variable is reclassified into four sub-categories, each represented by a dummy variable. The first sub-category is *R&Dnil*, for firms with *R&D* values of zero (this accounts for 521 observations). The remaining observations are then ranked according to their R&D intensities, and then divided into three groups of equal sizes: *R&Dlow* for the lowest one-third (with *R&D* values below 0.84), *R&Dmed* for the middle one-third (with *R&D* values ranging from 0.84 to 2.25) and *R&Dhigh* for the highest one-third (with *R&D* values above 2.25). In this way, we can examine whether the stock market reacts differently to announcements made by firms with differing R&D intensities without undue influence from outliers.

4.4 The Stock Market's Reaction to Foreign Acquisition Announcements

4.4.1 Overall Sample

Table 4.3 shows the average abnormal returns (daily and cumulative), the average standardised abnormal returns (daily and cumulative), and their *t*-values for the full sample of 1370 foreign-acquisition announcements. The daily *ARs* run from Day -10 to Day +10 relative to the announcement day, while the *CARs* are calculated for event windows of different lengths of time, ranging from 7 days ($n = 3$) to 21 days ($n = 10$).

The mean abnormal return on the day that a foreign acquisition is announced (Day 0) is 0.3 percent, which is significantly above zero (t -statistic = 3.57). This result is consistent with Morck and Yeung (1992), who report a mean abnormal return of 0.29 percent (t -statistic = 1.86) for a sample of 322 US firms making foreign acquisitions between 1979 and 1988. Although a significant abnormal return persists on the day following the announcement (Day +1), it is noticeably smaller in magnitude (0.12 percent). Thereafter the positive abnormal return gets even smaller, to the extent that on Day +5 the abnormal return becomes negative. In case this marks a reversal of trends which could potentially erode away the positive returns that accrued on the first few days of the announcement, we look beyond Day +5 but find that the negative return quickly disappears and by Day +10 it is practically zero.

TABLE 4.3
Abnormal Returns earned by Acquiring Firms

Event day/ window	Abnormal return (%)	Standardised abnormal return (%)	<i>t</i> -statistic
-10	0.041	2.17	0.80
-9	0.034	3.15	1.04
-8	-0.028	-3.43	-1.27
-7	-0.027	-2.11	-0.80
-6	0.030	4.08	1.27
-5	0.027	1.88	0.60
-4	0.067	4.46	1.44
-3	0.056	1.61	0.50
-2	0.048	1.28	0.36
-1	-0.017	-0.06	-0.01
0	0.300	20.58	3.57
+1	0.122	9.43	2.62
+2	0.061	3.59	1.01
+3	0.099	9.87	3.01
+4	0.062	7.15	2.21
+5	-0.130	-10.49	-2.87
+6	-0.059	-4.10	-1.34
+7	-0.037	-2.44	-0.81
+8	-0.057	-5.56	-1.93
+9	-0.064	-3.29	-1.10
+10	-0.030	-2.26	-0.74
[-10,+10]	0.498	7.75	1.78
[-9,+9]	0.486	8.17	1.86
[-8,+8]	0.517	8.67	1.94
[-7,+7]	0.601	11.55	2.56
[-6,+6]	0.665	13.67	2.99
[-5,+5]	0.694	14.87	3.20
[-4,+4]	0.798	19.30	4.06
[-3,+3]	0.670	17.50	3.59

In order to learn how these daily returns translate to overall shareholder wealth during the event period, we next study the cumulative abnormal returns. These are positive and statistically significant (at the 10 percent level or better) for the range of event windows employed, from the longest 21-day window [-10,+10] to the shortest 7-day window [-3,+3]. The daily abnormal returns show that most of the gains occurred on the days immediately following the acquisition announcement, so it is not surprising to find that the *CARs* for the shorter event windows are larger and more significant than the *CARs* for the longer event windows. In efficient capital markets, information that is available about an acquisition would be rapidly disseminated, and hence the investors' evaluation of the acquisition would also be impounded in the share prices within days of the event. Therefore, in the remaining

analyses we focus on abnormal returns occurring within the $[-5,+5]$ event window, since the effects of the acquisitions on shareholder wealth are largely concentrated around this period.

4.4.2 *Univariate Comparisons*

Having found that the stock market reacts positively to announcements of foreign acquisitions, we proceed with the investigation by identifying the source of this response. Given that the overall sample is a heterogeneous group with respect to various characteristics of the acquiring and acquired firms, we would not expect abnormal returns to be uniform for the entire sample. In order to determine the circumstances under which acquisitions are regarded as good news by the stock market, the sample is divided into various sub-groups according to the characteristics that were introduced in Section 4.3. For discrete binary variables (such as *Mfg*), the division into two sub-groups is straightforward. In the case of non-discrete variables, the median value of the variable is used to obtain two sub-groups with an equal number of observations in each. Abnormal returns (along with their *t*-statistics) are computed in the same way for each sub-group and presented in Table 4.4. Panel A of Table 4.4 gives the daily abnormal return for event day 0, while Panels B and C give the cumulative abnormal returns for the event windows $[-3,+3]$ and $[-5,+5]$ respectively.

The comparison of abnormal returns between these sub-samples sheds light on how acquirer and target characteristics influence the market's reception of the acquisition announcement. Panel A shows that relatively large acquisitions have positive abnormal announcement day returns of 0.48 percent, compared with 0.12 percent (which is also less significant) for relatively small acquisitions. This suggests that news about large acquisitions is better received (or more easily detected with this methodology, in the sense that it is less likely to be swamped by other news) than small acquisitions. Panels B & C reveal the presence of this result beyond the announcement day—*CARs* for both event windows are above 1 percent for large acquisitions and approximately 0.3 percent for small acquisitions.

TABLE 4.4
Comparing Abnormal Returns earned by Sub-samples of Acquiring Firms⁷

Panel A: Abnormal Return on Day 0

Sub-samples	No. of obs.	AR (%)	SAR (%)	<i>t</i> -statistic
Large acquisitions: <i>RelSize</i> >0.058	685	0.478	30.51	3.43
Small acquisitions: <i>RelSize</i> <0.058	685	0.122	10.66	1.45
Acquisitions in hot periods: <i>Hot</i> =1	948	0.401	28.33	3.86
Acquisitions in cool periods: <i>Hot</i> =0	422	0.073	3.18	0.36
US acquisitions	664	0.333	22.39	2.66
Non-US acquisitions	706	0.268	18.88	2.38
Europe acquisitions	556	0.337	24.48	2.53
Non-Europe acquisitions	814	0.274	17.92	2.52
Acquisitions outside US & Europe	150	0.015	-1.88	-0.19
US & Europe acquisitions	1220	0.335	23.34	3.67
More profitable acquirers: <i>Profit</i> >0.0645	672	0.266	13.23	1.41
Less profitable acquirers: <i>Profit</i> <0.0645	671	0.358	29.25	4.15
More diversified acquirers: <i>ProdDiv</i> >2	714	0.240	21.67	3.17
Less diversified acquirers: <i>ProdDiv</i> <3	656	0.365	19.40	2.04
R&D-active acquirers: <i>R&Dhigh</i>	271	0.532	36.03	2.34
R&D-active acquirers: <i>R&Dmed</i>	271	0.181	8.24	0.68
R&D-active acquirers: <i>R&Dlow</i>	271	0.045	0.62	0.04
R&D-inactive acquirers: <i>R&Dnil</i>	521	0.409	31.27	3.75
Large acquirers: <i>FirmSize</i> >1.714 x 10 ⁸	672	0.143	9.49	1.21
Small acquirers: <i>FirmSize</i> <1.714 x 10 ⁸	672	0.486	33.24	3.82
Manufacturing acquirers: <i>Mfg</i> =1	940	0.208	16.99	2.55
Non-manufacturing acquirers: <i>Mfg</i> =0	427	0.514	29.22	2.58

⁷ Smaller samples (i.e. where the sub-samples add up to less than the total sample size of 1370) are due to missing observations in their respective variables.

Panel B: Cumulative Abnormal Return [-3,+3]

Sub-samples	No. of obs.	CAR (%)	SCAR (%)	t-statistic
Large acquisitions: <i>RelSize</i> >0.058	685	1.013	25.52	6.68
Small acquisitions: <i>RelSize</i> <0.058	685	0.326	9.48	2.48
Acquisitions in hot periods: <i>Hot</i> =1	948	0.852	23.52	4.03
Acquisitions in cool periods: <i>Hot</i> =0	422	0.261	3.98	0.45
US acquisitions	664	0.832	22.89	5.90
Non-US acquisitions	706	0.516	12.43	3.30
Europe acquisitions	556	0.709	16.09	3.79
Non-Europe acquisitions	814	0.643	18.46	5.27
Acquisitions outside US & Europe	150	-0.198	-1.13	-0.14
US & Europe acquisitions	1220	0.776	19.79	6.91
More profitable acquirers: <i>Profit</i> >0.0645	672	0.654	16.49	4.27
Less profitable acquirers: <i>Profit</i> <0.0645	671	0.716	19.17	4.96
More diversified acquirers: <i>ProdDiv</i> >2	714	0.520	11.37	3.04
Less diversified acquirers: <i>ProdDiv</i> <3	656	0.832	24.17	6.19
R&D-active acquirers: <i>R&Dhigh</i>	271	1.442	44.68	3.97
R&D-active acquirers: <i>R&Dmed</i>	271	0.236	1.67	0.15
R&D-active acquirers: <i>R&Dlow</i>	271	0.291	1.77	0.18
R&D-inactive acquirers: <i>R&Dnil</i>	521	0.754	21.12	2.64
Large acquirers: <i>FirmSize</i> >1.714 x 10 ⁸	672	0.351	9.14	1.49
Small acquirers: <i>FirmSize</i> <1.714 x 10 ⁸	672	1.039	26.95	3.47
Manufacturing acquirers: <i>Mfg</i> =1	940	0.543	13.92	4.27
Non-manufacturing acquirers: <i>Mfg</i> =0	427	0.957	25.51	5.27

Panel C: Cumulative Abnormal Return [-5,+5]

Sub-samples	No. of obs.	CAR (%)	SCAR (%)	t-statistic
Large acquisitions: <i>RelSize</i> >0.058	685	1.112	22.42	5.87
Small acquisitions: <i>RelSize</i> <0.058	685	0.277	7.31	1.91
Acquisitions in hot periods: <i>Hot</i> =1	948	0.930	20.38	3.64
Acquisitions in cool periods: <i>Hot</i> =0	422	0.164	2.47	0.30
US acquisitions	664	0.985	23.97	6.18
Non-US acquisitions	706	0.421	6.30	1.67
Europe acquisitions	556	0.685	11.17	2.63
Non-Europe acquisitions	814	0.701	17.39	4.96
Acquisitions outside US & Europe	150	-0.555	-11.74	-1.44
US & Europe acquisitions	1220	0.848	18.14	6.34
More profitable acquirers: <i>Profit</i> >0.0645	672	0.720	15.97	4.14
Less profitable acquirers: <i>Profit</i> <0.0645	671	0.670	14.05	3.64
More diversified acquirers: <i>ProdDiv</i> >2	714	0.599	9.95	2.66
Less diversified acquirers: <i>ProdDiv</i> <3	656	0.798	20.22	5.18
R&D-active acquirers: <i>R&Dhigh</i>	271	1.527	38.30	3.67
R&D-active acquirers: <i>R&Dmed</i>	271	0.205	-1.22	-0.12
R&D-active acquirers: <i>R&Dlow</i>	271	0.388	5.27	0.57
R&D-inactive acquirers: <i>R&Dnil</i>	521	0.691	16.72	2.09
Large acquirers: <i>FirmSize</i> >1.714 x 10 ⁸	672	0.554	11.87	2.08
Small acquirers: <i>FirmSize</i> <1.714 x 10 ⁸	672	0.844	18.28	2.44
Manufacturing acquirers: <i>Mfg</i> =1	940	0.672	14.95	4.58
Non-manufacturing acquirers: <i>Mfg</i> =0	427	0.717	14.44	2.98

For all event windows, positive abnormal returns are confined only to the acquisitions announced during “hot” periods; those announced during “cool” periods earn insignificant returns. While retaining the assumption of market efficiency, we could infer that changing technologies or business conditions create better opportunities for restructuring, and hence acquisitions, in some periods (the “hot” periods) than others (the “cool” periods). Alternatively, we could view this result as a possible manifestation of the stock market’s inefficiency, so acquiring firms time their acquisitions to coincide with periods when the stock market is buoyant, particularly about acquisition prospects.

From the variables that account for the target’s location, we find that acquisitions in the US and Europe are greeted with enthusiasm by shareholders, but acquisitions outside these regions fail to elicit a positive reaction from the stock market. Perhaps the better information and more experience that UK firms have accrued on the US and European economies make investors more confident about the prospects of acquisitions in these markets. Another interesting observation that emerges from these variables is that the magnitudes of the abnormal returns for acquisitions in the US and Europe are similar on Day 0, but as the event window is extended the gap between the abnormal returns widens, with acquisitions in the US performing better than those in Europe. Whether or not this gap is significant will be addressed in the following analysis (re: Table 4.5).

In examining attributes of the acquiring firms, we find that foreign acquisition announcements made by less profitable acquirers are associated with a positive Day 0 abnormal return of 0.36 percent, with a highly significant *t*-statistic of 4.15. Although the equivalent return for the group of more profitable acquirers is also positive, it is not significantly different from zero. One explanation for this can be derived from the managerial theories of mergers and acquisitions. Specifically, the free cash flow proposition (Jensen, 1988) argues that firms with a large amount of free cash flow are more likely to undertake projects that are not in the best interests of shareholders because they are subjected to less scrutiny from external capital markets. Since free cash flow is likely to be generated by firms that have been highly profitable, the firm’s level of profitability is often an indicator of the abundance of free cash flow held by the firm. Less profitable firms (with less free cash flow to dispose of) are thus less likely to embark on wasteful projects, so their acquisition announcements are endorsed by external capital markets. Nevertheless, over the longer event windows this effect appears to have been eroded, with both sub-samples of firms earning comparable cumulative abnormal returns for the 7- and 11-day event windows.

By grouping the sample of firms according to their R&D intensities, we find that firms with R&D intensities that are either high or zero (i.e. at the two extremes) earn significantly positive abnormal returns, while those with low or medium R&D intensities do not earn any abnormal returns. Between the two groups with positive abnormal returns, the group with high R&D intensities generates a higher abnormal return (especially over the longer event windows). Perhaps firms that are very active in R&D are renowned for their innovations (or other knowledge-based proprietary assets) and hence the stock market believes that acquisitions conducted by such firms would have a higher chance of success.

