

**MASTER**  
ECONOMICS OF BUSINESS AND STRATEGY

# **Dominant Financial Characteristics of Hostile Takeover Targets**

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Dominant Financial Characteristics of Hostile Takeover Targets

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## **Abstract**

This study intends to analyse which financial characteristics make companies more attractive targets for hostile takeovers. Although there is already some research in this direction, the number of variables studied is relatively limited and the conclusions are not unanimous, thus this study aims to fill this gap. To this end, we have formulated four hypotheses related to financial performance of the targets. First, it was tested whether companies with worse financial performance are more attractive targets for hostile takeovers. Later, other factors were tested, namely, if companies that distribute less dividends, smaller companies or companies with low debt levels are more prone to hostile takeovers. Therefore, the present study aims to complement the existing approaches and contribute to the scarcity of recent studies on the factors that determine the likelihood of a deal being hostile comparing with friendly takeover. The data used in this study were collect from the Refinitiv Data Stream and it concerns deals that took place in the United Kingdom between 2000 and 2022. These data were used to estimate a probit econometric model composed of financial variables relating to the target companies. Although the estimated coefficients presented the expected sign, the variables were not statistically significant, therefore, our results do not support the formulated hypothesis.

**Key-words:** Mergers and acquisitions, Takeover likelihood, Target, Hostile

**JEL-Codes:** G10, G34, L25

## Sumário

Este estudo pretende analisar quais as características financeiras que tornam as empresas *target* mais atraentes para aquisições hostis. Apesar de já existir alguma investigação neste sentido, o número de variáveis estudadas é relativamente limitado e as conclusões não são unânimes, pelo que este estudo pretende colmatar esta lacuna. Nesse sentido, foram formuladas quatro hipóteses relacionadas com a performance financeira das empresas *targets*. Primeiro, foi testado se empresas com pior desempenho financeiro são alvos mais atraentes para aquisições hostis. Posteriormente, foram testados outros fatores, nomeadamente, se empresas que distribuem menos dividendos, empresas de menor dimensão ou empresas com níveis de endividamento baixos são mais propensas a aquisições hostis. Portanto, o presente estudo visa complementar as abordagens existentes e contribuir para a escassez de estudos recentes sobre os fatores que determinam a probabilidade de uma operação ser hostil comparativamente a aquisições amigáveis. Os dados utilizados neste estudo foram recolhidos do Refinitiv Data Stream e referem-se a *takovers* ocorridos no Reino Unido entre 2000 e 2022. Esses dados foram usados para estimar um modelo econométrico probit composto por variáveis financeiras relativas às empresas *target*. Embora os coeficientes estimados apresentem o sinal esperado, as variáveis não são estatisticamente significativas, pelo que os nossos resultados não suportam as hipóteses formuladas.

**Palavras-chaves:** Fusões e aquisições, Probabilidade de aquisição, Alvo, Hostil

**Código JEL:** G10, G34, L25

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# 1. Introduction

Waves of M&A have received considerable attention since 1851. In particular hostile takeovers, although they represent a small fraction of M&A activity, they involve large listed companies with substantial market value in many sectors, and for that reason they are seen as real threats by company boards.

In the late 1980s, there was a sharp decrease in the number of hostile takeovers, however, by analysing the historical evolution of M&A waves, it can be seen that hostile activity tends to increase after falls in financial markets. Two of the most recent examples are the 2008 financial crisis and the covid-19 pandemic, events that significantly impacted stock markets (Atkins et al., 2020).

At a time of resurgent hostile activity, which companies should be on the alert? Which firms are more likely to become the target of a hostile takeover? Considering that hostile takeovers have arisen, this study aims to answer this question by examining the financial performance and board characteristics of firms that have been the target of a hostile takeover.

Although several authors have already studied which characteristics affect the probability of an acquisition being hostile, the number of variables is relatively limited. Therefore, after a thorough analysis of the variables already studied, this research aims not only to reinforce the existing findings but also to extend the study to other financial indicators.

Considering the previous research in this topic, the first conclusion is that the hostile targets tend to be poorly performing firms. Morck et al., (1987) note that generally, disciplinary takeovers are often hostile while synergistic acquisitions are usually friendly. Disciplinary takeovers occur when the target company has poor performance due to poor management decisions. When this happens, the company's shareholders tend to perceive the value of the firm to be low, being willing to sell their shares at lower values. The acquirer firm, knowing that the value of the firm is higher, takes the opportunity to improve the efficiency of the target firm by taking control of it. In general, disciplinary takeovers promote competitive efficiency among firms because they pose a threat to management boards, which

will have fewer incentives to make management decisions in their favour, to the detriment of shareholders' interests (Scharfstein, 1988).

Several authors (e.g., Gillan and Starks, 2007; Bebchuk et al., 2015; Denes et al., 2016, etc.) share the view that activist-involved deals increase the firm value as a result of improved corporate repurchase decisions. However, activist investors have also been criticised, namely for focusing on short-term gains rather than investing in long-term value-adding projects, compromising the future of the company (Autore et al., 2019).

Given the objectives of this type of investor, what kind of companies are they looking for? There is broad consensus that target firms involved in hostile deals are poorly performing firms that are undervalued, older, are growing at low rates, have lower levels of debt, have lower Q and lower market value (Morck et al., 1987). Besides, they have a number of common characteristics related to management boards, such as weak management, smaller board ownership, the absence of family members in the board and have a non-aggressive management approach (Trough, 1977).

Taking into account the objectives of this research, this study intends to answer the following questions:

- Does the likelihood of hostile takeover increase with worse financial performance?
- Does dividend size reduce the likelihood that a company will become a hostile takeover target?
- Does a company's size reduce the likelihood that a company will become a hostile takeover target?
- Does the probability of a hostile takeover increase with lower debt levels?

For this investigation, information was gathered from Refinitiv Data Stream. The final sample used is composed of 692 deals whereby 657 correspond to friendly deals and 35 correspond to hostile deals, with acquisitions completed between 2000 and 2022, where the target company is located in the United Kingdom. We chose to analyse deals in the UK as hostile takeovers occur more frequently as a percentage of total takeovers in the UK than in the US as observed in the data base. This can be attributed to the fact that the takeover laws and regulations in the two regions differ, making it such that unsolicited bidder firms in the US have access to a wider range of defence strategies.

Although the estimated coefficients show the expected sign, the variables are not statistically significant, so our results do not support the hypotheses formulated.

Following this introduction, a literature review will be completed in Chapter 2 and in Chapter 3, the hypotheses will be presented. Then, methodological aspects will be discussed in Chapter 4. In Chapter 5, we describe how the data was collected, the main characterization of the sample, how the research was conducted and, lastly, we present the descriptive statistics. The results are discussed in Chapter 6 and the robustness tests in Chapter 7. Finally, the conclusions and limitations of the study are explained in Chapter 8.

## **2. Literature Review**

This section will address the main concepts developed, the theoretical background and existing literature around the topic.

The main topics addressed are: what are hostile takeovers; what motivates a buyer to acquire a company in this way; what are the reasons for the failure of this type of acquisitions; the main strategies followed by the acquirers and the main defence strategies of the target companies.

### **2.1. Hostile takeovers**

Firstly, it is essential to distinguish between friendly and hostile or unfriendly tender offers. An acquisition is considered friendly when the acquiring company intends to take control over the target company and the management of the target company is receptive to the idea and therefore advise the shareholders to accept the proposal. On the contrary, an acquisition is hostile when it is not welcomed by the management of the target company. In this case, the acquiring company tries to get around the target management company by directly soliciting shareholders to buy shares in a public stock exchange (DePamphilis, 2012).

Initiating a hostile takeover is not a risk-free business and most of the time it is not successful. Often the target company is put into play, this happens when a company initiates a hostile tender offer and other companies appear with the same intention. According to Eckbo (2009) when a rival company appears, it wins the auction twice as often as the initial bidder and according to Betton et al. (2009) only two-thirds of the initial ten thousand control proposals for US public targets 1980-2002 were successful.

Moreover, when there are multiple bidders competing, the winner tends to pay more than the company is worth, this is one of the possible justifications for the fact that historically the premiums in hostile offers exceed, on a large scale, the premiums in friendly offers. According to Varaiya (1988), bid premiums are positively correlated with both the number of bidders and the phenomenon known as winner's curse: given the difficulty in determining the target company's true value, the greater the number of bidders, the more willing they are to raise their offers in order to avoid losing the target to another bidder. Thus, the winner is cursed because he ended up paying more than the target is actually worth.

Most deals tend to be friendly (DePamphilis, 2012). The insufficient pre-deal due diligence, the difficulty in estimating the real value of the target, the lack of knowledge about the firm and the risky post-merger integration process leads acquirers to prefer friendly deals.

To protect the company against hostile tender offers, target management can carry out a set of strategies that we will cover in Section 2.5.

## **2.2. Motivations of Hostile Acquirers**

What are the motivations of the bidder firm that foster a hostile takeover? In fact, the motivations that lead a company to acquire another company in a hostile bidding process may be the same as the motivations present in a friendly deal: increase revenues, eliminate competition, have access to and benefit from the intellectual property of the target company, follow a diversification strategy, increase market power, create synergies, etc. Sometimes the bidder's objective is not to continue the business but to close, sell, or redeem the target's physical capital (Morck et al., 1987). However, there is usually something else to take into consideration.

According to Jensen (1993), hostile takeovers are part of Schumpeter's "creative destruction" process, where firms capable of innovating and creating competitive advantage destroy something, often the competitive position of a rival firm. On the other hand, this same author explains that hostile takeovers also serve as a "court of last resort", which means they are a source of discipline when the internal management of companies is inefficient and fragile.

Sometimes, managers develop some resistance to abandon strategies, projects and investments that did not go as planned and, therefore, are not contributing to the maximisation of the company's efficiency and profit. On the contrary, a change of management decreases this problem because it is usually associated with a new vision of the business and since there are no ties with current employees, it is easier to pursue a change in the company's strategy, closure or change of infrastructures, reallocation of resources, restructuring of assets, etc. (Jensen, 1998).

There is a broad consensus in the literature that inefficient management is one of the major causes of hostile takeovers and what lies behind this problem are the conflicts of interest between managers and shareholders. While the main objective of shareholders is to

maximise the present value of future profits, managers often seek to expand the company beyond the size that maximises shareholder wealth because their remuneration is positively related to the growth of the company, and this motivates them to increase the resources under their control. These conflicts of interest have greater weight the greater the free cash flow that the company is able to generate because pay-outs to shareholders decrease the resources under the control of managers and thus reduce their power (Jensen, 1986).

Grossman and Hart (1980) argue that the dilution of shares contributes to efficient management, because according to these authors, the greater the dilution of shares, the greater the threat of a hostile takeover. However, dilution also lowers the tender price that shareholders receive if a hostile takeover actually occurs.

According to Shleifer and Vishny (1986), the large shareholders of companies can have a great influence on takeovers since they have incentives to share the gains of their own shares with the bidder.

The disciplinary theory implies that hostile takeovers are a way of executing the necessary changes that the previous board failed to execute, and the result of this change will be the increase of the value of the company and maximization of shareholder wealth. However, some authors argue that the fear of a takeover makes managers look for strategies and actions that boost short-term profits at the expense of long-term value. This phenomenon is called managerial myopia and sometimes it happens because managers hold little stock in their company and their compensation is too dependent on the short-term value of the company (Jensen, 1998).

The market for corporate control is perceived as a competition between management teams to take over shareholders' assets. The team that promises higher returns for shareholders, thus defending shareholders' interests, will be the one that gains the right to manage the asset until it is replaced by another team capable of delivering greater value to shareholders (Jensen, 1998). This constant threat of replacement of the management team serves as a tool to monitor and control the strategy carried out by the management team.

### **2.3. Failure of Hostile Takeovers**

Generally, the bidder starts its takeover attempt in a friendly way, directly contacting the management board until an agreement is reached and the acquisition is made public,

however, when the answer is negative, the acquisition becomes hostile. Several authors (Schwert (2000); Branch, Wang, Yang (2007); Walkling (1985)) argue that the probability of failure is much higher in the case of hostile takeovers due to the resistance carried out by the target. So, what are the factors that positively and negatively influence the success of completing an acquisition?

According to Branch, Wang and Yang (2007), "Arbitrage spread, target resistance, deal structure and transaction size are the dominating factors that have impacts on the outcome of a takeover attempt". First of all, the resistance demonstrated by the target company through the use of several strategies, such as those mentioned in Section 2.5, drastically influence the bidder's ability to complete the acquisition, as already explained, thus hostile acquisitions usually present a higher failure rate than friendly acquisitions that are conducted with the support of the management board. In addition to resistance, the target management also influences the success of the acquisition through board ownership (Walkling, 1985). The higher the percentage of shares held by the management board, the larger the proportion of other shares needed to be tendered and the greater the resistance of the target, therefore the greater the probability of failure (Knoeber, 1986).

The risk arbitrage spread also negatively affects the success of the takeover. The risk arbitrage spread corresponds to the difference between the target post announcement market price and the offer price. Therefore, the higher this value, the higher the probability of failure (Knoeber, 1986).

According to Branch and Yang (2003), the form of payment influences the success of the acquisition because stock offers must be approved by the target and acquirer's stockholders while cash offers only need to be approved by the former. Consequently, stock offers are more likely to fail.

The failure rate also depends on the percentage of equity that the bidder intends to acquire, i.e., the probability of failure is lower as that percentage is lower. Here it is important to add the bargaining power of the bidder. That is, the higher the bidder's stake, the lower the percentage of equity the bidding company needs to acquire, and the shareholders have more incentives to tender their shares (Walkling, 1985).

## 2.4. Bidding Strategies

Initiating a hostile takeover involves risk and for it to be successful, the acquirer needs to implement strategies that allow it to gain a competitive advantage over other bidders or that reduce the target's resistance. Some of these strategies include offering an initial premium and then revising the initial offer, acquiring a shareholding in the target company before demonstrating an intention to launch a hostile takeover, selecting the most appropriate payment method, etc. (Eckbo, 2009). There are several strategies used by companies to succeed in hostile acquisition, however, the legislation of some countries restricts and/or prohibits their use.

One of the most important aspects to be taken into account by the acquirer is the initial bid. When the target is put into play, several other competitors may appear to launch their bids to win the auction, however, the first bidder can benefit from the first mover-advantage. So why is the initial bid so important? According to Eckbo (2009), “bidder entry costs are sunk, toehold acquisitions are expensive (they take place at market prices reflecting the expected takeover premium), and it may be difficult to lower any cash portion that defines the payment method selected by the first bidder”. Between the acquirer and the target there is an asymmetry of information and, contrary to what happens in friendly acquisitions, it is not possible to carry out an exhaustive due diligence, so the acquirer will have difficulties in knowing the ideal value for the initial bid and which is the target reserve price, so bidders should pursue an investigation to evaluate the target (Fishman, 1988). This assessment, in addition to mitigating the asymmetry of information, can be a competitive advantage for potential bidders if it is completed before the initial bid, allowing them to respond more efficiently and quickly.