Smaller acquiring firms are found to induce a more positive response from the stock market than their larger counterparts. The Day 0 abnormal return for small acquirers is a positive and significant 0.49 percent while that of large acquirers is an insignificant 0.14 percent. This effect persists for the longer event windows, though more strongly for the 7-day than for the 11-day *CARs*. This is a slightly surprising result, as large firms are generally more active in making acquisitions (especially foreign acquisitions, as confirmed in Chapter 2) and with the experience gained we would expect them to fare better in this field. Nevertheless, being a more active acquirer per se does not necessarily make acquisitions more beneficial to the firm.⁸ This result could also reflect managerial control issues, since monitoring problems arising from separation of ownership and control are more likely to be relevant for larger corporations. Moreover, a large firm acquiring a small target should experience a much smaller stock price change than a small firm acquiring a large target. Although not possible in a univariate context, this effect can be controlled for by including the target's size relative to its acquirer's as an additional explanatory variable in a multivariate analysis (re: Section 4.4.3).

Less diversified acquirers have a higher Day 0 abnormal return (0.37 percent) than more diversified acquirers (0.24 percent). However, whether the difference between these values is significant cannot be ascertained from these results. In order to compare the two returns, we calculate their difference and run a *t*-test to evaluate the significance of the value obtained. The abnormal returns for sub-samples differentiated by *Mfg* are likewise not clearly distinguishable. The purpose of Table 4.5 is thus to show how these sub-samples compare directly against each other, by focusing on the differences between the two sub-samples for each variable. As for Table 4.4 there are 3 panels, one for each of the three types of abnormal returns, viz. AR_0 , $CAR[-3,+3]$ and $CAR[-5,+5]$.

⁸ It is possible that small acquirers could be more likely to engage in large acquisitions (in terms of relative size), so that *RelSize* and *FirmSize* are effectively picking up the same effect. However, such a trend is not prevalent in this sample, where the variables *RelSize* and *FirmSize* have a correlation coefficient of -0.03 .

TABLE 4.5
Differences in Abnormal Returns between Sub-samples

Panel A: Abnormal Return on Day 0

Difference	AR (%)	SAR (%)	<i>t</i> -statistic
Large – Small acquisitions	0.356	19.85	1.72
Hot – Cool acquisitions	0.328	25.15	2.01
US – Non-US acquisitions	0.065	3.51	0.30
Europe – Non-Europe acquisitions	0.062	6.56	0.56
ROW – US & Europe acquisitions	-0.320	-25.22	-1.36
More – Less profitable acquirers	-0.092	-16.02	-1.37
More – Less diversified acquirers	-0.126	2.27	0.20
<i>R&Dhigh</i> – other R&D acquirers	0.275	18.53	1.27
<i>R&Dmed</i> – other R&D acquirers	-0.166	-16.43	-1.14
<i>R&Dlow</i> – other R&D acquirers	-0.336	-25.84	-1.77
<i>R&Dnil</i> – other R&D acquirers	0.157	16.38	1.36
Large – Small acquirers	-0.343	-23.75	-2.03
Mfg – Non-mfg acquirers	-0.306	-12.23	-0.98

Panel B: Cumulative Abnormal Return [-3,+3]

Difference	CAR (%)	SCAR (%)	<i>t</i> -statistic
Large – Small acquisitions	0.687	16.05	1.64
Hot – Cool acquisitions	0.591	19.54	1.85
US – Non-US acquisitions	0.316	10.46	1.07
Europe – Non-Europe acquisitions	0.067	-2.37	-0.24
ROW – US & Europe acquisitions	-0.974	-20.92	-1.34
More – Less profitable acquirers	-0.062	-2.68	-0.27
More – Less diversified acquirers	-0.312	-12.79	-1.31
<i>R&Dhigh</i> – other R&D acquirers	0.941	33.53	2.72
<i>R&Dmed</i> – other R&D acquirers	-0.576	-20.52	-1.68
<i>R&Dlow</i> – other R&D acquirers	-0.501	-20.23	-1.64
<i>R&Dnil</i> – other R&D acquirers	0.102	5.24	0.51
Large – Small acquirers	-0.688	-17.81	-1.80
Mfg – Non-mfg acquirers	-0.414	-11.59	-1.10

Panel C: Cumulative Abnormal Return [-5,+5]

Difference	CAR (%)	SCAR (%)	<i>t</i> -statistic
Large – Small acquisitions	0.835	15.11	1.63
Hot – Cool acquisitions	0.766	17.91	1.78
US – Non-US acquisitions	0.564	17.67	1.90
Europe – Non-Europe acquisitions	-0.017	-6.22	-0.66
ROW – US & Europe acquisitions	-1.403	-29.88	-2.01
More – Less profitable acquirers	0.049	1.92	0.20
More – Less diversified acquirers	-0.199	-10.27	-1.11
<i>R&Dhigh</i> – other R&D acquirers	1.040	29.16	2.49
<i>R&Dmed</i> – other R&D acquirers	-0.622	-20.53	-1.77
<i>R&Dlow</i> – other R&D acquirers	-0.388	-12.22	-1.04
<i>R&Dnil</i> – other R&D acquirers	-0.010	2.78	0.29
Large – Small acquirers	-0.290	-6.41	-0.68
Mfg – Non-mfg acquirers	-0.045	0.50	0.05

These results provide corroboration for the key differences across sub-samples that were highlighted by Table 4.4. Large acquisitions (in terms of relative size) outperform small acquisitions by 0.4, 0.7 and 0.8 percent on Day 0 and the 7- and 11-day event windows respectively, all of which are significant (at the 0.10 level).

As we have previously observed, acquisitions conducted in “hot” periods earn significantly higher abnormal returns. While this finding is present for the three event windows, it weakens slightly as the event window lengthens, demonstrating that the positive reaction to announcements in “hot” periods is primarily centred on the announcement day.

Acquisitions in countries outside the US and Europe underperform those within, a result that becomes more marked over the longer event windows. Although the difference between US and non-US acquisitions has a positive and significant 11-day *CAR* of 0.6 percent, it can be attributed to the difference between US acquisitions and the acquisitions outside the US and Europe. Upon further investigation it was confirmed that the difference in abnormal returns between acquisitions in the US and Europe was negligible. When a separate *t*-test was conducted to compare only the acquisitions within these two sub-samples (i.e. excluding those in the rest of the world), it yielded a *t*-statistic of 1.26, which is not significant.

Although the results in Table 4.4 showed less profitable acquirers to have higher abnormal returns on the announcement day than more profitable acquirers, this difference in abnormal returns is found not to be significant ($t = -1.37$). In other words, the stock market does not appear to judge acquisitions on the basis of the acquiring firm’s profitability.

The finding that announcements made by highly R&D-intensive firms receive the most positive response from the stock market is reinforced in Table 4.5. These acquirers earn roughly 1 percent more (for both 7- and 11-day *CARs*) than firms in other R&D categories when their acquisitions are announced.

As before we find that the stock market reacts more positively to acquisition announcements made by small acquirers than by large acquirers. Specifically, small acquirers on average earn 0.3 percent ($t = -1.82$) more than large acquirers on the announcement day. While this difference remains for the 7- and 11-day event windows, its significance is eroded as the event window is widened.

For the remaining variables, the differences across sub-samples are not significant on a univariate basis. In the following section, we explore which of these characteristics are found to be more informative within a multivariate framework.

4.4.3 Cross-sectional Analysis

To investigate further the patterns in abnormal returns that accrue to acquiring firms, we estimate the following cross-sectional regression:

$$AR = \beta_0 + \beta_1 RelSize + \beta_2 Hot + \beta_3 US + \beta_4 Europe + \beta_5 Profit + \beta_6 ProdDiv + \beta_7 R\&Dnil + \beta_8 R\&Dmed + \beta_9 R\&Dhigh + \beta_{10} \ln(FirmSize) + \beta_{11} Mfg + \varepsilon$$

Apart from the variable $\ln(FirmSize)$ which is the natural logarithm of the variable $FirmSize$, all other explanatory variables are as defined in Section 4.3. We first run the regression with AR taking on the values of the abnormal returns to the acquiring firms' shareholders on the announcement day (AR_0). The model is then re-estimated in turn with two alternative abnormal return measures, i.e. $CAR[-3,+3]$ and $CAR[-5,+5]$, in place of AR_0 as the dependent variables. Table 4.6 presents the three sets of estimated OLS coefficients (based on a sample of 1334 observations), one for each dependent variable.

TABLE 4.6
Determinants of Abnormal Returns: OLS estimates

Explanatory variable	Dependent variable		
	AR_0	$CAR[-3,3]$	$CAR[-5,5]$
RelSize	0.126 (0.76)	0.275 (0.73)	0.466 (1.05)
Hot	0.324 (2.15)	0.563 (1.65)	0.721 (1.80)
US	0.389 (1.65)	0.970 (1.81)	1.474 (2.35)
Europe	0.377 (1.58)	0.904 (1.67)	1.246 (1.96)
Profit	0.409 (1.74)	1.291 (2.43)	1.351 (2.17)
ProdDiv	-0.015 (-0.24)	-0.047 (-0.34)	-0.094 (-0.58)
R&Dnil	0.084 (0.41)	-0.074 (-0.16)	-0.046 (-0.09)
R&Dmed	0.111 (0.52)	-0.114 (-0.23)	-0.278 (-0.49)
R&Dhigh	0.359 (1.60)	0.923 (1.82)	0.888 (1.50)
$\ln(FirmSize)$	-0.095 (-2.12)	-0.210 (-2.08)	-0.147 (-1.24)
Mfg	-0.269 (-1.60)	-0.381 (-1.00)	0.090 (0.20)
Constant	0.924 (1.45)	2.099 (1.46)	0.623 (0.37)
R^2	0.019	0.020	0.017

Note: t -statistics appear in parentheses

In the previous univariate analyses, we found that large acquisitions (in terms of relative size) were better received by the stock market than small acquisitions. In Table 4.6, although the coefficient on the *RelSize* term remains positive, it is no longer significant. Because *RelSize* shares a fairly strong correlation with terms like *Profit* and $\ln(\text{FirmSize})$, it could have been picking up the effects of these variables in a univariate framework. Having controlled for these other variables, we find that *RelSize* per se does not have a distinguishable effect on abnormal returns. In the previous chapter, *RelSize* was used as a proxy for the extent of geographical diversification effected through the acquisition, which in turn represents the degree of risk diversification achieved by the acquiring firm. Based on this interpretation, these results indicate that the stock market does not appear to particularly favour (or disfavour) acquisitions that convey more (or less) diversification to their acquiring firms.

The variable *Hot* shows that the stock market consistently favours acquisitions announced in “hot” periods. In particular, acquisitions announced during these periods earn significant premia of 0.6 and 0.7 percent over the 7- and 11-day event windows respectively. As mentioned earlier, while this could be a signal that the “hot” periods have yielded better opportunities for firm restructuring, it could also be a reflection of buoyant investor sentiments in stock markets over this period.

The location variables *US* and *Europe* demonstrate that acquisitions of companies in these regions constitute positive news for the stock market. Relative to acquisitions in the rest of the world, acquisitions in either of these regions earn a positive premium of around 0.4 percent on the announcement day. Over the longer 11-day event window, this premium rises to above 1 percent in both cases. The endorsement of acquisitions in the US and Europe is consistent with the proposition that firms perform better when acquiring in countries with which they are familiar. Newbould et al. (1978) confirm that firms’ foreign subsidiaries perform better when they initially choose sites with low information costs. The result is, however, inconsistent with the diversification hypothesis which suggests that investors value multinational firms for their ability to diversify into less related markets.

When acquirers were compared on the basis of profitability in Table 4.5, we found no significant difference between the less and more profitable acquirers. In this multivariate framework, abnormal returns are found to increase with the profitability of the acquiring firm, a result that is significant across all periods. This result is, however, driven by a small number of outlying observations. The minimum and maximum values of *Profit* are -6.32 and 2.65 respectively, while the observations at the 5th and 95th percentiles have values of -0.02

and 0.25 respectively. We re-estimate the model after excluding outliers with values beyond the 5th and 95th percentiles, and find no discernible effect of *Profit* on abnormal returns in each of the three cases. From the perspective of the stock market, the profitability of the acquiring firm does not appear to play a significant role in determining the success of a foreign acquisition.

The same is true for *ProdDiv*, for which the estimated coefficients are insignificant across the three event windows. As a robustness check, we employ an alternative means of representing product diversification which is not dependent on the assumption that the distance in product space increases equally for each unit increase in the *ProdDiv* variable. In a separate regression, a binary dummy variable is assigned to each value of *ProdDiv* from 0 through 4. Using this alternative specification, the results remain consistent with those obtained using the original *ProdDiv* variable, i.e. the coefficients on the set of *ProdDiv* dummy variables are not significant, suggesting that the extent of product diversification does not play a role in determining abnormal returns.

Firms that are highly R&D-intensive, denoted by *R&Dhigh*, earn higher abnormal returns (than firms in the other R&D categories) throughout the event period. This finding is especially significant over the 7-day event window, in which highly R&D-intensive firms realise nearly 1 percent more in terms of cumulative abnormal returns. The result is consistent with the internalisation theory (re: Section 2.1), which argues that the value of proprietary goods increases in direct proportion to the scale of the firm's markets. To realise the potential value of employing these intangible assets abroad, a firm must internalise the market for them (for a variety of reasons including public goods and information problems, they cannot easily be exchanged in arms-length transactions). Therefore, when firms possessing significant proprietary assets expand abroad, the increased scale over which such intangible assets are applied contribute to an increase in shareholder wealth. Given that R&D serves as an indicator of technology-related proprietary assets, these assets could perhaps be generated only when firms engage intensively in R&D activities. In this instance, we could regard an R&D-intensity level of 2.25 percent (the lower limit for firms in the *R&Dhigh* category) to be the threshold value below which proprietary assets are either non-existent or too trivial to play a significant role in foreign acquisitions. This could account for the lack of a discernible difference in performance between firms with lower R&D intensities and those without R&D operations.

Abnormal returns are negatively associated with the size of the acquiring firm, as shown by the coefficients on $\ln(\text{FirmSize})$. We mentioned in the previous section that an

acquisition of a given size would likely make less of an impact on large acquirers than on small acquirers, translating to smaller share price changes for larger acquirers. However, the variable measuring absolute firm size still yields a significantly negative coefficient (in the two shorter event windows) even though we have controlled for the relative size of the target firm in this regression analysis, i.e. firm size has a negative impact on abnormal returns that is independent of the relative size effect. One possible explanation involves the diffuse ownership patterns of larger firms. Because a larger firm is less likely to have dominant shareholders, there is less incentive for shareholders to engage actively in monitoring the firm's managers. This could give managers the opportunity to indulge in non-profit maximising acquisitions which are frowned upon by the stock market.