When the bidder pretends to acquire the target, he/she can go directly to target's shareholders, without the approval of the target's board directors and propose a per-share price, and the shareholder can decide whether or not to sell their shares (Offenberg & Pirinsky, 2015). This is what happens in a tender offer which can be classified in one-tier offer or two-tiered offer. In the first case, the acquirer proposes the same share price offer to all shareholders which can accelerate the bidding advantage by gaining control over the target quickly and, thus, discouraging potential bidders. In the second case, the acquirer offers to buy a certain number of shares at one price and later, additional shares but at a lower price.



This strategy can pressure the shareholders to accept the tender in the first phase, since they will lose value if they decide to sell in the future.

Another form to increase the bidder competitive advantage is by establishing a toehold which happens when the bidder purchases target shares in the market before the initial bid (Betton et al., 2009). By doing that, the number of shares that the toehold bidder needs to buy if he/she wins the target is lower. Moreover, if a rival bidder wins the target, the toehold shares can be sold at a greater premium (Eckbo, 2009). Another positive point is that the toehold increases the target bidder's valuation and it can reduce the free-rider problem (that problem occurs when no shareholder has incentives to sell their shares and prefer to keep them). The toehold makes the bidder a more aggressive competitor, allowing a competitive advantage over other bidder rival, increasing the probability of winning the target as demonstrated by empirical evidence and supported by several authors such as Walkling (1985), Jennings and Mazzeo (1993), and Betton and Eckbo (2000). However, the constitution of toehold by bidders has been decreasing a lot throughout the history of M&A, especially after the 1980s. This decline of toeholds coincides with the drop in the frequency of hostile takeovers, which can be explained by the emergence of new defence strategies that will be explained in Section 2.5. and the development of antitakeover legislation. There are several arguments that justify the decline of toeholds, namely the cost associated with revealing the bidder's intentions too early, at the beginning of the takeover process. On the other hand, if the target resists, the share price will fall, and this drop will be greater the greater the number of shares held by the toehold. In conclusion, there is a trade-off here between the benefits of the toehold, namely the greater probability of winning, and the disadvantages, that is, the costs associated with resistance on the part of the target and the fall in the share price that makes some bidders prefer to constitute a small toehold or none at all. The truth is that toeholds are much more common in hostile than in friendly takeovers and evidence shows that half of initial bidders in hostile contests have a toehold (Eckbo, 2009).

Another common strategy is known as "bear hug" in which the bidder shows interest in acquiring the target at a share price higher than what the company is actually worth. By pursuing a bear hug, the potential acquirer invites the target to negotiate and, at the same time, makes pressure on the target management board reminding that if the target didn't accept the negotiation, the next step will be a tender offer. Since the bidder offers to buy the

target shares at premium, it limits the competition and disincentives the target to reject because the management has the responsibility to generate the highest returns to shareholders and a rejection of a significant premium can lead shareholders to file a lawsuit against the management on the grounds that the board is not looking out for the shareholders' interests. In agreement with Eckbo (2009), a public tender offer takes place when the potential acquirer launches an open offer to all shareholders to sell their shares to the highest bidder during the tender period. The tender period is on average three to four weeks, however, this period is extended if another bid is made within 14 trading days of the expiration of a previous bid (Bradley et al., 1988).

As a result of the increase in companies adopting anti-takeover barriers, the proxy contest has become a recurrent resource used to exercise control over companies. Generally, the costs of preparing and executing a proxy fight are quite high and borne by dissenting shareholders who will only be reimbursed if they win the fight. Evidence shows that contest targets show significantly negative abnormal returns and a degradation of operating performance (Ikenberry & Lakonishok, 1993).

There is a range of strategies, in addition to those mentioned, that bidders can follow in order to achieve control over the target. For example, announcing the bid at a moment of vulnerability for the target with the publication of an offer document with the aim of reducing the target's response time or even communicating directly with employees, collaborators, unions in order to obtain their support.

## **2.5. Target Defences**

The slowdown in hostile takeover activity during the period 1989 to 1998 was largely explained by the development of anti-takeover legislation and the increased use of takeover defences which increase target resistance and made it difficult for bidders to take control, discouraging managerial discipline. Consequently, it is often argued in the literature that target defences go against the interests of shareholders and may lead to management entrenchment. Holl and Kyriazis (1997) showed that firms that resist hostile takeovers through the use of various defence strategies increase shareholder wealth gains by 9%–14% compared to friendly takeovers, however, it also decreases the likelihood of completing the acquisition.

Defence strategies can be classified into two groups: pre-bid defences, which try to make companies less appealing to possible buyers, and post-bid defences, which are only employed in response to an unpleasant approach from a potential acquirer. The effectiveness of target defences has been widely discussed and some authors, such as Comment and Schwert (1995) concluded that the adoption of pre-bid defences in the US decreases the probability of a successful takeover, on the contrary, they argue that the adoption of post-bid defences in the UK is less effective.

Starting with the pre-bid defences, the poison pill or warrant dividend plan, first introduced in 1982, consists of the right granted to shareholders to subscribe for target shares at a large discount. The popularization of the adoption of this strategy is presented as a major factor for the drastic decrease in the number of hostile takeovers in the 1980s (Eckbo, 2009). By diluting the value of the target company's shares, the bidder will find it difficult to acquire a part of the company without the authorization of the board directors, wasting time and money and making the target less attractive. This strategy is divided into two categories: flip-in pill and flip-over pill. While the first consists of issuing preferred shares that only the target shareholders can acquire, at prices below market value, the second consists of issuing rights to shareholders.

Golden Parachutes are implemented in order to increase executives' resistance, preventing them from losing their jobs. According to Berkovitch and Khanna (1985), golden parachutes are used to eliminate agency problems between shareholders and their managements. That strategy consists of a package of benefits granted to executives in case the company is effectively acquired against their will. These benefits, which can be high-value payments, discourage executives from conducting efforts to block the takeover attempt. Therefore, the interests of shareholders will be more aligned with the wealth of executives, since this strategy avoids, to a certain extent, the possibility of opportunism on the part of executives in keeping their jobs even when profitability and wealth are not from shareholders.

The use of golden parachutes is more common in companies and sectors where the frequency of hostile takeovers is higher. Generally, larger companies, where public offerings are unlikely, and in companies where the manager holds a considerable fraction of the shares, have a small cost of golden parachutes (Knoeber, 1986).

In the case of a hostile takeover attempt, the bidder generally needs to obtain more than 50 percent of the votes, however, super-majority amendments are a defensive measure whose objective is to increase the number of shares needed to pass a decision. This measure is implemented by the target company's shareholders and activated by the board of directors.

All these measures alone do not prevent the completion of a hostile takeover but reduce its probability, especially if applied together, by increasing the resistance of the target company making it less attractive by increasing the costs and time needed to execute the takeover. In addition to these, there are also post-bid defensive measures and in this group the following stand out: greenmail, standstill agreement, white knight, crown jewels and pac-man defences.