Firms in the non-manufacturing sector earn higher returns upon announcement of a foreign acquisition, at least on the announcement day itself. This is a surprising result considering that manufacturing firms have traditionally been more active in the field of foreign direct investment, so they would have acquired more experience in setting up foreign operations. Nevertheless, the keen competition for foreign investment opportunities in the manufacturing sector could have exhausted the supply of good investments. It is also possible that intense bidding for target firms could have resulted in manufacturing acquirers overpaying for their acquisitions.

4.5 Robustness Checks

Abnormal returns are computed from the difference between the actual return to the acquiring firm's shareholders and a counterfactual (or control) return. Therefore, for the same firm abnormal returns can vary according to how the counterfactual return is defined. The value of the counterfactual return is in turn dependent on a number of factors. In the first set of robustness checks, we employ other market indices (apart from the FTSE all-share index) as our benchmarks while retaining the market model as the means of generating the counterfactual returns. Alternative models are subsequently adopted in place of the market model in the second series of tests. A post-acquisition, rather than pre-acquisition, period is also used to estimate the market model parameters. In each case, the abnormal returns that are generated by these alternative methods are compared against the original set of results.

4.5.1 Benchmark Market Index

Based on the market model equation, the counterfactual return ($C_{it} = \alpha_i + \beta_i R_{mt}$) is determined by the return on the market index (R_{mt}) as well as the estimated coefficients α_i

and β_i , which are also dependent on the market index. Hence, selecting a different market index as the benchmark would lead to a different set of abnormal returns. This analysis explores whether our earlier findings are robust to changing the benchmark market index. In place of the FTSE all-share index that was adopted previously, we use two alternative share indices, viz. the FTSE 100 and FTSE 250. Given that foreign acquisitions are generally undertaken by the larger firms in an industry, we select indices that are representative of large firms. The computation of abnormal returns is the same as before, except that the returns from the FTSE 100 and FTSE 250 are used to estimate the OLS coefficients α_i and β_i , and then to calculate the counterfactual return C_{it} .

Corresponding to Table 4.3, the daily and cumulative abnormal returns based on the new benchmarks are presented in Table 4.7. The regression model in Table 4.6 is also re-estimated using the abnormal returns based on the FTSE 100 and FTSE 250 as the new dependent variables, the results of both appearing in Table 4.8.

The new set of results is generally consistent with the main findings observed when the FTSE all-share index was used. Regardless of whether the FTSE 100 or the FTSE 250 is used as the benchmark market index, the following principal results remain unchanged:

(i) A positive abnormal return of approximately 0.3 percent (significant at the 0.01 level) is found on average on the announcement day (Day 0). The abnormal return remains positive (though smaller at 0.12 percent) and significant on the day after the announcement (Day 1). Beyond that the daily abnormal return diminishes in magnitude and by Day 10 becomes indistinguishable from zero.

(ii) Cumulative abnormal returns are positive and significant for almost all event windows from $[-3,+3]$ to $[-10,+10]$. The shorter event windows surrounding Day 0 register higher abnormal returns than the longer event windows, confirming that the abnormal returns are closely associated with the event occurring on Day 0.

(iii) The stock market reacts positively to acquisitions of firms located in the US and Europe, as well as to acquisitions announced in periods of intense acquisition activity.

(iv) High abnormal returns are associated with acquisitions announced by firms that are highly R&D-intensive, small (as measured by firm sales), and operating in the non-manufacturing sector.⁹

⁹ Although the variable *Profit* bears a positive and significant coefficient in these results, we find as before that the effect of *Profit* is not robust to removing a small number of outlying observations.

TABLE 4.7
Abnormal Returns earned by Acquiring Firms
 (Alternative benchmarks: FTSE 100 & FTSE 250)

Event day/ window	FTSE 100			FTSE 250		
	AR (%)	SAR (%)	<i>t</i> -statistic	AR (%)	SAR (%)	<i>t</i> -statistic
-10	0.038	1.88	0.70	0.062	3.48	1.27
-9	0.030	2.91	0.95	0.042	3.43	1.11
-8	-0.036	-3.89	-1.44	-0.002	-1.78	-0.66
-7	-0.026	-2.27	-0.86	-0.037	-3.13	-1.21
-6	0.029	3.70	1.13	0.037	4.58	1.42
-5	0.026	1.64	0.52	0.040	3.22	1.03
-4	0.063	4.04	1.31	0.070	4.59	1.47
-3	0.057	1.64	0.52	0.053	1.50	0.47
-2	0.048	1.20	0.33	0.058	2.03	0.57
-1	-0.015	-0.09	-0.02	-0.015	0.05	0.01
0	0.297	20.22	3.52	0.320	22.05	3.78
+1	0.115	8.94	2.49	0.124	9.37	2.61
+2	0.058	3.28	0.94	0.076	4.24	1.17
+3	0.102	10.18	3.12	0.093	9.12	2.73
+4	0.064	7.21	2.23	0.054	6.48	1.96
+5	-0.147	-11.44	-3.12	-0.100	-8.77	-2.39
+6	-0.063	-4.37	-1.43	-0.057	-4.22	-1.37
+7	-0.032	-2.34	-0.77	-0.017	-1.03	-0.34
+8	-0.066	-6.21	-2.15	-0.031	-3.86	-1.34
+9	-0.063	-3.49	-1.14	-0.069	-3.35	-1.12
+10	-0.029	-2.12	-0.70	-0.030	-2.07	-0.67
[-10,+10]	0.452	6.68	1.52	0.672	10.02	2.33
[-9,+9]	0.442	7.08	1.61	0.639	10.21	2.36
[-8,+8]	0.476	7.63	1.70	0.667	10.78	2.44
[-7,+7]	0.577	10.73	2.36	0.700	12.93	2.89
[-6,+6]	0.635	12.80	2.79	0.754	15.04	3.30
[-5,+5]	0.669	14.12	3.03	0.773	16.24	3.50
[-4,+4]	0.789	18.88	3.98	0.834	19.81	4.15
[-3,+3]	0.662	17.15	3.53	0.710	18.27	3.72

TABLE 4.8
Determinants of Abnormal Returns: OLS estimates
(Alternative benchmarks: FTSE 100 & FTSE 250)

Explanatory variable	FTSE 100			FTSE 250		
	AR_0	$CAR[-3,3]$	$CAR[-5,5]$	AR_0	$CAR[-3,3]$	$CAR[-5,5]$
RelSize	0.123 (0.74)	0.223 (0.59)	0.399 (0.89)	0.133 (0.80)	0.314 (0.83)	0.504 (1.15)
Hot	0.302 (1.99)	0.547 (1.60)	0.731 (1.81)	0.318 (2.11)	0.541 (1.58)	0.693 (1.75)
US	0.370 (1.56)	0.944 (1.76)	1.461 (2.31)	0.390 (1.65)	1.126 (2.11)	1.745 (2.82)
Europe	0.366 (1.52)	0.904 (1.67)	1.258 (1.96)	0.396 (1.65)	0.996 (1.84)	1.414 (2.25)
Profit	0.396 (1.68)	1.216 (2.28)	1.256 (1.99)	0.432 (1.84)	1.435 (2.70)	1.548 (2.52)
ProdDiv	-0.016 (-0.26)	-0.060 (-0.43)	-0.118 (-0.72)	-0.004 (-0.07)	-0.022 (-0.16)	-0.061 (-0.38)
R&Dnil	0.072 (0.35)	-0.075 (-0.16)	-0.070 (-0.13)	0.065 (0.32)	-0.081 (-0.18)	-0.053 (-0.10)
R&Dmed	0.111 (0.51)	-0.147 (-0.30)	-0.355 (-0.62)	0.085 (0.39)	-0.102 (-0.21)	-0.319 (-0.57)
R&Dhigh	0.355 (1.58)	0.912 (1.80)	0.874 (1.46)	0.362 (1.61)	0.946 (1.87)	0.948 (1.62)
ln(FirmSize)	-0.096 (-2.14)	-0.208 (-2.05)	-0.149 (-1.24)	-0.089 (-1.98)	-0.221 (-2.18)	-0.160 (-1.37)
Mfg	-0.281 (-1.66)	-0.357 (-0.94)	0.125 (0.28)	-0.269 (-1.60)	-0.435 (-1.14)	0.014 (0.03)
Constant	0.986 (1.54)	2.124 (1.47)	0.699 (0.41)	0.853 (1.34)	2.123 (1.47)	0.644 (0.39)
R ²	0.018	0.019	0.017	0.018	0.022	0.021

Note: *t*-statistics appear in parentheses

4.5.2 Model for generating Counterfactual Returns

Apart from the market model, another frequently used counterfactual model is the capital asset pricing model (CAPM). The principal difference between the CAPM and market model is their specification of the intercept term. The expression of the market model ($C_{it} = \alpha_i + \beta_i R_{mt}$) shows that returns on security i are linearly related to the returns on a market portfolio, and hence the estimated parameter α_i is assumed constant over time. Instead, CAPM argues that the intercept term is the risk-free interest rate, or the rate of return on the minimum variance zero-beta portfolio, both of which may vary over time. Therefore, the counterfactual return given by CAPM is

$$C_{it} = R_{ft} + \beta_i(R_{mt} - R_{ft}),$$

where R_{ft} , the risk-free rate, is taken as the interbank rate of interest (LIBOR)¹⁰ and R_{mt} is the return on the FTSE all-share index. In implementing this model, we use the values of β_i previously estimated from the market model. Hence the new abnormal return can be expressed as:

$$AR_{it} = R_{it} - R_{ft} - \beta_i(R_{mt} - R_{ft}).$$

In addition, we consider another counterfactual model—the market index model, where actual returns are compared directly against a market index, i.e. the counterfactual return is taken to be the return on the market index. In this case, the abnormal return is given by:

$$AR_{it} = R_{it} - R_{mt}.$$

Since this model sets $\beta = 1$ for all firms in the sample, it implicitly assumes that firms are identical in their response to market-wide risk factors. This analysis thus also examines whether imposing this assumption alters the findings that we had earlier. Simulation studies (Brown and Warner, 1985; Malatesta, 1986) suggest that in most cases relatively straightforward procedures are as powerful as more elaborate tests in detecting abnormal returns. This claim can therefore be investigated by re-calculating the abnormal returns using the CAPM and market index model, then comparing them against the original market model.

The daily abnormal returns for the same event period, i.e. from Day -10 to Day $+10$, and the cumulative abnormal returns from $[-3,+3]$ to $[-10,+10]$ are presented for both alternative models in Table 4.9. These figures are generally consistent with their corresponding values in Table 4.3. As before we have in both cases a significant positive abnormal return of about 0.3 percent on the announcement day, followed by another significant positive abnormal return of about 0.1 percent on the following day. The cumulative abnormal returns are also positive for the range of event windows employed.

One difference is, however, that the magnitude and significance of these abnormal returns tend to be higher than those based on the original market model. The CAPM-generated cumulative abnormal returns are mostly around 1 percent, where previously they were between 0.5 and 0.8 percent. The higher abnormal returns resulting from the CAPM can be explained by its use of the risk-free rate R_f as the intercept term in place of the estimated coefficient α_i . Because estimates of α_i are generally greater than the return on the riskless asset (in agreement with previous studies (Copeland and Weston, 1988)), the abnormal

¹⁰ While this is a nominal rate of return, there is no significant difference between using real and nominal rates as these returns are computed on a daily basis. The inflation rate over each day is sufficiently low as to make the difference between real and nominal rates negligible.

return, which involves subtracting the intercept term from the acquiring firm's return, would be lower when α_i is used.

TABLE 4.9
Abnormal Returns earned by Acquiring Firms
 (Alternative counterfactual models: CAPM & Market Index Model)

Event day/ window	CAPM			Market Index Model		
	AR (%)	SAR (%)	<i>t</i> -statistic	AR (%)	SAR (%)	<i>t</i> -statistic
-10	0.067	3.84	1.43	0.053	1.76	0.67
-9	0.060	4.85	1.64	0.051	3.49	1.26
-8	-0.002	-1.72	-0.65	-0.008	-1.96	-0.73
-7	-0.001	-0.42	-0.16	-0.007	-0.96	-0.37
-6	0.056	5.73	1.81	0.060	5.02	1.70
-5	0.053	3.54	1.16	0.034	1.65	0.57
-4	0.093	6.11	2.01	0.081	6.07	2.06
-3	0.082	3.19	1.01	0.047	0.51	0.17
-2	0.074	2.91	0.82	0.062	2.42	0.72
-1	0.009	1.48	0.27	0.005	-0.41	-0.08
0	0.326	21.94	3.86	0.310	18.24	3.57
+1	0.148	10.97	3.10	0.134	8.90	2.66
+2	0.087	5.08	1.45	0.076	3.66	1.13
+3	0.125	11.61	3.63	0.109	8.40	2.88
+4	0.088	8.60	2.71	0.094	7.81	2.64
+5	-0.104	-8.61	-2.42	-0.118	-9.47	-2.99
+6	-0.033	-2.37	-0.79	-0.034	-2.34	-0.85
+7	-0.011	-0.64	-0.22	-0.011	-1.25	-0.44
+8	-0.031	-3.81	-1.34	-0.051	-4.82	-1.75
+9	-0.038	-1.60	-0.54	-0.015	0.60	0.21
+10	-0.004	-0.36	-0.12	-0.002	-0.54	-0.18
[-10,+10]	1.044	15.34	3.83	0.870	10.21	3.00
[-9,+9]	0.980	15.33	3.79	0.819	10.45	3.03
[-8,+8]	0.959	15.42	3.71	0.782	10.06	2.82
[-7,+7]	0.992	17.85	4.21	0.841	12.46	3.41
[-6,+6]	1.003	19.46	4.50	0.859	13.99	3.78
[-5,+5]	0.980	20.15	4.54	0.834	14.41	3.76
[-4,+4]	1.032	23.96	5.23	0.918	18.54	4.63
[-3,+3]	0.852	21.61	4.56	0.743	15.77	3.77

The market index model also generates cumulative returns that are generally higher than those from the market model. In this case, the difference is brought about by changes in both α_i and β_i . If the only change had been in α_i , we would have expected the cumulative returns from the market index model (with $\alpha_i = 0$) to exceed those of the CAPM (with $\alpha_i = R_f$). However, the cumulative returns of the market index model, while higher than those of the market model, are lower than those of the CAPM. This suggests that setting the value of β_i equal to 1 on average overstates the true β_i -values (assuming that it is the value estimated

in the market model) of these firms. In other words, these firms are generally less exposed to risk than the average publicly listed firm, which is not surprising considering that firms usually undertake foreign acquisitions only when they have become well established in their domestic industries. It is likely that such firms enjoy a more stable stream of earnings, and are in a better position to deal with risk, both of which translate to lower β -values.

In Table 4.10, the regression model is re-estimated with the abnormal returns generated from the CAPM and the market index model. As with the original market model, we find evidence of abnormal returns being positively associated with acquisitions in the US and Europe, acquisitions announced in “hot” periods (significant only on Day 0), as well as acquirers that are highly R&D-intensive and operating in the non-manufacturing sector. On the other hand, abnormal returns are negatively affected by firm size.

TABLE 4.10
Determinants of Abnormal Returns: OLS estimates
 (Alternative counterfactual models: CAPM & Market Index Model)

Explanatory variable	CAPM			Market Index Model		
	AR_0	$CAR[-3,3]$	$CAR[-5,5]$	AR_0	$CAR[-3,3]$	$CAR[-5,5]$
RelSize	0.107 (0.64)	0.142 (0.38)	0.257 (0.61)	0.080 (0.48)	0.124 (0.34)	0.274 (0.67)
Hot	0.308 (2.05)	0.452 (1.35)	0.546 (1.43)	0.252 (1.68)	0.296 (0.91)	0.335 (0.91)
US	0.384 (1.63)	0.935 (1.78)	1.419 (2.37)	0.362 (1.54)	0.710 (1.39)	1.269 (2.20)
Europe	0.377 (1.58)	0.904 (1.70)	1.246 (2.06)	0.358 (1.50)	0.845 (1.63)	1.272 (2.17)
Profit	0.382 (1.63)	1.105 (2.12)	1.058 (1.78)	0.425 (1.81)	1.279 (2.51)	1.288 (2.24)
ProdDiv	-0.023 (-0.38)	-0.109 (-0.80)	-0.192 (-1.24)	-0.010 (-0.17)	-0.114 (-0.85)	-0.197 (-1.31)
R&Dnil	0.081 (0.40)	-0.094 (-0.21)	-0.078 (-0.15)	0.023 (0.12)	-0.208 (-0.47)	-0.234 (-0.47)
R&Dmed	0.120 (0.56)	-0.055 (-0.12)	-0.185 (-0.34)	0.108 (0.50)	-0.061 (-0.13)	-0.228 (-0.43)
R&Dhigh	0.370 (1.66)	0.999 (2.01)	1.008 (1.78)	0.321 (1.44)	0.943 (1.95)	0.886 (1.62)
ln(FirmSize)	-0.102 (-2.28)	-0.257 (-2.59)	-0.221 (-1.95)	-0.100 (-2.24)	-0.232 (-2.40)	-0.182 (-1.67)
Mfg	-0.293 (-1.75)	-0.548 (-1.47)	-0.172 (-0.41)	-0.280 (-1.67)	-0.601 (-1.65)	-0.250 (-0.61)
Constant	1.084 (1.71)	3.212 (2.28)	2.373 (1.47)	1.094 (1.73)	3.110 (2.26)	2.088 (1.34)
R ²	0.020	0.024	0.021	0.017	0.022	0.019

Note: *t*-statistics appear in parentheses

The above analyses demonstrate that the principal findings are not affected by the use of alternative counterfactual models in calculating the counterfactual returns. This confirms the findings of other studies (cited above) that the choice of counterfactual model is not crucial to the results of event studies.

4.5.3 *Estimation Period for Market Model Parameters*

When the event study methodology is applied to mergers, the underlying assumption is that the event does not alter the firm's systematic risk (represented by β in the above framework). Nevertheless, a firm's risk is likely to be affected when it undertakes an acquisition as a result of changing financial and operating risks of participants or different β 's between acquiring and acquired firms (Conn, 1985). Under such instances, estimation methods for parameters of the market model that use pre-announcement returns may not provide the right risk-adjusted counterfactual returns in the post-acquisition period. If the uncertainty associated with an acquisition increases a firm's β (assuming α unchanged), then the firm's abnormal returns will indicate positive gains from the acquisition even though in reality risk-adjusted returns may not have changed. Conversely, if the acquisition enables the firm to diversify risk, thereby lowering its β , abnormal returns will be negatively biased.

Previous studies investigating the effects of mergers and acquisitions on a firm's β have yielded mixed findings. On the one hand, some studies (e.g. Mandelker, 1974) suggest that the magnitude of abnormal returns is sensitive to the period chosen to estimate the parameters of the market model. On the other hand, there is also evidence that a firm's risk is not significantly altered by a merger or acquisition (Haugen and Langetieg, 1975), so that the use of different estimation periods has no effect on abnormal returns (Dodd, 1980).

In view of the concerns about possible changes in systematic risk, we recalculate the abnormal returns for the firms in our sample by estimating the market model parameters from a post-announcement (instead of pre-announcement) period. The length of the estimation period remains the same, at 100 days, but in this case the period begins on the 21st trading day after the announcement day (Day 0), or roughly a month later. Our previous results indicated that abnormal returns associated with the event disappeared completely by Day 10. Hence, an estimation period beginning on Day 21 was chosen to allow the market sufficient time to establish its equilibrium following acquisition-induced changes in systematic risk that might have occurred.

The market model parameters that are obtained from this estimation period are then used to calculate the abnormal returns over the event period. These abnormal returns (shown

in Table 4.11) generally exhibit the same trends that were found in previous calculations, viz. a significantly positive abnormal return of around 0.3 percent on the announcement day, as well as significantly positive cumulative abnormal returns throughout the event period. These cumulative abnormal returns are, however, larger than the original set of returns (in Table 4.3) in terms of magnitude and significance. If we consider the parameters calculated from the post-announcement period to be a more accurate reflection of the firm's post-acquisition status, then the original set of returns were negatively biased. This in turn indicates that the acquisition led to a reduction in risk.¹¹

TABLE 4.11
Abnormal Returns earned by Acquiring Firms
 (Alternative estimation period: Days [21,120])

Event day/ window	AR (%)	SAR (%)	<i>t</i> -statistic
-10	0.076	6.24	2.12
-9	0.069	7.42	1.72
-8	0.011	-2.59	-0.80
-7	-0.009	-1.05	-0.36
-6	0.071	4.96	1.54
-5	0.070	3.02	0.93
-4	0.109	9.18	2.99
-3	0.097	7.60	2.03
-2	0.090	4.73	1.40
-1	0.025	4.31	0.76
0	0.335	29.26	5.36
+1	0.155	12.78	3.12
+2	0.094	6.60	1.48
+3	0.129	10.35	3.02
+4	0.095	6.64	2.11
+5	-0.101	-3.00	-0.45
+6	-0.031	-2.11	-0.73
+7	0.024	0.51	0.18
+8	-0.022	-5.16	-1.64
+9	-0.006	-1.36	-0.47
+10	0.016	-0.03	-0.01
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[-10,+10]	1.299	21.44	4.43
[-9,+9]	1.207	21.11	4.47
[-8,+8]	1.144	20.85	4.30
[-7,+7]	1.155	24.20	4.86
[-6,+6]	1.139	26.14	5.14
[-5,+5]	1.099	27.56	5.16
[-4,+4]	1.130	30.46	6.30
[-3,+3]	0.925	28.57	5.68

¹¹ This is confirmed when we compare the estimated β -values, and find that the pre-acquisition coefficients are generally higher than the post-acquisition coefficients.

Corresponding to the model in Table 4.6, abnormal returns are related to a set of acquisition and acquirer characteristics in Table 4.12. Again the findings here are generally consistent with those of the original model. There is evidence of a positive correlation between abnormal returns and acquisitions in the US and Europe, as well as acquirers that are profitable, small (in terms of absolute size), and in the non-manufacturing sector. The effects of the variables *Hot* and *R&Dhigh*, while present, are less pronounced.

Therefore, while the use of a post-acquisition estimation period does not alter the main findings of this study, it does reveal an interesting aspect of the acquisition, i.e. a reduction in the firm's post-event β -values. To the extent that β (in the CAPM context) is a measure of the firm's risk, the results suggest that an acquisition provides an opportunity for risk diversification.

TABLE 4.12
Determinants of Abnormal Returns: OLS estimates
 (Alternative estimation period: Days [21,120])

Explanatory variable	Dependent variable		
	AR_0	$CAR[-3,3]$	$CAR[-5,5]$
RelSize	0.060 (0.36)	0.004 (0.01)	0.078 (0.18)
Hot	0.225 (1.49)	0.302 (0.89)	0.293 (0.74)
US	0.329 (1.39)	0.920 (1.72)	1.518 (2.45)
Europe	0.286 (1.19)	0.850 (1.57)	1.372 (2.19)
Profit	0.397 (1.69)	1.342 (2.52)	1.409 (2.29)
ProdDiv	-0.036 (-0.59)	-0.138 (-0.99)	-0.220 (-1.37)
R&Dnil	0.020 (0.10)	-0.085 (-0.19)	-0.037 (-0.07)
R&Dmed	0.070 (0.33)	-0.108 (-0.22)	-0.371 (-0.66)
R&Dhigh	0.327 (1.46)	0.777 (1.54)	0.738 (1.26)
ln(FirmSize)	-0.108 (-2.42)	-0.297 (-2.94)	-0.263 (-2.24)
Mfg	-0.275 (-1.63)	-0.391 (-1.03)	0.121 (0.28)
Constant	1.364 (2.14)	3.928 (2.73)	3.040 (1.82)
R ²	0.018	0.023	0.020

Note: *t*-statistics appear in parentheses

4.6 Conclusion

In this study we have examined the stock market's reaction to a large sample of 1370 foreign acquisitions made by UK firms over the years 1986-1997. Shareholders of acquiring firms experienced significant positive abnormal returns at the announcement of the acquisition, demonstrating the stock market's approval of these foreign acquisitions. The positive response was not, however, uniform across all types of acquisitions, as revealed in a subsequent analysis that characterised the acquisitions in terms of various acquisition and acquirer attributes.

Acquisitions located in the US and Europe produced higher returns than acquisitions outside these regions, consistent with the hypothesis that multinational firms select foreign markets so as to minimise information and transactions costs (Dunning, 1981). Relative to domestic investments, foreign acquisitions involve high information and search costs, which include overseas site visits and the cost of acquiring the necessary approvals from foreign governments. Where acquiring information is more costly, a firm would have more difficulty predicting an acquisition outcome, and hence the acquisition is expected to be more risky (Aharoni, 1966). When the acquisition is located in a country with which the acquirer is already well acquainted or where the cost of obtaining information is relatively low (for UK acquirers this would be the case for the US or countries in Europe), shareholders have more confidence in the investment decision, and bid up the share price accordingly.

Acquisition announcements made by acquiring firms that were highly R&D-intensive (an indicator of proprietary assets owned by the firm) achieved higher abnormal returns. This relationship agrees with the internalisation theory, which predicts that foreign direct investment increases the firm's value by internalising markets for its proprietary assets (such as technological know-how) that are intangible in nature, and hence not amenable to propagation through arms-length contracts.

Interestingly, the positive stock market reaction to foreign acquisitions contrasts with the basic finding of the previous chapter, which revealed that the profitability of acquiring firms declined following a foreign acquisition. This discrepancy could have arisen from inaccuracies in either measure. We acknowledged previously the shortcomings associated with the profitability measure. Nevertheless, it is also possible that the stock market's evaluation of foreign acquisitions was inaccurate. While the stock market believed an acquisition to have positive prospects, the realised outcome (in terms of post-acquisition profitability) could turn out to be entirely different. Which of these is the more relevant

explanation is investigated in the following chapter, which attempts to reconcile the findings generated by the two alternative measures of acquisition performance.

Furthermore, the next chapter also addresses the related subject of market efficiency. The interpretation of event study findings inevitably raises questions about the stock market's ability to assimilate information on events like foreign acquisitions. For example, we observed that acquisitions announced in periods of intense acquisition activity earned significantly higher returns than those announced in periods of less intense activity. Setting aside the notion that the stock market can be influenced by fads, this result could suggest that intense periods of acquisition activity occur because opportunities for restructuring are particularly attractive during these times. On the other hand, we also acknowledge that speculative bubbles and fads may occur, in which case the higher frequency of acquisitions as well as the higher returns earned in hot periods could both be manifestations of the stock market's irrational enthusiasm for acquisitions during these periods, and not a reflection of fundamental changes that promote restructuring. In the following chapter, we construct a test for market efficiency that is based on the stock market's response to foreign acquisitions.

4.7 Data Appendix

Explanatory variables used in the analyses:

Europe: Dummy variable set equal to 1 for acquisitions in Europe, and 0 otherwise.

Source: *Acquisitions Monthly*.

FirmSize: Average sales revenue of the acquiring firm in the three years preceding the foreign acquisition, expressed in constant prices. Sources: *Extel* (for sales revenues) and the Retail Price Index published in the Office of National Statistics' *Economic Trends: Annual Supplement, 1997 Edition* (for price adjustments).

Hot: Dummy variable that denotes periods of intense acquisition activity—*Hot* has a value of 1 in the years 1987-1989 as well as 1994-1997, and 0 in the remaining years. Source: *Acquisitions Monthly*.

Mfg: Dummy variable set equal to 1 for acquiring firms based in the manufacturing sector (primary SIC codes beginning with 2, 3 or 4), and 0 otherwise. Source: *Extel*.

ProdDiv: Discrete variable equal to 0 when only one four-digit SIC code is reported by the acquiring firm; 1 when the first three digits are shared by all lines of business; 2 when the first two only; 3 when the first only; and 4 when the first digit is different for at least two of the sectors. Source: *Extel*.

Profit: Net income of acquiring firm divided by its sales revenue averaged over the three years before the acquisition. Source: *Extel*.