Greenmail is a tactic that entails paying the potential acquirer to let the target go, in other words, the target offers to repurchase the bidder's shares at a premium. Berkovitch and Khanna (1985) demonstrated that by purchasing out low synergy generating acquirers so that the target can be bought by bids who can generate higher synergies, increases the welfare of the target shareholders and the efficiency of acquisition markets.

Standstill agreement corresponds to a provision that restricts the ownership of a company for a predetermined amount of time, this way eliminating the possibility of the potential acquirer taking control of the target. According to Ruback (1987), this provision decreases the wealth of the target shareholders since it is associated with a considerable decrease in the target company's share price, around 4%.

When a company is under the threat of a hostile takeover, it has the possibility of looking for another potential acquirer, so the company will be sold in a friendly way, avoiding a hostile takeover. This situation is preferable for managers and shareholders even though the firm is still sold because, for example, the white knight commits to restructure the target company once the acquisition is finished in a way that the target company's management supports. This strategy is called white knight and as explained by Smiley and Stewart (1985), a successful white knight is usually associated with a significant positive excess return while an unsuccessful white knight is associated with a significant negative abnormal return.

To make the target less valuable, the company can carry out an asset restructuring that can consist of the sale of crown jewels, that is, the sale of assets that may interest the bidder or, on the other hand, invest in assets that the bidder does not want. These

investments or disinvestments will make the bidder unwilling to pay such a high price for the target, discouraging its purchase (Ruback, 1987).

Finally, to pressure the bidder, the target can become a predator and counterbid. This strategy is called a pac-man defence and basically the target reacts the same way as the bidder, which can be a risky strategy as both can end up in a financial pressure situation.

Analysing the different defence strategies and the degree of success of each one, it is concluded that the resistance process is more important than the choice of a specific tactic (Schoenberg & Thornton, 2006).

## **2.6. Empirical Evidence**

As mentioned in Section 2.2, hostile takeovers often serve as a disciplinary mechanism in relation to managers who do not seek to maximise shareholder returns. In this sense, bidder companies seek targets that are in a weak financial situation or that are not using their resources in the most efficient way, to increase the value of the company and consequently, shareholder wealth. They believe that by taking ownership of that target they will be able to manage the company's resources more efficiently so that the value of the company increases, and the initial investment pays off.

Some authors have focused on what reasons underlie a hostile takeover, what characteristics differentiate a company that is seen as a good target for a hostile takeover from a company acquired in a friendly manner. In the following, some of these authors and the arguments they put forward will be presented.

According to Morck , Shleifer and Vishny (1987), usually disciplinary takeovers are hostile while synergetic takeovers are friendly, so hostile targets tend to perform poorly. The targets' performance is analysed through a set of financial aspects, such as the company value, the indebtedness, the shareholders' returns, the intangible assets, etc.

The larger the size of the target and the higher its market value, the more difficult it will be for the acquirer to acquire the target. In the case of a hostile takeover, market value will have an even greater impact since the acquirer will face greater resistance from the financial markets to provide the credit required for the transaction (Morck et al., 1987).

The free cash flow theory defends that takeovers happen because companies are not being managed in the most efficient way, so a takeover is nothing more than the transfer of assets to another management team that is deemed capable of managing them in a more profitable manner. Jensen (1998) explained that firms' abnormal returns are positively impacted by the level of the debt and that debt reduces the agency cost of excess cash flow. In the same line of thought, Goldstein (2000) demonstrated that hostile targets are characterized by low levels of debt because those firms are more likely to be squandering their resources, hence will be more attractive to management teams seeking to restructure and discipline these businesses.

The Tobin's Q is another indicator of companies' financial performance. Some authors such as Morck, Shleifer and Vishny (1987) and Sinha (2004) agree that targets of hostile takeovers have lower Tobin's Q and those targets are also in industries with lower Tobin's Q. A lower Tobin's Q can mean a low value of intangible assets. The mentioned authors argue that these companies may not have progressed technologically and have been overtaken by the competition. Therefore, acquirers look for companies in this state to reallocate their assets in a more efficient way.

The price-earnings ratio is an indicator widely used by investors to value companies. It expresses the price paid for the result of each share and is based on the assumption that companies should be valued for the results generated and not for their patrimony. Authors such as Knoeber (1986) and Robert Harris et al. (1982) agree that this ratio negatively influences the probability of an acquisition being hostile. Steven Schwartz (1982) argues that a high price-earnings ratio is not a guarantee that the company will not be taken over, but it reduces that chance. Therefore, it can be inferred that companies which are undervalued in the market are more likely to be targets of hostile deals.

According to Sinha (2004) the annual abnormal return is a financial indicator extensively deployed to rate managerial quality and the author has proven that there is an inverse relationship between the probability of hostile deal and the value of annual abnormal returns. That is, the worse the quality of management, the lower the annual abnormal returns and, consequently, the higher the probability of the company being an attractive target for a hostile takeover.

As Morck et al. (1987) discussed, acquisitions usually have a disciplinary purpose because the acquirer believes it can increase shareholder value by changing the way management is run. Following this logic, companies that distribute less value to shareholders will be targets for acquisitions with this purpose, not least because the acquirer can more easily get the support of shareholders to complete the acquisition by arguing a future increase in his earnings.

The following table summarizes this literature review and the major factors that can influence the occurrence of hostile takeovers:

<b>Purpose</b>	<b>Variable</b>	<b>Description</b>	<b>Expected effect</b>	<b>Authors</b>
Size	Market Value of equity	The market value of equity is determined by multiplying the market value per share by the total number of diluted shares outstanding.	The market value and the probability of a hostile takeover have a negative relation. The higher the market value, the lower the probability of a hostile deal.	(Morck et al., 1987)
Indebtedness	Debt to equity ratio	Indebtedness can be assessed using the debt-equity ratio, obtained by dividing a company's total liabilities by its total shareholders' equity. The debt to equity ratio serves as an indicator of the company's risk level.	The indebtedness and the probability of a hostile takeover have a negative relation. The higher the level of debt, the lower the probability of a hostile deal.	(Jensen, 1998), (Goldstein, 2000), (Trough R., 1977)
Results generated	Price-earnings ratio	The price-earnings ratio is derived by dividing the market value per share by the earnings per share. A low P/E ratio could mean that the firm is not generating enough results.	The price-earnings ratio and the probability of a hostile takeover have a negative relation. The higher the price-earnings ratio, the lower the probability of a hostile deal.	(Knoeber, 1986), (Robert Harris et al., 1982), (Steven Schwartz, 1982)
Shareholders Returns	Dividend Pay-out Ratio	This ratio reflects the percentage of net income that is distributed to shareholders in the form of dividends.	The pay-out ratio and the probability of a hostile takeover have a negative relation. The higher that ratio, the lower the probability of a hostile deal.	(Morck et al., 1987)



Intangible Value	Tobin's Q	Tobin's Q can serve as an indicator of a firm's intangible assets. It is computed by dividing the market value of the firm by its book value.	The Tobin's Q and the probability of a hostile takeover have a negative relation. The higher the Tobin's Q, the lower the probability of a hostile deal.	(Morck et al., 1987), (Sinha, 2004), (Lang René M Stulz et al., 1993)
Expected returns	Abnormal returns	Abnormal returns are the variation between the actual return on a stock and the return based on market expectations over a certain period.	The annual abnormal returns and the probability of a hostile takeover have a negative relation. The higher the annual abnormal returns, the lower the probability of a hostile deal.	(Sinha, 2004)

Table 1. Summary of keys studies

### 3. Hypotheses Formulation

The present study aims to analyse which financial characteristics make a company a more attractive target for a hostile takeover, that is, what hostile acquirers look for when selecting potential targets. Although there is already some research in this direction, the number of variables studied is relatively limited and the conclusions are not unanimous, therefore, this study aims to fill this gap.