R&D: The acquiring firm's R&D expenditures divided by sales. Before 1989, coverage of this variable was poor as there was no requirement for firms to disclose their R&D expenditures. Following legislation in 1989 firms had to report their R&D expenditures if they met two out of the three conditions: that the firm had more than 2,500 employees, a turnover of at least £80 million or a balance sheet total exceeding £39 million. Since most of the companies in the sample satisfied these criteria, we could assume that firms not reporting R&D expenditures after 1989 were not involved in R&D activities, i.e. the variable *R&D* was set to zero. Where R&D expenditures were available, the *R&D* variable was calculated as the average of the three years preceding the acquisition announcement. In cases where R&D expenditures were not reported in these three years but only in subsequent years (such as for announcements occurring before 1989), *R&D* was calculated from the years following the acquisition. In so doing we make the implicit assumption that a firm's R&D intensity is relatively stable over time. This is found to be true for observations with R&D data available in both pre- and post-acquisition periods. Moreover, in order to test whether the effect of

R&D is altered by this assumption, we re-estimate the model without the observations for which pre-acquisition R&D data were not available, and find no significant differences between the two samples. Source: *Extel*.

R&Dlow, *R&Dmed*, *R&Dhigh*: Acquiring firms that report expenditures on R&D are ranked according to the variable *R&D*, and then divided into three groups of equal sizes: *R&Dlow* for the lowest one-third (with *R&D* values below 0.84), *R&Dmed* for the middle one-third (with *R&D* values ranging from 0.84 to 2.25) and *R&Dhigh* for the highest one-third (with *R&D* values above 2.25). Source: *Extel*.

R&Dnil: Acquiring firms with *R&D* values of zero. Source: *Extel*.

RelSize: Sales revenue of acquiring firm divided by sales revenue of acquired firm, or if not available (which happens for about one-third of the acquired firms), purchase price of acquired firm divided by market value of acquiring firm. Sources: *Acquisitions Monthly* (for acquired firms) and *Extel* (for acquiring firms).

US: Dummy variable set equal to 1 for acquisitions in the US, and 0 otherwise. Source: *Acquisitions Monthly*.

5. POST-ACQUISITION PROFITABILITY VS. ABNORMAL STOCK RETURNS: AN APPRAISAL OF STOCK MARKET PERFORMANCE

5.1 Introduction

Do the results from an event study provide a reliable assessment of acquisition performance? The answer to this question would depend on the extent to which we believe that the stock market is efficient. Fama (1970) defines an efficient market as one “in which prices always fully reflect available information,” where “available information” can take the form of past prices, publicly available information, or all information, giving rise correspondingly to the “weak”, “semi-strong” and “strong” forms of efficiency. If the market truly reflected all information that was available about an acquisition, we would be able to rely on the market for a very precise estimate of the acquisition’s prospects. While it seems unlikely that the market can have access to all information (including private information that may only be known to the firm concerned), it is reasonable to assume that information known publicly would be incorporated into the market’s assessment of the acquisition.

To the extent that the market is efficient (in this semi-strong sense), investors who possess publicly available information can only earn a competitive return from investing in the acquiring firm’s stock once the acquisition has been announced. This observation gives rise to the corollary that information available at the time of announcement cannot be used to construct a profitable trading rule. The existence of such a trading rule is therefore deemed to be inconsistent with market efficiency. Therein lies the basis for the test of market efficiency in this chapter. Given that we have assembled a set of acquisition and acquirer characteristics that are related to post-acquisition profitability, we investigate whether information about these characteristics (which are known publicly at the time of announcement) can be used to devise a successful trading rule.

Before embarking on the test of efficiency, we first study the abnormal returns that accrue to acquiring firms in the longer-term post-announcement period. While the previous chapter focused on event windows of up to two weeks (or ten trading days) after the announcement, the window is now extended to six years. A number of studies (e.g. Barnes, 1978 and 1984; Franks and Harris, 1989) involving domestic acquisitions have revealed negative cumulative abnormal returns in the years following an acquisition announcement.

The common finding among these studies is a decline in the stock performance of these firms, to the extent that any gains that were realised upon announcement of the acquisition are subsequently wiped out. In addition to investigating if this trend emerges in our sample of foreign acquirers, we also compare our findings with actual post-acquisition profitability. While there has been extensive research conducted on the performance of acquiring firms' share prices in the years after the acquisition event, these studies have predominantly focused on the general pool of acquirers. However, because few (if any) studies have separated subsets of these acquirers from the general pool, we cannot conclude that this result holds for all acquirers, regardless of their subsequent post-acquisition performance. Hence, we hope to shed light on the issue of whether all acquirers suffer a decline in stock price, or if this is related to their actual performance in the years following the acquisition.

Furthermore, we examine whether the stock market's reaction at the time of the acquisition announcement is a good predictor of the acquirer's actual post-acquisition profitability. These analyses bring together the findings from the previous two chapters, and provide for interesting comparisons between the two measures of acquisition performance.

5.2 Announcement and Post-announcement Abnormal Returns

5.2.1 Event Window Abnormal Returns

In this section, we calculate the abnormal returns that accrue to acquiring firms during the event period, as well as the post-announcement period. Abnormal returns, computed based on the market model, are given by:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}),$$

where R_{it} is the return for stock i on day t , α_i and β_i are the OLS estimates of the intercept and slope coefficients respectively of the market model regression, and R_{mt} is the return at time t on the market (as proxied by the FTSE all-share index). α_i and β_i are estimated for the 100 days before the event window, i.e. $[-110, -11]$ with $t = 0$ as the announcement date. This is the same procedure that was used in Chapter 4 (re: Table 4.3).¹

In order to compare the results of this study with our earlier findings on post-acquisition profitability, we use the sample of 238 firms that was selected in Chapter 3,² which is a sub-sample of the 1370 firms in Chapter 4. The difference in sample sizes can be attributed primarily to two reasons. First, the sample period for the larger sample was 1986-

¹ As described below, alternative estimates of α_i and β_i are employed (in the relevant sections) as a means of verifying the robustness of our findings.

² The sample in Chapter 3 actually contained 256 firms, but daily share price data for 18 of these firms was not available, so we are left with 238 firms.

1997 while that for the smaller sample was 1989-1993. The latter sample was chosen to accommodate additional data in the pre- and post-acquisition years required for the analysis (as explained in Chapter 3). Second, in selecting the transactions to be included a 1-percent cut off (in terms of the acquired firm's size relative to its acquirer) was imposed in Chapter 4 while a 5-percent cut off was imposed in Chapter 3, in consideration of the differing sensitivities of the performance measures. Table 5.1 reproduces the table of daily and cumulative abnormal returns over the 21-day event window corresponding to Table 4.3, as a means of comparing similarities and differences between the two samples.

Similar to the finding in the previous chapter, these results indicate that the abnormal return on the announcement day is significantly positive with a magnitude of about 0.3 percent. However, noticeably different are the cumulative abnormal returns, none of which are significant even though they remain positive throughout the 7- to 21-day event windows. This is a result of the unusually negative return of -0.4 percent on day -1 (which is not driven by outliers). Given that news of the acquisition could have been leaked to the stock market before the actual announcement, we could expect the acquiring firm's share price to become more volatile as the announcement date approaches. While the reason for the negative abnormal return on day -1 is less apparent, it could be that a fall in the share price prompts managers to make acquisition announcements (perhaps in an attempt to arrest the fall), which is perceived to be good news by the market.

The absence of significantly positive cumulative abnormal returns in this sample can be reconciled with the earlier sample (in Table 4.3) along two dimensions. First, the sample period has been reduced from 1986-1997 to 1989-1993. This shorter time window coincides roughly with a period of relatively less intense acquisition activity (the "cool" period identified previously). The analysis in Chapter 4 (re: Section 4.4) showed that acquisitions during "hot" periods tended to outperform those in "cool" periods. In other words, the positive cumulative abnormal returns were generated predominantly by announcements that were made during the "hot" periods. Apart from the difference in sample periods, the samples also differ in terms of the acquisition's size (relative to the acquiring firm). As explained above, the acquisitions in this sample are on average larger. This difference in size contributes to the lower abnormal returns observed in this sample—in particular, the day -1 return was significantly more negative for larger than smaller acquisitions.

While the cumulative abnormal returns in this sample are less positive, the non-negative abnormal returns obtained here disagree with the distinctly negative post-acquisition profitability found for the same group of acquirers in Chapter 3. How do we account for the

different verdicts delivered by the two measures of acquisition performance? This question will be addressed in the following sections (5.3 and 5.4), which examine the relationship between post-acquisition profitability and abnormal returns.

TABLE 5.1
Abnormal Returns earned by Acquiring Firms

Event day/ window	Abnormal return (%)	Standardised abnormal return (%)	<i>t</i> -statistic
-10	0.089	6.24	1.11
-9	-0.024	5.79	0.79
-8	0.032	1.92	0.32
-7	-0.144	-8.49	-1.40
-6	0.042	1.06	0.15
-5	0.062	6.38	0.85
-4	-0.023	-1.99	-0.32
-3	0.267	17.51	1.82
-2	0.012	0.53	0.06
-1	-0.382	-27.28	-1.70
0	0.277	22.14	1.81
+1	0.136	9.23	1.05
+2	0.027	-5.48	-0.71
+3	0.005	-2.12	-0.30
+4	-0.009	1.94	0.29
+5	-0.028	-2.83	-0.41
+6	-0.010	-2.46	-0.40
+7	-0.035	-0.89	-0.15
+8	-0.060	-2.87	-0.40
+9	0.028	2.42	0.37
+10	-0.083	-10.23	-1.48
<hr/>			
[-10,+10]	0.178	2.29	0.23
[-9,+9]	0.172	3.33	0.33
[-8,+8]	0.168	1.53	0.14
[-7,+7]	0.196	1.87	0.17
[-6,+6]	0.376	4.61	0.42
[-5,+5]	0.343	5.44	0.48
[-4,+4]	0.310	4.83	0.41
[-3,+3]	0.342	5.50	0.43

5.2.2 Long-term Post-announcement Abnormal Returns

Abnormal returns are also computed for longer post-announcement periods as a means of exploring the longer-term effects of an acquisition on shareholder wealth. Instead of daily returns, these abnormal returns are calculated for longer time periods, ranging from 1 year to 6 years (after the announcement date). In other words, we compute the abnormal returns that would accrue to shareholders who purchase the stock on the announcement date

(technically the closing price on that day) and hold it for the specified length of time, i.e. 1, 2, 3, 4, 5 or 6 years. The average abnormal return for the portfolio of 238 firms, reported in Table 5.2, is then calculated on the basis that each firm contributes an equal amount (i.e. 1/238) to the portfolio.

As before, these abnormal returns are computed with the counterfactual return being generated by the market model, using the values of α_i and β_i that were estimated previously. Because we found in the last chapter that a firm's β falls after an acquisition, we investigate whether abnormal returns are robust to this change in β -value through a second market model regression. In this instance, α_i and β_i are estimated over a six-year post-announcement period beginning on the day after the announcement, i.e. [+1,+1560] given that there are on average 260 trading days in a year.³ Therefore, we have two sets of estimates for α_i and β_i that yield two sets of abnormal returns, both of which are reported in Panel A of Table 5.2. To facilitate comparisons of the returns earned within each year, Panel B of the same table presents the incremental abnormal returns that are earned every year, from the first to the sixth year.

Regardless of which estimation period is used, abnormal returns are significantly negative in the first two years. Panel A shows that when the holding period is extended to three years, the returns become less negative and thereafter (for holding periods beyond three years) they are positive, though not significantly different from zero. Focusing on each year individually (Panel B), abnormal returns earned in the first and second year are significantly negative, as before. Although in the third year acquirers earn virtually zero abnormal returns, in the fourth year abnormal returns become significantly positive. The returns remain positive, albeit weaker, in the fifth year. We subsequently find, however, that these positive returns are primarily driven by outlying observations. When the observations that are more than four standard deviations away from the mean are removed (three observations in each case), the resulting Year 4 returns are 4.37 percent (t -statistic = 0.92) and 4.36 percent (t -statistic = 0.94) for the pre- and post-acquisition estimation periods respectively. Similarly, the Year 5 and Year 6 returns become much smaller in magnitude (and not distinct from zero) when the same outliers are dropped. In other words, from Year 3 onwards acquiring firms are no different from other comparable firms in terms of the stock returns that they earn.

³ If share price data becomes unavailable in the course of the six-year period, the abnormal return for that firm is calculated up to the day of the last seen price, and set equal to zero thereafter.

TABLE 5.2
Abnormal Returns (%) earned by Sample of 238 Acquiring Firms
over Longer-term Post-announcement Periods

Panel A: Holding periods from announcement date

No. of years	Pre-announcement estimation period	Post-announcement estimation period
1	-7.10 (-3.13)	-7.15 (-3.16)
2	-11.16 (-3.14)	-11.25 (-3.21)
3	-3.19 (-0.59)	-3.22 (-0.61)
4	7.14 (0.98)	6.73 (0.96)
5	12.80 (1.21)	11.20 (1.11)
6	5.34 (0.56)	6.55 (0.70)

Panel B: Incremental yearly holding periods

Year	Pre-announcement estimation period	Post-announcement estimation period
1	-7.10 (-3.13)	-7.15 (-3.16)
2	-4.86 (-2.09)	-4.97 (-2.15)
3	2.59 (0.60)	2.53 (0.59)
4	11.73 (1.84)	11.40 (1.85)
5	16.96 (1.73)	15.50 (1.64)
6	11.65 (1.27)	12.88 (1.42)

Note: *t*-statistics appear in parentheses

What is puzzling is the persistently negative result obtained in the first two post-acquisition years. Any share price adjustments in response to the acquisition announcement should be completed on the announcement day or, allowing for new information to arrive in the immediate post-announcement period, shortly after. In order to ascertain that the negative returns are not a response to new information arriving in the immediate post-announcement period, abnormal returns are recalculated commencing on the 30th trading day after the announcement date (i.e. when the market has had sufficient time to digest the new information). The main findings nevertheless remain unchanged—negative abnormal returns

are observed up to two years after the acquisition. For example, the Year 1 return is -7.42 percent with a t -statistic of -3.50 (computed using estimates from the post-acquisition period), showing that the negative outcome is not any weaker despite commencing calculations from a later date. Is the market's response so sluggish that the repercussions of the acquisition announcement are still visible for as long as two years after the event? We revisit this question in Section 5.4.

Abnormal returns are also computed for sub-samples of acquirers divided according to their actual post-acquisition profitability. In Chapter 3, two measures of post-acquisition profitability were constructed, viz. $\Delta\pi_{is}$ and $\Delta\pi_{il}$, the first representing industry-adjusted profit changes in the short term (average of the first three post-acquisition years) and the second profit changes in the long term (average of the fourth to the sixth post-acquisition years). The grouping of firms into the high- and low-profitability sub-samples is first based on their $\Delta\pi_{is}$ values, and then on their $\Delta\pi_{il}$ values. Firms are classified as highly profitable if their profitability is above the median value (-3.2 percent in both instances). Conversely, firms are placed into the low-profitability sub-sample if their profitability is below the median value. In this way, from a sample of 238 firms two sub-samples of equal sizes (i.e. 119 firms) are generated. Abnormal returns across sub-samples are compared by computing the differences between the two sub-samples (i.e. low – high profitability acquirers) for both short and long term periods.

Table 5.3 displays these results.⁴ Abnormal returns in Panels A and B are calculated using estimates of α_i and β_i from the pre- and post-announcement periods respectively. Separating the acquirers in this manner, we find that the non-negative returns that accrue over the longer post-announcement periods are confined only to the sub-samples of highly profitable acquirers (regardless of the estimation period or profitability measure used). In fact, the sub-samples of highly profitable firms earn positive abnormal returns for all holding periods beginning with the first year, and these returns become significantly positive for holding periods beyond two years. Abnormal returns remain negative for low profitability acquirers throughout the six-year period, though by the sixth year they are not significantly different from zero.

The wide disparity in abnormal returns for the two sub-samples gives rise to negative and significant mean differences for all periods considered, i.e. high profitability acquirers exhibit much higher returns than low profitability acquirers. For example, based on the long-

⁴ All abnormal returns reported in this table, as well as the next (Table 5.4), represent holding periods beginning from the announcement date, i.e. corresponding to Panel A of Table 5.2.

term profit variable in Panel A, the highly profitable sub-sample outperforms the less profitable sub-sample by 17 percent on average in the first year after announcement of the acquisition, and this difference increases to 47 percent after six years. The trend is similar for the sub-samples computed using the short-term profit variable, as well as the alternative estimation period used in Panel B. Hence, while both high and low profitability sub-samples exhibit less negative abnormal returns over time, the improvement in performance is more substantial for the highly profitable group of acquirers.

TABLE 5.3
Comparing Abnormal Returns (%) earned by Sub-samples of Acquiring Firms:
 firms with profitability below *median* vs. firms with profitability above *median*

Panel A: Pre-announcement estimation period

No. of years	Low $\Delta\pi_{is}$	High $\Delta\pi_{is}$	Low – High $\Delta\pi_{is}$	Low $\Delta\pi_{il}$	High $\Delta\pi_{il}$	Low – High $\Delta\pi_{il}$
1	-15.25 (3.15)	1.05 (3.11)	-16.30 (4.43)	-13.67 (3.43)	3.80 (3.15)	-17.47 (4.66)
2	-29.23 (4.05)	6.92 (5.37)	-36.15 (6.72)	-24.49 (4.70)	10.29 (5.59)	-34.77 (7.30)
3	-28.35 (5.94)	21.96 (8.48)	-50.32 (10.36)	-23.13 (6.46)	26.47 (9.49)	-49.59 (11.48)
4	-17.95 (8.78)	32.22 (11.26)	-50.17 (14.28)	-19.88 (9.41)	42.48 (12.72)	-62.36 (15.82)
5	-18.69 (10.59)	44.30 (17.82)	-62.99 (20.73)	-23.75 (12.13)	53.18 (19.94)	-76.93 (23.34)
6	-12.76 (14.84)	23.44 (11.67)	-36.20 (18.88)	-17.67 (17.38)	29.77 (12.35)	-47.44 (21.32)

Panel B: Post-announcement estimation period

No. of years	Low $\Delta\pi_{is}$	High $\Delta\pi_{is}$	Low – High $\Delta\pi_{is}$	Low $\Delta\pi_{il}$	High $\Delta\pi_{il}$	Low – High $\Delta\pi_{il}$
1	-15.28 (3.21)	0.97 (3.02)	-16.25 (4.41)	-13.74 (3.43)	3.54 (3.09)	-17.28 (4.62)
2	-29.86 (4.02)	7.36 (5.22)	-37.21 (6.59)	-24.34 (4.64)	9.82 (5.48)	-34.15 (7.18)
3	-29.36 (5.80)	22.92 (8.27)	-52.28 (10.10)	-23.17 (6.20)	25.82 (9.40)	-48.99 (11.26)
4	-19.96 (8.48)	33.42 (10.63)	-53.39 (13.60)	-19.61 (8.94)	40.81 (12.19)	-60.42 (15.12)
5	-21.77 (10.33)	44.17 (16.92)	-65.94 (19.82)	-24.82 (11.78)	50.54 (19.04)	-75.35 (22.39)
6	-12.53 (14.67)	25.63 (11.55)	-38.17 (18.67)	-15.13 (17.09)	29.98 (12.42)	-45.11 (21.12)

Note: standard errors appear in parentheses

Because the number of firms with negative profitability (i.e. firms that underperformed their industry average) is substantially larger than those with positive profitability, another means of dividing the firms into sub-samples is by grouping them according to whether their profitability values are above or below zero. Based on the profitability measures $\Delta\pi_{is}$ and $\Delta\pi_{il}$, there are respectively 92 (out of 238) firms and 70 (out of 210) firms, or roughly one-third of each sample, in the highly profitable sub-sample. In other words, firms with negative (industry-adjusted) profitability outnumber those with positive (industry-adjusted) profitability by approximately two to one. The results are presented in Panels A and B of Table 5.4, which as before represent the two different periods employed in estimating the market model parameters.

The principal findings here are essentially the same as before, i.e. low profitability acquirers experience negative returns while high profitability acquirers have positive returns. The difference between them has, however, become more distinct, especially over the longer holding periods. This suggests that the abnormal returns earned by acquiring firms are closely associated with their realised profitability after the acquisition has occurred. Unlike the general trend amongst domestic acquisitions, shareholders of firms that undertake foreign acquisitions do not necessarily suffer in the long-term post-acquisition period. Even shareholders of acquirers that subsequently exhibit below-average (relative to their industry norms) profitability earn returns that are not significantly worse than the market return, provided they hold their shares for a period of six years.

In the light of our concerns about market efficiency, it is worth noting that these results are not intended to pass judgement on the market's performance. Since they are based on actual post-acquisition performance, the finding that firms experiencing "good news" (in the form of above-average profitability) have better stock returns than firms experiencing "bad news" does not violate any no-arbitrage conditions. Allocating acquirers into high and low profitability categories is based on information that is available only after the acquisition, not at the time when the acquisition was announced. We are also unable to tell if the market's valuation of the news event is correct. In order to make this assessment, we have to test whether the market has processed the relevant information that is available at the time of the news event. We demonstrate one means of carrying out such a test in Section 5.4.

TABLE 5.4
Comparing Abnormal Returns (%) earned by Sub-samples of Acquiring Firms:
 firms with profitability below *zero* vs. firms with profitability above *zero*

Panel A: Pre-announcement estimation period

No. of years	Low $\Delta\pi_{is}$	High $\Delta\pi_{is}$	Low – High $\Delta\pi_{is}$	Low $\Delta\pi_{il}$	High $\Delta\pi_{il}$	Low – High $\Delta\pi_{il}$
1	-14.04 (2.87)	3.92 (3.44)	-17.96 (4.53)	-8.51 (2.92)	2.22 (4.10)	-10.73 (5.05)
2	-23.51 (4.00)	8.44 (6.15)	-31.94 (7.01)	-16.44 (4.11)	11.59 (7.62)	-28.03 (7.92)
3	-22.74 (5.85)	27.83 (9.70)	-50.57 (10.66)	-15.20 (5.55)	35.41 (13.27)	-50.61 (12.22)
4	-13.91 (8.31)	40.54 (12.86)	-54.45 (14.62)	-11.08 (7.86)	56.06 (17.76)	-67.14 (16.76)
5	-13.04 (9.70)	53.82 (21.93)	-66.85 (21.25)	-16.88 (9.78)	77.89 (28.71)	-94.77 (24.53)
6	-5.61 (13.20)	22.71 (12.69)	-28.32 (19.45)	-13.08 (13.34)	44.33 (17.43)	-57.41 (22.53)

Panel B: Post-announcement estimation period

No. of years	Low $\Delta\pi_{is}$	High $\Delta\pi_{is}$	Low – High $\Delta\pi_{is}$	Low $\Delta\pi_{il}$	High $\Delta\pi_{il}$	Low – High $\Delta\pi_{il}$
1	-14.04 (2.90)	3.78 (3.32)	-17.82 (4.51)	-8.58 (2.90)	1.85 (4.06)	-10.43 (5.01)
2	-23.92 (3.96)	8.86 (5.97)	-32.77 (6.88)	-16.47 (4.01)	11.15 (7.55)	-27.62 (7.79)
3	-23.27 (5.71)	28.61 (9.49)	-51.88 (10.41)	-15.45 (5.30)	34.87 (13.23)	-50.32 (11.98)
4	-14.88 (8.03)	41.03 (12.09)	-55.91 (13.94)	-11.42 (7.43)	54.64 (17.08)	-66.06 (16.00)
5	-15.08 (9.41)	52.92 (20.86)	-68.00 (20.35)	-18.40 (9.39)	75.38 (27.47)	-93.79 (23.50)
6	-6.10 (12.99)	26.62 (12.68)	-32.72 (19.22)	-11.83 (13.05)	45.93 (17.67)	-57.76 (22.29)

Note: standard errors appear in parentheses

5.3 Predicting Post-acquisition Profitability

Since share prices are supposed to reflect changes in the firm's value, it may not be surprising to find that post-announcement returns are closely correlated with the acquirer's actual post-acquisition profitability. Given that they are measured in contemporaneous periods, it is likely that the observed share price movements are in response to new information about the firm's profitability, such as when earnings reports are released. When an acquisition occurs, the underlying value of the acquiring firm also changes because an acquisition can potentially enhance (or detract from) the subsequent profitability of the

acquirer. Such changes in a firm's underlying profitability may not occur immediately, and in fact are likely to take a year or more before the returns from a new subsidiary can be realised. A question that arises is: can such changes in future profitability be predicted at the time when the acquisition is announced?

If information on an acquisition's potential were available at the time of announcement and if the stock market were able to process that information, then we would expect future changes in profitability brought about by the acquisition to be reflected in the firm's share price upon announcement of the acquisition. Whether this actually occurs is addressed in this section. With the benefit of hindsight, we are able to observe a firm's post-acquisition performance and compare this with the stock market's reaction to the announcement. In other words, we relate the stock market's ex ante assessment of the firm's acquisition prospects to accounting data which provides an ex post evaluation of the firm's post-acquisition performance.

We demonstrated in a previous chapter (re: Section 3.6) how the change in the firm's profitability following an acquisition was correlated with a set of acquisition and acquirer characteristics. If the stock market's assessment were accurate, we should also be able to use the abnormal returns accruing to the firm's shareholders at the time of the announcement as a predictor of the subsequent change in profitability—these are the same dependent variables denoted by $\Delta\pi_{is}$ and $\Delta\pi_{il}$, i.e. the industry-normalised changes in short- and long-term profitability. In addition to the set of explanatory variables used previously, the firm's abnormal return around the announcement date is introduced as a new explanatory variable. The abnormal returns (calculated from the market index model using the FTSE all-share index as the benchmark) over the three event windows AR_0 , $CAR[-3,+3]$ and $CAR[-5,+5]$ are each used in three separate OLS regressions, the results of which are reported in Table 5.5.

The first row of Table 5.5 shows the coefficients on the abnormal return variables. All three measures of abnormal returns are found to be positively correlated with both short- and long-term changes in profitability, albeit some relationships are more robust than others. Since the abnormal return variables are expressed in percentages, a coefficient of 0.0116 on the AR_0 variable in the first column indicates that a unit increase in AR_0 (in this case 1 unit being 1 percent) brings about an increase in short-term profitability of 0.0116 (or 1.16 percent). Similarly, a 1-percent increase in announcement day returns also corresponds to an equivalent 1-percent increase in the long-term profitability variable. These relationships are significant over both short- and long-term periods. The effect of abnormal returns, despite being weaker in magnitude over the 7- and 11-day event windows, still remains significant

over the short-term period in both cases. Their coefficients remain positive, though no longer significant, in the long-term regressions. Hence, from these results we can infer that the stock market is better at predicting changes in profitability for nearer-term horizons.

Furthermore, the effects of the remaining variables in these regressions are generally unaffected by the inclusion of the new abnormal return variables. This suggests that the stock market predicts post-acquisition performance using information that is fairly orthogonal to the original set of regressors. In other words, the ability of the stock market to predict changes in post-acquisition profitability is not derived from the information contained in the existing set of acquiring firm-characteristics or acquisition attributes.

TABLE 5.5
OLS Regression of Profit Changes on Abnormal Returns,
Acquisition and Acquirer Characteristics

	AR_0		$CAR[-3,+3]$		$CAR[-5,+5]$	
	$\Delta\pi_{is}$	$\Delta\pi_{il}$	$\Delta\pi_{is}$	$\Delta\pi_{il}$	$\Delta\pi_{is}$	$\Delta\pi_{il}$
AR or CAR	0.0116 (2.17)	0.0114 (2.12)	0.0053 (2.54)	0.0024 (1.15)	0.0033 (1.74)	0.0024 (1.24)
RelSize	0.0096 (0.17)	0.1345 (2.40)	0.0070 (0.12)	0.1293 (2.27)	0.0150 (0.26)	0.1339 (2.37)
RelSize ²	-0.0079 (-0.45)	-0.0294 (-1.76)	-0.0065 (-0.38)	-0.0274 (-1.62)	-0.0092 (-0.52)	-0.0289 (-1.72)
ProdDiv	0.0158 (1.83)	0.0314 (3.83)	0.0138 (1.63)	0.0281 (3.48)	0.0135 (1.58)	0.0283 (3.51)
First	-0.0179 (-0.59)	-0.0239 (-0.82)	-0.0196 (-0.65)	-0.0210 (-0.72)	-0.0175 (-0.58)	-0.0214 (-0.73)
US	-0.0100 (-0.24)	-0.0634 (-1.63)	-0.0126 (-0.30)	-0.0659 (-1.68)	-0.0158 (-0.37)	-0.0677 (-1.72)
Europe	-0.0359 (-0.86)	-0.0608 (-1.58)	-0.0397 (-0.96)	-0.0627 (-1.61)	-0.0405 (-0.97)	-0.0635 (-1.63)
Mfg	0.0006 (0.02)	0.0380 (1.56)	0.0025 (0.10)	0.0398 (1.63)	0.0024 (0.09)	0.0397 (1.63)
R&D	0.2121 (0.52)	0.1858 (0.50)	0.2199 (0.54)	0.2132 (0.57)	0.2425 (0.60)	0.2322 (0.62)
Ln FirmSize	-0.0042 (-0.53)	-0.0030 (-0.40)	-0.0023 (-0.29)	-0.0009 (-0.11)	-0.0021 (-0.27)	-0.0007 (-0.09)
LaggedProfit	-0.5055 (-8.34)	-0.4243 (-7.74)	-0.5050 (-8.36)	-0.4282 (-7.76)	-0.5077 (-8.34)	-0.4277 (-7.75)
Dividends	-0.0197 (-0.52)	-0.0618 (-1.74)	-0.0228 (-0.61)	-0.0625 (-1.75)	-0.0214 (-0.56)	-0.0614 (-1.72)
Constant	0.0342 (0.35)	-0.0216 (-0.23)	0.0227 (0.23)	-0.0347 (-0.37)	0.0215 (0.22)	-0.0377 (-0.40)
R ²	0.296	0.380	0.302	0.370	0.291	0.371

Note: *t*-statistics appear in parentheses

Given that abnormal returns are positively correlated with post-acquisition profitability, we would have expected the two indicators of acquisition performance to deliver the same general verdict on the merits of undertaking foreign acquisitions. Nevertheless, while the results from Chapter 3 showed that foreign acquirers generally performed worse than other firms in the same industry, there was no evidence of a negative stock market reaction during the event period for the same sample of foreign acquirers.