Next, the formulated hypotheses will be presented, as well as the rationale on which they are based.

The main question this study aims to answer is whether firms with poor financial performance observe an increase in the likelihood of being the target of a hostile takeover or not. That is, companies with worse financial performance may become attractive targets for hostile acquisitions, either because shareholders will be more easily persuaded or because the acquirer will not face as much resistance from the management board. Since the company is not reporting favourable results, it will be easier for the acquirer to communicate directly with the shareholders and convince them that a change in management will be beneficial for the company. To measure financial performance, an accounting performance was used, namely EBIT/Assets, as we will present later. Our first hypothesis is thus formulated as follows:

**H1:** Hostile takeover probability is increased with lower financial performance.

The second hypothesis is related to dividend distribution, i.e., the fact that a company is able to generate earnings and then not distribute them in the form of dividends to its shareholders may attract the attention of activist investors. The fact that the company distributes few dividends or does not distribute them at all, can draw the attention of shareholder activists since this could mean that the board management is not looking out for the interests of the shareholders, that is, it is not increasing their wealth. Furthermore, with the promise of increased dividend, it is easier to convince shareholders of the benefit of a potential change in management. To measure the size of dividends, we use the Dividend/Assets ratio, which we will explain later. Our second hypothesis will thus be:

**H2:** The size of dividend reduces the likelihood of a firm becoming a hostile takeover target.

In addition to financial performance, we intended to analyse whether the size of a company impacts the decision of activist investors to initiate a hostile takeover, that is, a large company may become a less attractive target for a hostile takeover due to the complexity in acquire sufficient control to proceed with the intended changes to the business by the buyer. In other words, a large company will hardly be acquired in a hostile manner, firstly because it is necessary to have greater financial capacity and because the shares will be distributed by a greater number of shareholders from the outset. Contrary to what happens with a friendly acquisition, the buyer will not be able to negotiate payment terms with the target and will certainly find more limitations on access to credit by financial institutions. On the other hand, the fact that the shares are distributed among a greater number of shareholders would imply an increased negotiation effort, since, in hostile takeovers, the buyer normally must contact the shareholders directly. Our third hypothesis is therefore stated as:

**H3:** The size of a company reduces the likelihood of a firm becoming a hostile takeover target.

Finally, the last hypothesis aims to study whether the level of indebtedness negatively affects the probability of a hostile occasion occurring. Companies with low levels of indebtedness can be seen by activist investors as complacent companies that do not seek resources to invest and promote the company's growth and, consequently, the increase of shareholders' earnings. We accordingly formulated our fourth hypothesis in the following way:

**H4:** Hostile takeover probability is increased with lower level of indebtedness.

Next, the methodological aspects of the econometric model used to test the formulated hypotheses are presented.

## 4. Methodological Aspects

For this analysis, the econometric model chosen was to estimate a probit regression to model the probability of certain variables affecting the occurrence of a hostile takeover, following the approach of other authors who have studied the same topic, as seen in the work of Walkling (1985).

To test the null hypotheses presented in Chapter 3, the following unstructured and undated model was estimated:

$$Y = \text{EBIT\_ASSETS} + \text{DIVIDEND\_ASSET} + \text{FIRM SIZE} + \text{INDEBTEDNESS} + \text{IND}_{i-1} + C$$

### Dependent Variable

- **Y** - The dependent variable is a binary variable which assumes the value  $y=1$  when the deal is hostile or  $y=0$  when the deal is not hostile.

### Independent Variables

- **EBIT\_ASSETS** – This variable is determined by dividing EBIT (earnings before interest income, interest expense, non-operating income, taxes, and minority interest) by the total assets from one year before the deal announcement. Total assets encompass current assets, long-term investments and funds, net fixed assets, intangible assets, and deferred charges from the most recent fiscal year prior to the transaction announcement. The formula for total assets is the sum of total liabilities, shareholders' equity, and minority interest. A higher value for this variable, EBIT\_ASSET ratio, is anticipated to have a negative effect on the likelihood of a takeover. In other words, as the EBIT\_ASSET ratio increases, the probability of a takeover decreases.
- **DIVIDEND\_ASSET** – This variable corresponds to the ratio between dividends and assets. The dividends correspond to the total dividends actually paid on the target company's common stock in the most recent fiscal year prior to the announcement of the transaction. This variable is expected to have a negative impact on takeover likelihood, that is, the higher the ratio DIVIDEND\_ASSET, the lower the takeover likelihood.

- **FIRM SIZE** – To gauge firm size, the variable LOG\_ASSETS was employed, representing the logarithm of the Assets variable. Additionally, to validate the findings, the variable LOG\_EV was also tested, which denotes the logarithm of the enterprise value of a transaction. The enterprise value was computed by multiplying the number of target actual shares outstanding by the offer price and then adding the cost of acquiring convertible securities, short-term debt, straight debt, and preferred equity, while subtracting cash and marketable securities. This figure represents the enterprise value for 100% of the company based on the offering price, irrespective of the actual acquisition percentage. Both LOG\_ASSETS and LOG\_EV are utilized as indicators of firm size, and they are expected to have a negative influence on the likelihood of a takeover. In other words, as the firm size increases, the probability of a takeover decreases. These variables were cross-examined for their correlation to ensure the robustness of the estimates.
- **IND\_i-1** – This variable is a sectorial dummy and was included in the model with the objective of excluding the possibility of the industry in which the target operates influencing the probability of a hostile takeover, that is, to understand if there are certain industries where hostile takeovers are more common as there may be regulatory differences between the industries under consideration that influence the frequency of occurrence of hostile takeovers. Therefore, 10 dummy variables were added and they take the value 1 if the target of the respective deal operates in the industry in question.
- **INDEBTEDNESS** – To measure the level of indebtedness of the companies, we used the variable DEBT\_ASSETS which results from the division between total debt and total assets. The total debt corresponds to total of all short-term debt, straight debt (long term non-convertible debt), and convertible debt of the target as of the date of the most current financial information available prior to the announcement of the transaction. To check the results obtained, it was also tested the variable DEBT\_TO\_EQUITY which is the ratio of total debt to shareholder's equity results of total debt divided by shareholder's equity as of the date of the most current financial information prior to the announcement of the transaction. However, both variables were used only as an alternative to check the results since they are highly correlated. These variables are expected to have a negative impact

on the takeover likelihood, that is, the higher they are, the lower the likelihood of hostile takeover.

	<b>Variable</b>	<b>Description</b>	<b>Expected sign</b>
Dependent variable	Hostile deal	If = 0 the deal was friendly, If = 1 the deal was hostile.	N/A
Independent variables	EBIT_ASSETS	The ratio between EBIT and total assets one year prior to deal announcement.	(-)
	DIVIDEND_ASSET	The ratio between the total dividends actually paid on the target company's common stock during the most recent fiscal year before the transaction announcement and the total assets.	(-)
	DEBT_ASSETS	The ratio between total debt and total assets. Included as a measure of indebtedness.	(-)
	DEBT_TO_EQUITY	The ratio between total debt and total shareholders' equity. Included as a measure of indebtedness, to verify the results of previous variable.	(-)
Control variables	LOG(ASSETS)	The asset value logarithm was included to control for firm size.	(-)
	LOG(EV)	Enterprise value logarithm is highly correlated with assets value logarithm, so this variable was included to verify the results of previous variable.	(-)
	IND_i-1	Sectorial Dummy.	N/A

Table 2. Summary of variables

## 5. Sample Selection and Descriptive Statistics

### 5.1. Sample Selection

The data was collected from the Refinitiv Data Stream database. The sample consists of 692 deals, which took place between 2000 and 2022, of which 35 correspond to hostile deals and 657 to friendly deals. The deal attitude is classified as friendly when the board recommends the offer, and it is considered hostile when the board officially rejects the offer, but the acquirer continues with the takeover attempt.