We can resolve this apparent paradox by observing the distribution of signs on each of the two performance indicators within our sample of acquisitions. In the case of abnormal returns, positive and negative returns were roughly equal for the event windows considered. In contrast, negative profitability (i.e. where the acquirer's increase in profitability was below that of the industry control group) outweighed positive values by approximately two to one. Therefore it is likely that some acquirers experienced a post-acquisition fall in profitability despite having earned positive abnormal returns at the time of announcement. This does not imply that the stock market was mistaken, since we established that relatively high abnormal returns were associated with relatively high subsequent profitability (i.e. the stock market was right about which acquirers were likely to be more profitable relative to other acquirers). Instead, these findings could reflect shareholders' willingness to pay for acquisitions that could lead to a subsequent decline in profitability, perhaps because the benefits that these acquisitions conveyed to the firm or investor could not be captured entirely by the profitability measure that was constructed.⁵ In particular, these benefits could be non-profitability related (such as risk-diversification opportunities⁶) or of a longer-term nature, such that their impact on profitability would only be realised in a future period that we could not observe. So even though the results of the event study suggest that acquiring firms benefit from foreign acquisitions, there is the caveat that the benefits generally perceived by the stock market are not necessarily manifested in the near-term profitability figures.

5.4 Testing the Efficient Market Hypothesis

Jensen (1978) defines efficient markets as those where agents could not have constructed a profitable trading rule based on current information. For this sample of foreign acquirers, we found that their post-acquisition profitability was related to a set of acquisition- and acquirer-specific characteristics measured at the time of the acquisition announcement.

⁵ In Chapter 3, we suggested that acquired firms could be less profitable than their acquirers, so if a measure of the combined firm's profitability had been available, the change in profitability might be less negative.

⁶ In view of our finding (re: Section 4.5.3) that the value of β (a measure of risk in the CAPM sense) falls after an acquisition has been announced, risk diversification can be a plausible motivation for firms to acquire abroad.

Can these characteristics enable us to devise a successful trading rule? For example, can we formulate a trading rule by buying shares in firms where we can predict good ex-post performance (in terms of profitability) and selling shares in firms where we can predict poor ex-post performance?

Studies testing the weak efficiency of the stock market (e.g. Fama et al., 1969) show that no profitable investment strategies could be found based on news events (such as the announcement of stock splits), confirming that the market adjusted share prices instantaneously in response to the new information. Since information on acquisition and acquirer characteristics is publicly available, a market that is efficient (at least in the semi-strong sense) should incorporate this information in its evaluation of the acquirer's post-acquisition prospects. Subsequent changes in profitability that can be predicted by these characteristics should pose no surprise to the stock market, so they should generate no further abnormal returns.⁷ Therefore in an efficient market, the expected gains to shareholders should be fully reflected in the stock market's response to the announcement, thereby foreclosing the possibility of a viable trading rule.

5.4.1 *Portfolio Formation*

We put the stock market to a test by constructing two portfolios of acquiring firms grouped according to their predicted post-acquisition profitability, based on a set of acquisition and acquirer characteristics. The portfolios are denoted H and L which represent acquiring firms with high and low predicted profitability respectively. These are the predicted values obtained from the regression models in Table 3.6 that predict short and long term changes in ex post profitability. The 238 acquirers are first ranked by their predicted short term profit changes ($\Delta\pi_{is}$), then the top half of the sample is allocated to the H portfolio while the bottom half go to the L portfolio. Thus, on the portfolio formation date, taken to be the announcement date, each portfolio comprises 119 shares, one from each acquiring firm allocated to that portfolio.

The same group of 238 acquirers can also be separated into high and low predicted profitability portfolios by means of an alternative performance measure—predicted long-term profit changes ($\Delta\pi_{il}$). Predicted values are obtained from the regression of long-term profit changes on acquisition and acquirer characteristics (in Table 3.6). Firms with predicted

⁷ Nevertheless, it is possible to have abnormal returns in the post-acquisition period arising from unanticipated shocks to the firm (regardless of whether they are related to the acquisition). Since these shocks can be regarded as random occurrences that cannot be forecast by the stock market, our test of efficiency focuses only on the component of profitability that can be predicted by information present at the time of announcement.

profitability above the median value are denoted H while those with values below the median are L . Therefore, we have two sets of high and low predicted profitability portfolios formed using different (albeit closely related) criteria.⁸

The methodology of comparing the performance of two contrasting portfolios, often termed “winners” and “losers”,⁹ has frequently been adopted in tests of stock market efficiency. This is developed in De Bondt and Thaler (1985), in which monthly return data is first recorded for a sample of firms over an observation period (extending over 7 years or less, depending on the availability of data)—termed the formation period. From this sample, the extreme high and low return securities (in the top and bottom decile) are labelled as winners and losers, and placed into two separate equally-weighted portfolios. Hence, winner portfolios consist of firms with high returns during the formation period while loser portfolios consist of firms with low returns during the same formation period. The performance of both portfolios over a subsequent period of 60 months is measured through the cumulative abnormal returns accruing to each portfolio. When the returns of both portfolios are compared, loser portfolios are found to outperform winner portfolios, particularly in the second and third years of the test period. This overreaction phenomenon¹⁰ is one piece of evidence against market efficiency, since a trading rule that buys the loser portfolio by selling the winner portfolio short earns average annual returns ranging between 5 and 8 percent. In an efficient market, such arbitrage profits would not have been possible.

Likewise, the method of comparing portfolios of winners against losers has been employed in other studies of market efficiency (e.g. Fama and French, 1986; Vermaelen and Verstringe, 1986; Dark and Kato, 1986; De Bondt and Thaler, 1987; Ou and Penman, 1989; Zarowin, 1989 and 1990). Although the majority of such studies have corroborated the principal finding that losers outperform winners, there has been some debate about whether an underlying size effect has been driving the overreaction phenomenon. For example, Zarowin (1989) finds that losers are significantly smaller than winners at the time of portfolio formation. When winner and loser portfolios are matched by size, the differential stock return performance that was previously obtained disappears, suggesting that size discrepancies may be responsible for the overreaction phenomenon. In any case, the finding that one portfolio

⁸ Of the 119 firms chosen as winners by the first criterion, 90 firms are also chosen as winners by the second criterion, and vice versa.

⁹ Although our portfolios are also comparable to winner and loser portfolios, we use different terminology so as to avoid confusing them with the winner and loser portfolios used in the context of the overreaction literature, which uses different portfolio formation methods.

¹⁰ According to the overreaction hypothesis, individual investors have a propensity to overweigh dramatic, unanticipated news events. Overreaction behaviour may be driven by non-rational expectations of future earnings (i.e. fashions and fads) or investors overreacting to each other's trades (De Bondt, 1988).

systematically outperforms another, whether a result of overreaction or size phenomena, remains a well-documented anomaly of the efficient market.

5.4.2 *Portfolio Performance*

Starting with the day after the announcement date ($t = 1$), abnormal returns are computed for all acquiring firms in the portfolio, with the counterfactual returns being generated by the market model (based on the FTSE all-share index). As we have done in Section 5.2.2, the parameters of the market model are estimated over a pre-announcement as well as a post-announcement period, so that we have two sets of abnormal returns for each firm. Abnormal returns are computed for various holding periods ranging from one year (equivalent to 260 trading days) to six years, i.e. $t = [1, 260], [1, 520], [1, 780], [1, 1040], [1, 1300]$ and $[1, 1560]$. This enables us to test whether a multi-period buy-and-hold strategy (based on predicted profitability) earns abnormal returns.

If a firm's share price data becomes unavailable during the 6-year period, we assume that the stock is sold at the last available price on the *Financial Times Prices* database, and the proceeds from the sale subsequently reinvested in the market (benchmark) portfolio for the remainder of the period. Therefore, from the day in which the missing data first occurs that stock is assumed to earn zero abnormal returns. In this way, the weights of the other shares in the portfolio are unaffected.¹¹

Table 5.6 presents the abnormal returns (and their respective standard errors) calculated for each portfolio: L_s and H_s refer to the portfolios that are based on the firms' predicted short-term profitability, while L_l and H_l refer correspondingly to predicted long-term profitability. After the first year, the abnormal returns reported in the table represent incremental abnormal returns—i.e. for the second year, this would be the two-year holding period return minus the one-year return. This allows us to judge whether, for any particular year, the abnormal return makes a significant contribution to the overall abnormal return of the portfolio. For example, a significantly negative average abnormal return is obtained for the low predicted profitability portfolios over one- and two-year holding periods. The average abnormal return is still negative for the three-year holding period, but upon calculating the incremental abnormal return for the third year, we find that the latter is not significantly different from zero, and hence does not contribute to the negative three-year holding period return.

¹¹ If we had instead dropped the stock from the portfolio and calculated the average abnormal return from the remaining stocks, this would mean that an implicit rebalancing of the portfolio occurs whenever a stock drops out.

TABLE 5.6

Abnormal Returns (%) earned by Portfolios with Low and High Predicted Profitability

Panel A: Pre-announcement estimation period

Period (year)	Portfolios formed from Predicted Short-term Profit Changes			Portfolios formed from Predicted Long-term Profit Changes		
	L_s	H_s	L_s-H_s	L_l	H_l	L_l-H_l
1	-11.06 (2.77)	-3.15 (3.57)	-7.91 (4.52)	-10.98 (2.83)	-3.22 (3.53)	-7.77 (4.52)
2	-5.95 (2.91)	-3.76 (3.63)	-2.19 (4.65)	-4.43 (2.78)	-5.28 (3.73)	0.86 (4.65)
3	-0.02 (4.76)	5.21 (7.27)	-5.22 (8.69)	-3.84 (4.70)	9.03 (7.27)	-12.87 (8.66)
4	13.03 (7.36)	10.44 (10.47)	2.59 (12.80)	9.96 (7.53)	13.51 (10.35)	-3.56 (12.80)
5	14.13 (9.75)	19.80 (17.00)	-5.67 (19.60)	10.98 (9.85)	22.94 (16.93)	-11.96 (19.59)
6	13.14 (14.35)	10.15 (11.44)	2.99 (18.35)	13.59 (14.66)	9.71 (11.04)	3.88 (18.35)

Panel B: Post-announcement estimation period

Period (year)	Portfolios formed from Predicted Short-term Profit Changes			Portfolios formed from Predicted Long-term Profit Changes		
	L_s	H_s	L_s-H_s	L_l	H_l	L_l-H_l
1	-11.64 (2.79)	-2.67 (3.53)	-8.97 (4.50)	-11.48 (2.88)	-2.82 (3.46)	-8.66 (4.50)
2	-5.96 (2.93)	-3.97 (3.57)	-1.99 (4.62)	-4.27 (2.76)	-5.66 (3.71)	1.39 (4.62)
3	-0.52 (4.70)	5.58 (7.18)	-6.10 (8.58)	-4.27 (4.64)	9.33 (7.18)	-13.59 (8.55)
4	12.09 (7.23)	10.71 (10.01)	1.38 (12.35)	9.42 (7.39)	13.37 (9.89)	-3.95 (12.35)
5	11.39 (9.42)	19.60 (16.40)	-8.22 (18.91)	9.49 (9.53)	21.50 (16.32)	-12.01 (18.90)
6	13.29 (14.28)	12.47 (11.34)	0.82 (18.23)	14.59 (14.57)	11.18 (10.95)	3.41 (18.23)

Note: standard errors appear in parentheses

In Table 5.6, the majority of abnormal returns are not significantly different from their respective counterfactual returns. The only exception is the performance of the L_s and L_l portfolios in the first two years. In the first year, these portfolios earn significantly less (by 11-12 percent) than the counterfactual return; while the differential is narrower (at around 5 percent) in the second year, it remains significant. These results are robust to dropping outliers, to excluding the first 30 post-announcement days (as we did in Section 5.2.2), and to the different periods used in estimating the market model parameters. If this negative performance were observed over a shorter period (such as 1-2 months instead of 1-2 years)

we could argue that, given the costs of collection or processing, information about an acquisition might not become available all at once on the announcement date, so that the market responds to the new information as it arrives. Should this be the case, observing negative returns need not be a violation of market efficiency. However, it should not take the market as long as 1-2 years to digest the information. This raises questions about the efficiency of the market since we have been able to predict that a certain category of firms will underperform their expected levels (at least over the first two post-announcement years) using information available at the time of the announcement.

Section 5.2 also revealed that the overall sample of acquiring firms earned negative abnormal returns in the first two post-acquisition years, a result that resembles that of domestic acquisition studies. The majority of event studies on domestic acquisitions found consistently that acquiring firms earned negative returns that extended over fairly long post-acquisition periods, usually lasting one to three years (e.g. Asquith, 1983; Magenheim and Mueller, 1988). These findings have prompted Jensen and Ruback (1983, p. 20) to comment that “these post-outcome negative abnormal returns are unsettling because they are inconsistent with market efficiency.” The slow adjustment of stock market prices to corporate announcements has been termed the Underreaction Hypothesis (Ikenberry et al., 1995), which argues that the stock market treats such announcements with scepticism, leading prices to adjust slowly over time.

As a further test of market performance, the average abnormal return of the low predicted profitability portfolio is compared against that of the high predicted profitability portfolio in each period. In an efficient market, we should not expect one portfolio to systematically outperform another. These differences are given in the columns labelled L_s-H_s and L_T-H_T in Table 5.6, i.e. they are obtained by subtracting the mean of the high predicted profitability portfolio from that of the corresponding low predicted profitability portfolio.

In the year of the acquisition announcement, the low predicted profitability portfolio performs worse than the high predicted profitability portfolio by roughly 8-9 percent regardless of the profitability variable or the estimation period used. On examining the distribution of the abnormal return variable, we find three observations on the right tail of the distribution with values above 120 percent, while the rest of the abnormal returns have values below 70 percent. For a sample with mean and standard deviation of -7 percent and 35 percent respectively, these three observations can be considered outliers. When the differences are recalculated after excluding these outliers, the difference in performance between low and high predicted profitability portfolios in the first year is no longer

significant in all cases. For example in the case of the pre-announcement estimation period, the values of L_s-H_s and L_T-H_T (in percent) are respectively -4.17 (standard error = 4.01) and -4.03 (standard error = 4.02).¹²

Of the remaining years (second through sixth), the only difference that is marginally significant occurs in the third year with the portfolio division based on predicted long-term profitability. Winners are found to outperform losers by approximately 13 percent in both Panels A and B. As before, this result is driven by the presence of outliers in the right tail of the distribution. In this case, the relevant abnormal return variable (i.e. the incremental third year abnormal return) has a mean of 3 percent and a standard deviation of 66 percent. Removing outliers with values above 300 percent, the resulting difference becomes -4 percent (standard error = 7 percent) for both panels. Hence, there is no discernible difference in the performance of low relative to high predicted profitability portfolios for the majority of firms in the sample.

5.5 Conclusion

The main objective of this chapter has been to evaluate the performance of the stock market on the basis of its reaction to announcements of foreign acquisitions. In comparing the returns earned by individual portfolios against their respective counterfactual returns, or against each other (low vs. high predicted profitability portfolios), we have found that in most cases the results are consistent with market efficiency. However, the underperformance of acquiring firms, in particular low predicted profitability portfolios, over the first two post-acquisition years could be an indication of market inefficiency, i.e. the market's sluggish response to news of acquisitions. Portfolios of firms that are predicted to have poor post-acquisition profitability also perform poorly in terms of their stock returns in the first two post-announcement years. Using current information we are able to construct a portfolio of acquiring firms that performs systematically worse than another portfolio (based on the market index¹³) in some future period, thereby presenting us with a profitable trading rule. Upon announcement of a foreign acquisition, an arbitrage strategy that buys the market

¹² It is worth noting at this juncture that the exclusion of outliers would also have made the returns of the H portfolios significantly negative in the first two years when compared against their respective counterfactual returns (i.e. columns H_s and H_T of Table 5.6). This explains why L portfolios underperform only relative to their counterfactuals, but not relative to H portfolios.

¹³ Although the return of the loser portfolio was compared against the counterfactual return generated by the market model, we find these counterfactual returns to be closely linked to the actual return on the market index. In fact, the main findings of Section 5.4.2 are unaffected when the counterfactual returns are replaced with the market return.

portfolio by selling the loser portfolio short earns positive average returns by the end of that year (as well as the year after).

Do these findings invalidate the event study as a means of assessing acquisition performance? We can conclude, at the very least, that it is not necessarily safe to assume (as we do in event studies) that the reaction of market prices to important news events is instantaneous and unbiased. The existence of a profitable trading rule based on publicly available information also casts doubt on the semi-strong form of market efficiency. Nevertheless, one redeeming feature of the stock market's reaction to acquisition announcements is its ability to distinguish the acquirers that perform relatively well (in terms of post-acquisition profit changes) from those that perform relatively badly. Therefore, while event period returns may understate the actual changes in firm value, the event study is still useful as a device for comparing the relative performance of the firms concerned.

6. CONCLUSIONS

Having completed the empirical investigations, we are now in a position to revisit the three fundamental questions that were posed at the beginning of this study.

(i) The choice of acquisition – how can it be explained?

In order to address this question, we have studied the acquisition behaviour of a sample of UK publicly listed companies over the period 1986-1997. The acquisition patterns observed are consistent with several theories on multinational investment, the range of acquisition choices available allowing the possibility of more than one theory to be applicable. Nevertheless, these disparate theoretical strands can be captured within the overarching framework of the transaction cost model, which presents a useful approach to explaining acquisition behaviour.

The transaction cost model (Williamson, 1975 and 1985), in rationalising the growth of a firm, predicts that a firm will seize the opportunity to displace a market if transaction costs can be reduced in the process. While this lowers the costs of arms-length transactions in external markets, the costs of organising internal transactions also increase, so the firm's decision involves a tradeoff between internal and external costs. Over time, a firm learns how to lower the cost of managing its internal activities by improving the efficiency of its organisational structure. Hence, if two firms are faced with the same investment opportunity (i.e. external transaction costs can be lowered by the same amount), the investment is likely to attract the more efficient firm, for which the acquisition will be less costly to assimilate. We find in corroboration that indicators of a firm's organisational experience, such as its size, profitability and investment activity, have a positive influence on the decision to acquire (relative to not acquire).

In the choice between domestic and foreign acquisitions, firms that acquire abroad are more likely to be active in R&D, compared with firms that acquire domestically. Moreover, within the group of firms that are active in R&D, those with higher R&D intensities are even more likely to undertake foreign acquisitions than those with lower R&D intensities. Since knowledge-based proprietary assets are usually generated through a firm's in-house R&D activities, these findings lend support to the internalisation theory. With evidence of

Proprietary assets providing the motivation for a firm's investment decisions, the remaining findings also make sense from the perspective of the transaction cost model. Having developed its proprietary assets, a firm would find it easier to first propagate these assets within its home market, since set-up and adjustment costs are lower in a familiar environment. In contrast, acquiring a foreign subsidiary entails the additional cost of learning how things are done abroad, which disadvantages the potential acquirer relative to local competitors who can access that legal and social milieu without explicit cost. In order to overcome this inherent disadvantage, the transaction cost savings from internalisation must be sufficiently large to make the foreign investment as attractive to a potential acquirer as a domestic investment.

However, the pool of domestic targets available is not unlimited. As a firm expands through domestic acquisitions, the marginal returns to acquiring domestically eventually decline, as it becomes increasingly difficult to find a good match for the potential investor. Acquiring overseas thus becomes more and more attractive. Hence, firms that have reached the stage of diminishing returns to domestic acquisitions, or those that have learnt to cope with foreign practices, have a higher probability of choosing foreign acquisitions. This is supported in the empirical results by variables that measure the firm's size, profitability, as well as indicators of the firm's penetration in foreign markets.

For a firm that is considering a foreign acquisition, transaction costs again play a part in determining the choice of destination, given that the costs of establishing a new subsidiary vary among foreign destinations. In order to minimise these costs, firms would want to select countries in which they face the least disadvantage, i.e. foreign markets where they have most information about. We find, in agreement with this proposition, that UK firms are more likely to make an acquisition where infrastructure or communications links are well developed, thereby facilitating the flow of information. Furthermore, firms also prefer to acquire in countries that are open to trade, which suggests an existing demand for foreign goods. In addition to observing that R&D-active firms are more likely to acquire abroad, we also find evidence of acquirers being drawn to countries which themselves are active in R&D, indicating the presence of positive spillover effects of R&D activities.

Certain types of information about a host country, such as exchange rates, are inherently ambiguous because of the continuous fluctuations in their values. Under such circumstances, a potential investor has to use current information to make a forecast about how future conditions could affect the desirability of the acquisition. In exploring the influence of uncertainty on acquisition choice, we find, consistent with the real options

model, that uncertainty (measured by the volatility of the exchange rate and stock market) deters a firm from undertaking an investment. Therefore, firms want to acquire not only where information is more readily accessible, but also where there is less uncertainty associated with the information.

The finding that uncertainty deters investment is subject to an alternative interpretation. A manager that undertakes an acquisition for risk diversification purposes would want to avoid uncertainty when selecting a target. Hence, we would also observe an aversion to targets located in highly uncertain environments. While we have previously only considered theories that conform to profit maximising principles, it is possible that managers select acquisitions to fulfil their personal objectives. The free cash flow theory, another example of non-profit maximising behaviour, is also supported through the finding that highly leveraged firms are less likely to undertake acquisitions.

(ii) The acquiring firm – has it made the right choice?

For a sample of large foreign acquisitions undertaken by UK firms over the period 1989-1993, we evaluate the acquisition performance of these firms using two measures: changes in profitability and abnormal stock returns. Based on the overall sample, the first measure shows acquiring firms to have performed badly while the second shows no indication of negative performance. Given that both measures are fairly well correlated with each other, these results indicate that the decline in profitability recorded over the six-year post-acquisition period is not regarded by the stock market as a setback to the firm. This apparent incongruity could arise from one of two scenarios: (i) the constructed measure of profitability was unable to capture the actual profitability improvements that occurred (e.g. profitability could have increased only after the six-year post-acquisition period); or (ii) profitability is not the only criterion upon which the stock market evaluates the acquisition. The first possibility, which could not be pursued in this study due to data constraints, can be explored in further research.

We study the second possibility by examining the acquisition's effect on measures of risk. Comparing pre- and post-acquisition values of β (i.e. risk measured through the CAPM), we find that post-acquisition values are significantly lower, indicating that acquiring firms have on average achieved a reduction in risk following the acquisition.

When risk is calculated from the variability of profit changes, an interesting risk-return pattern emerges. For example, the returns to the acquiring firm increase with the size of the acquisition (relative to the acquirer), but so do the risks. On the other hand,

acquisitions in the US and Europe (compared to the rest of the world) enable the acquiring firm to reduce risks, albeit at the expense of lower returns. These findings suggest that risk reduction, in addition to improving the firm's expected future profitability, could be a significant consideration in foreign acquisitions.

Using a larger sample of acquisitions that extends from 1986 to 1997, we find that acquisitions undertaken in Europe and the US earn higher abnormal returns than acquisitions in other regions. Most of these gains come from acquisitions in the post-1992 period, in which Europe became increasingly important (relative to the US and the rest of the world) as a destination for outward direct investment by UK firms. The advent of economic integration has been recognised as a motive for firms to establish foreign bases, possibly to take advantage of opportunities that arise from the expanded economic area (Caves, 1991). The increase in European acquisitions observed in the wake of the single market formation could be a result of UK firms attempting to gain a foothold in the larger European market. From the stock market's positive response, we can infer that these restructuring activities were considered beneficial to the acquiring firm. As the potential returns, such as from increased market power, to these acquisitions are likely to materialise only over the long term, we may have to wait for more time to elapse before any increase in profitability is observable. This could perhaps be explored in a future study as data from later post-acquisition periods become available.

Investigating changes in profitability has also revealed the presence of certain categories of acquiring firms that have performed particularly well, in the sense that they have been able to select targets to improve returns without incurring more risks, or vice versa. One example is the group of highly diversified firms, or conglomerates, which have higher post-acquisition profitability (than less diversified acquirers) without incurring higher risk. Geographic diversification (achieved through a foreign acquisition) and product diversification have often been regarded as substitutes, since the proprietary assets that support foreign investment are also associated with diversification across product lines. Therefore, firms that have become successful conglomerates are likely to have an advantage in foreign acquisitions relative to firms that have less experience with product diversification.

Other groups of acquirers that have performed well are manufacturing firms and large firms. These acquirers demonstrate lower risks (than their respective comparison groups, i.e. non-manufacturing and small firms) without corresponding reductions in profitability. In both cases, the experience gained from previous investments tends to have conferred upon them an advantage in undertaking foreign acquisitions.

For these specific groups of acquirers (such as conglomerates and manufacturing firms), it is evident that their choices of foreign acquisition targets have on average been sound. As for the remaining acquirers, it is less clear whether the acquisitions turned out differently from what they expected, or if they had motives other than the enhancement of firm value. In any case, based on these results we cannot rule out the possibility of non-profit maximising incentives, such as reducing profit variability (at the expense of profit levels), serving as viable motives for firms to undertake foreign acquisitions.

(iii) The stock market – is it a good indicator of acquisition performance?

In order to be considered a good measure of acquisition performance, we suggested that the stock market would have to satisfy two criteria. On the first criterion, abnormal stock returns earned by acquiring firms during the event windows are shown to have some correlation with the firms' changes in profitability over the six-year post-acquisition period. Whilst there is some disagreement between the stock market's reaction to the acquisition announcement (which is generally positive) and the observed change in profit levels (which is predominantly negative), the stock market's reaction is useful in ranking acquisitions within the distribution. In other words, particularly low abnormal returns are associated with particularly large reductions in profitability, and vice versa.

On the second criterion, the efficiency of the stock market is tested via the performance of low and high predicted profitability portfolios constructed using information on acquisition and acquirer characteristics available on the announcement date. Over the six-year test period, the results are generally consistent with market efficiency, in the sense that neither portfolio is able to earn returns that are significantly different from their respective counterfactual returns. The only exception occurs in the distinctly negative abnormal returns earned by the low predicted profitability portfolio (and to a smaller extent, the high predicted profitability portfolio as well) during the first two years of the test period. While it would have been reasonable to expect deviations from expected returns in the immediate post-announcement period, it is hard to explain, on the basis of an efficient market, why the negative reaction persists for such a long period (of up to two years).

This study contributes to a growing body of literature which suggests that the stock market's reaction to news is not always completed over short time periods, a crucial assumption of the event study methodology. By observing the stock market's reaction to announcements of foreign acquisitions, we have presented new evidence consistent with the underreaction phenomenon (Ikenberry et al., 1995). Regardless of whether the news takes the

form of spinoffs (Cusatis et al., 1993), initial public offerings (Ritter, 1991), repurchase tender offers (Lakonishok and Vermaelen, 1990), proxy contests (Ikenberry and Lakonishok, 1993), or foreign acquisitions (as in this case), the stock market can take up to several years to incorporate the full impact of the event on firm value. Although some tentative explanations for this anomalous behaviour have been put forward (e.g. Shleifer and Vishny (1990) suggest that the flurry of arbitrage activity surrounding short-term assets leads to inefficiencies in the pricing of assets with longer-term horizons), the issue remains largely unresolved. The apparently sluggish response of the stock market to corporate announcements thus provides an intriguing subject for further research.

In the light of these results, can we continue to rely on the stock market for an assessment of acquisition performance? The answer to this question, given the mixed findings on market performance, would have to be a qualified yes. While the stock market's delayed response to such events gives rise to concerns about efficiency, it nonetheless conveys useful information, through its correlation with post-acquisition profit changes, about the acquisition performance of the acquiring firm. Therefore, even in cases where the stock market may not be completely efficient, the movement of share prices remains a valuable source of information.

7. Bibliography

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