All target companies considered are from the UK. It should be highlighted that the financial data collected are all from the target company and refer to the company's financial performance before the deal was announced.

### 5.2. Characterization of the sample

The Table 3 shows the distribution of the sectors used in our sample. The target company proprietary macro-level industry are classifications based on SIC Codes, NAIC Codes and overall company business description.

<b>Macro Industry</b>	<b>Hostile Deals</b>	<b>Friendly Deals</b>	<b>Total</b>
1.Consumer Products and Services	6	78	84
2.Consumer Staples	1	37	38
3.Energy and Power	2	47	49
4.Financials	4	72	76
5.Healthcare	0	44	44
6.High Technology	1	92	93
7.Industrials	6	72	78
8.Materials	3	47	50
9.Media and Entertainment	9	71	80
10.Real Estate	2	33	35
11.Retail	1	46	47
12.Telecommunications	0	18	18
Total	35	657	692

Table 3. Distribution of targets by macro industries

As one can see in the table above, the most common macro industry among hostile deals is media and entertainment, whereas in the case of friendly deals, the most common is



high technology. There are two macro industries for which there are no hostile deals in the sample, namely healthcare and telecommunications.

### 5.3. Descriptive Statistics

As presented in Chapter 4, the dependent variable is a binary variable which assumes the value  $y=1$  when the deal is hostile or  $y=0$  when the deal is not hostile. As shown in Table 4, 94.94% of the times it assumes the value 0, that is, 94.94% of the sample corresponds to friendly deals and only 5.06% of the sample corresponds to hostile deals, which is normal since the difficulty, the cost, the risk and other factors associated with this type of deals causes them to occur to a much lesser extent.

The Table 5 reports the descriptive statistics of the variables used in the empirical analysis.

The mean values of the EBIT\_ASSETS and DIVIDENDS\_ASSETS ratios are 0.031178 and 0.012711, respectively. Analysing the differences between the mean values of hostile and friendly deals, it is possible to conclude that there is a difference of 0.01372 and 0.003286 for the EBIT\_ASSETS and DIVIDENDS\_ASSETS ratios, respectively, with both ratios presenting, on average, higher values in the sample of friendly deals. The mean value of  $\log(\text{assets})$  is 5.339143 for the whole sample, however, the mean value for the hostile deals sample is slightly higher. As for the level of indebtedness of the companies, although no significant differences are observed for the debt/assets ratio between the two samples, for the debt and debt to equity ratio variables the differences are notorious. Regarding the debt variable, the mean value for the total sample is 3118.880, with a mean value of 3259.084 for the sample of friendly deals and a mean value of 487.0561 for the sample of hostile deals, which is in line with the hypothesis placed in relation to the level of debt being reduced in companies that are the target of hostile takeovers, reflecting the risk aversion of the management team and, consequently, the poor optimisation of the company's resources, i.e. this result may reflect the lack of debt of the companies for investment purposes. This argument is reinforced by the estimated results for the debt-to-equity ratio variable that exhibit mean values of 1.602319 for the whole sample, 1.643014 for the friendly takeovers sample and a lower value of 0.838429 for the hostile takeovers sample.

In turn, the standard deviation represents a measure of the dispersion of data in relation to the mean. Therefore, it facilitates the appreciation of the degree of dispersion of the values obtained. Thus, the closer the standard deviation value is to zero, the higher the homogeneity of the data. The variables with the highest standard deviation are: FIRM SIZE and INDEBTEDNESS, and the variables with lowest standard deviation are: DIVIDEND\_ASSET and EBIT\_ASSETS, both for the total sample and the hostile takeover and friendly takeover samples observed separately, which means these variables, DIVIDEND\_ASSET and EBIT\_ASSETS, are generally more constant and do not deviate frequently from the mean.

<b>DEP. VALUE</b>	<b>CUMULATIVE</b>			
	<b>Count</b>	<b>Percent</b>	<b>Count</b>	<b>Percent</b>
<b>0</b>	657	94.94	657	94.94
<b>1</b>	35	5.06	692	100.00

Table 4. Dependent variable frequencies

<b>MEAN</b>			
<b>VARIABLE</b>	<b>Dep=0</b>	<b>Dep=1</b>	<b>All</b>
<b>EBIT_ASSET</b>	0.031872	0.018152	0.031178
<b>DIVIDEND_ASSET</b>	0.012877	0.009591	0.012711
<b>FIRM_SIZE</b>	5.311685	5.854569	5.339143
<b>INDEBTEDNESS</b>	0.238176	0.222416	0.237379
<b>IND_1</b>	0.118721	0.171429	0.121387
<b>IND_2</b>	0.056317	0.028571	0.054913
<b>IND_3</b>	0.071537	0.057143	0.070809
<b>IND_4</b>	0.109589	0.114286	0.109827
<b>IND_6</b>	0.140030	0.028571	0.134393
<b>IND_7</b>	0.109589	0.171429	0.112717
<b>IND_8</b>	0.071537	0.085714	0.072254
<b>IND_9</b>	0.108067	0.257143	0.115607
<b>IND_10</b>	0.050228	0.057143	0.050578
<b>C</b>	1.000000	1.000000	1.000000
	<b>Standard Deviation</b>		
<b>VARIABLE</b>	<b>Dep=0</b>	<b>Dep=1</b>	<b>All</b>
<b>EBIT_ASSET</b>	0.147790	0.091180	0.145444
<b>DIVIDEND_ASSET</b>	0.021588	0.010674	0.021180
<b>FIRM_SIZE</b>	2.089728	1.921286	2.083645
<b>INDEBTEDNESS</b>	0.184739	0.187843	0.184792
<b>IND_1</b>	0.323707	0.382385	0.326813
<b>IND_2</b>	0.230708	0.169031	0.227976
<b>IND_3</b>	0.257917	0.235504	0.256691
<b>IND_4</b>	0.312615	0.322803	0.312900
<b>IND_6</b>	0.347283	0.169031	0.341321
<b>IND_7</b>	0.312615	0.382385	0.316475
<b>IND_8</b>	0.257917	0.284029	0.259096
<b>IND_9</b>	0.310702	0.443440	0.319984
<b>IND_10</b>	0.218582	0.235504	0.219293
<b>C</b>	0.000000	0.000000	0.000000
<b>OBSERVATIONS</b>	657	35	692

Table 5. Categorical Descriptive Statistics for Explanatory Variables

## 6. Empirical Results

Regarding the first hypothesis under analysis, the estimated coefficient for the full model is not statistically significant, although the sign of the results suggests that the probability of a deal being hostile decreases as operating results increase, i.e. the higher the value of the variable EBIT\_ASSETS, which represents the ratio of earnings before interest and taxes to the target's assets, the lower the probability of the company being acquired in a hostile behaviour. Regarding the second hypothesis, the situation is identical, the variable DIVIDEND\_ASSET is not statistically significant, so we have to reject the null hypothesis which predicts that the higher the amount of dividends distributed, the lower the probability of being a hostile deal.

The variable LOG\_ASSETS was added to the model to test the impact of firm size in takeover likelihood, however the results don't support our hypothesis since the variable estimated has a positive coefficient which means that the higher the firm size the higher the takeover likelihood.

To test the impact of the level of debt, we added the variable DEBT\_ASSETS, however, once again the variable is not statistically significant so we cannot reject the null hypothesis. The variable presents a negative coefficient revealing that the higher the level of indebtedness the lower the probability of the company being acquired in a hostile way, which is in line with the results demonstrated by several researchers in this field, namely Jensen (1998); Goldstein (2000); Troubh (1977). However, since the coefficient is insignificant, it cannot be assumed that this hypothesis has been proven.

Although the coefficients of the estimated variables show the expected impact for the hypothesis 1, 2 and 4, they are not statistically significant, calling into question the potential conclusions regarding the hypotheses under analysis.

In order to test these results, we estimated a model with alternative variables (Table 9) for the hypothesis 3 and 4. So to check the results obtained from the variable LOG\_ASSETS we used the LOG\_EV as an alternative variable and to check the results obtained from the DEBT\_ASSETS variable, the DEBT\_TO\_EQUITY ratio was considered. These variables were not added to the main model since they are highly correlated. As expected the results were quantitatively similar which reinforce our initial findings.

It is important to focus on the value of McFadden's R-squared, which measures the degree to which the statistical model predicts the outcome and the closer to 1 the better, i.e. when this measure has a value of 0 it means that the model does not predict the outcome and when it has a value of 1 it means that the model predicts the outcome perfectly. Since for the estimated model this value is 0.085302, we can say that the model only moderately predicts the outcome.

Dependent Variable: Y

Method: ML – Binary Probit (Newton-Raphson / Marquardt steps)

Sample: 1 692

Included observations: 692

Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
<i>EBIT_ASSET</i>	-0.251579	0.631113	-0.398628	0.6902
<i>DIVIDEND_ASSET</i>	-8.154352	6.194972	-1.316286	0.1881
<i>FIRM_SIZE</i>	0.084664	0.046029	1.839379	0.0659
<i>INDEBTEDNESS</i>	-0.709949	0.529076	-1.341864	0.1796
<i>IND_1</i>	0.963341	0.436140	2.208788	0.0272
<i>IND_2</i>	0.478355	0.577059	0.828953	0.4071
<i>IND_3</i>	0.625331	0.510659	1.224556	0.2207
<i>IND_4</i>	0.636412	0.457926	1.389769	0.1646
<i>IND_6</i>	0.103606	0.537415	0.192786	0.8471
<i>IND_7</i>	0.956091	0.439090	2.177436	0.0294
<i>IND_8</i>	0.811567	0.481292	1.686226	0.0918
<i>IND_9</i>	1.201072	0.426121	2.818619	0.0048
<i>IND_10</i>	0.875378	0.525676	1.665241	0.0959
<i>C</i>	-2.593010	0.444719	-5.830677	0.0000
McFadden R-squared	0.085302	Mean dependent var	0.050578	
S.D. dependent var	0.219293	S.E. of regression	0.217883	
Akaike info criterion	0.406732	Sum Squared resid	32.18683	
Schwarz criterion	0.498574	Log likelihood	-126.7294	
Hannan-Quinn criter.	0.442253	Deviance	253.4589	
Restr. Deviance	277.0958	Restr. Log likelihood	-138.5479	
LR statistic	23.63694	Avg. log likelihood	-0.183135	
Prob (LR statistic)	0.034639			
Obs with Dep=0	657	Total Obs	692	
Obs with Dep=1	35			

Table 6. Probit model results – Full model

## 7. Robustness checks

To prevent the influence of differences in the regulatory environment on the likelihood of a hostile takeover bid, sector dummies were added. However, the results obtained do not allow us to draw solid conclusions since the coefficients all have a positive sign and only industries 1, 7 and 9 (Consumer Products and Services; Industrials and Media and Entertainment, respectively) are statistically significant. Furthermore, the small number of hostile takeovers in the total sample does not allow an in-depth analysis of the distribution of takeovers by industry.

To test the third hypothesis related to the firm size, we analysed the variable LOG\_ASSETS. In order to check the results obtained we also included the variable LOG\_EV. The results were qualitatively similar, which reinforces the results tested through the estimated variable LOG\_ASSETS (Table 9).

Likewise, to test the fourth hypothesis related to the level of indebtedness, we analysed the variable DEBT\_ASSETS, however, the variable DEBT\_EQUITY was used as an alternative to check the results. As expected, the results were similar since they are highly correlated (Table 9).

Yet to test the significance of the variables, we divided the sample into two groups based on the value of the companies' assets: one group with values above the mean and another with values below the mean and re-estimated the model for each of the samples. However, even with this approach, we were unable to obtain statistically significant coefficients.

In order to enhance the robustness of the analysis, two interactions between different variables were introduced: EBIT\_ASSETS x FIRM SIZE and DEBT\_ASSETS x FIRM SIZE. However, the coefficient of these interaction term was found to be statistically insignificant.

To check the consistency of the results obtained, three models were estimated, as shown in Table 7, where variables were gradually added until reaching the final model. The results from the model 1, 2, 3 and full model are presented in Table 8. The estimated results do not differ significantly, neither in terms of coefficient nor in terms of statistical

significance, so we can say that the final model is consistent because it does not present different results depending on whether new variables are added to the model.

Finally, the same regression was estimated using the Logit method and the differences between the two methods are insignificant. Although the probit model estimates coefficients closer to zero, the levels of statistical significance are identical. Moreover, the McFadden R-squared is very close, being 0.085302 and 0.084363, respectively for the probit and logit models.

<b>1<sup>st</sup> Model</b>	<b>2<sup>nd</sup> Model</b>	<b>3<sup>rd</sup> Model</b>	<b>Full model</b>
Y = EBIT_ASSETS + IND_i-1	Y = EBIT_ASSETS + DIVIDEND_ASSETS + IND_i- 1	Y = EBIT_ASSETS + DIVIDEND_ASSETS + FIRM SIZE + IND_i-1	Y = EBIT_ASSETS + DIVIDEND_ASSETS + FIRM SIZE + INDEBTEDNESS + IND_i-1

Table 7. Summary of the estimated models



Independent variables	1°Model		2°Model		3°Model		Full Model	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
<i>EBIT_ASSET</i>	-0.312229	0.5748	-0.141301	0.8126	-0.348134	0.5758	-0.251579	0.6902
<i>DIVIDEND_ASSET</i>			-6.044158	0.2790	-7.667545	0.2055	-8.154352	0.1881
<i>FIRM_SIZE</i>					0.069275	0.1190	0.084664	0.0659
<i>INDEBTEDNESS</i>							-0.709949	0.1796
<i>IND_1</i>	0.898210	0.0341	0.926376	0.0301	0.948724	0.0269	0.963341	0.0272
<i>IND_2</i>	0.442772	0.4343	0.476413	0.4000	0.440046	0.4401	0.478355	0.4071
<i>IND_3</i>	0.631388	0.1989	0.653138	0.1873	0.567454	0.2567	0.625331	0.2207
<i>IND_4</i>	0.737610	0.0937	0.750957	0.0896	0.638624	0.1565	0.636412	0.1646
<i>IND_6</i>	0.055298	0.9168	0.058405	0.9126	0.124112	0.8150	0.103606	0.8471
<i>IND_7</i>	0.935563	0.0277	0.981435	0.0223	0.936832	0.0300	0.956091	0.0294
<i>IND_8</i>	0.810879	0.0814	0.847469	0.0710	0.805130	0.0899	0.811567	0.0918
<i>IND_9</i>	1.146579	0.0056	1.165869	0.0051	1.153331	0.0058	1.201072	0.0048
<i>IND_10</i>	0.770244	0.1267	0.779371	0.1239	0.733794	0.1503	0.875378	0.0959
<i>C</i>	-2.353799	0.0000	-2.312229	0.0000	-2.647644	0.0000	-2.593010	0.0000
Total Obs		692		692		692		692
McFadden R-squared		0.064317		0.069722		0.078438		0.085302

Table 8. Estimates of 4 fragmented probit models

Dependent Variable: Y  
Method: ML – Binary Probit (Newton-Raphson / Marquardt steps)  
Sample: 1 692  
Included observations: 692  
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
<i>EBIT_ASSET</i>	-0.104053	0.772603	-0.134679	0.8929
<i>DIVIDEND_ASSET</i>	-8.922755	6.570618	-1.357978	0.1745
<b><i>FIRM_SIZE*</i></b>	<b>0.087401</b>	<b>0.048414</b>	<b>1.805286</b>	<b>0.0710</b>
<b><i>INDEBTEDNESS*</i></b>	<b>-0.061568</b>	<b>0.053296</b>	<b>-1.155201</b>	<b>0.2480</b>
<i>IND_1</i>	0.872940	0.0430224	2.029034	0.0425
<i>IND_2</i>	0.439899	0.565580	0.777785	0.4367
<i>IND_3</i>	0.551762	0.500852	1.101648	0.2706
<i>IND_4</i>	0.624644	0.462144	1.351623	0.1765
<i>IND_6</i>	0.080084	0.528985	0.151391	0.8797
<i>IND_7</i>	0.837830	0.434888	1.926544	0.0540
<i>IND_8</i>	0.788859	0.472726	1.668745	0.0952
<i>IND_9</i>	1.121514	0.417465	2.686488	0.0072
<i>IND_10</i>	0.770710	0.508228	1.516466	0.1294
<i>C</i>	-2.667367	0.433712	-6.150095	0.0000
McFadden R-squared	0.082595	Mean dependent var	0.045588	
S.D. dependent var	0.208744	S.E. of regression	0.207612	
Akaike info criterion	0.381193	Sum Squared resid	28.70644	
Schwarz criterion	0.474295	Log likelihood	-115.6056	
Hannan-Quinn criter.	0.417230	Deviance	231.2111	
Restr. Deviance	252.0273	Restr. Log likelihood	-126.0137	
LR statistic	20.81619	Avg. log likelihood	-0.170008	
Prob (LR statistic)	0.076645			
Obs with Dep=0	657	Total Obs	692	
Obs with Dep=1	35			

Table 9. Probit model results – \*Alternative variables

Variable	Probit		Logit	
	Coefficient	p-value	Coefficient	p-value
<i>EBIT_ASSET</i>	-0.251579	0.6902	-0.468895	0.6972
<i>DIVIDEND_ASSET</i>	-8.154352	0.1881	-17.20952	0.1909
<i>FIRM_SIZE</i>	0.084664	0.0659	0.177214	0.0592
<i>INDEBTEDNESS</i>	-0.709949	0.1796	-1.378342	0.2213
<i>IND_1</i>	0.963341	0.0272	2.219911	0.0423
<i>IND_2</i>	0.478355	0.4071	1.133100	0.4289
<i>IND_3</i>	0.625331	0.2207	1.508972	0.2266
<i>IND_4</i>	0.636412	0.1646	1.461451	0.2055
<i>IND_6</i>	0.103606	0.8471	0.195289	0.8910
<i>IND_7</i>	0.956091	0.0294	2.193162	0.0455
<i>IND_8</i>	0.811567	0.0918	1.942847	0.0971
<i>IND_9</i>	1.201072	0.0048	2.659720	0.0127
<i>IND_10</i>	0.875378	0.0959	2.002702	0.1106
<i>C</i>	-2.593010	0.0000	-5.160087	0.0000
Total Obs		692		692
McFadden R-square		0.085302		0.084363

Table 10. Estimates of Probit and Logit models

## 8. Conclusion, Limitations and Future Research

The main objective of this study was to analyse which financial characteristics make a company more appealing to be the target of a hostile takeover. The data used for this was collected from the Refinitiv Data Stream database and relates to 692 deals, whose targets are from the UK, which took place between 2000 and 2022.

Four hypotheses were formulated related to corporate performance, dividend distribution, size, and level of indebtedness, namely

- Hostile takeover probability is increased with lower financial performance.
- The size of dividend reduces the likelihood of a firm becoming a hostile takeover target.
- The size of a company reduces the likelihood of a firm becoming a hostile takeover target.
- Hostile takeover probability is increased with lower level of indebtedness.

Although the estimated coefficients show the expected sign, that is, the results obtained confirm that hostile takeover targets have lower financial performance, distribute fewer dividends, are generally smaller companies and have low levels of debt, the variables are not statistically significant, questioning the tested hypotheses.

To verify the results obtained, the model was estimated with alternative variables, as is the case with the variables LOG\_EV and DEBT\_EQUITY, and the results obtained were qualitatively similar since the variables are correlated. In addition, to test the significance of the coefficients, we divided the sample into two according to the value of each company's assets (higher and lower than the average of the initial sample) but even so, we were unable to obtain statistically significant coefficients. Furthermore, we introduce two interactions between different variables: EBIT\_ASSETS x FIRM SIZE and DEBT\_ASSETS x FIRM SIZE, however, the coefficients turned out to be statistically insignificant. Finally, to test the consistency of the data obtained, the final regression was divided in four models according to the hypothesis under study to check whether the results changed by adding variables and, in fact, the results did not differ. In addition, the regression was estimated using two models: probit and logit and the results were reported as consistent.

In relation to the limitations identified, although the sample is sufficiently large, only 5.06% of the sample corresponds to hostile deals because the complexity associated with hostile takeovers makes acquirers prefer to buy another in a friendly way. Furthermore, there are few targets for each industry identified in the sample and it is therefore difficult to analyse if there is an industry where hostile takeovers are more likely to occur regardless of the financial characteristics of the target.

Another relevant limitation is that past relative stock price performance of the targets which is missing in the econometric model. Further research on financial characteristics of hostile deals, should include, for example, the cumulative return above the stock exchange return in the same period, 1 year before the deal.

Although the focus of this study is the financial characteristics that make companies more attractive for a hostile takeover, it would be enriching to analyse variables related to corporate governance and ownership structure, since the importance of these variables in takeovers is widely defended in the literature. According to Morck, Shleifer and Vishny (1987), hostile targets have lower board ownership and a lower probability of having a member of the founder's family in the board than a friendly target. Sinha (2004) also argues that non-executive directors of companies that are targets of hostile takeover bids have a smaller ownership interest and have fewer outside directorships. Also Shivdasani (1993) found that the ownership by outside directors is significantly lower in the case of firms subjected to a hostile takeover offer.

## Appendixes

Dependent Variable: Y

Method: ML – Binary Probit (Newton-Raphson / Marquardt steps)

Sample: 1 692

Included observations: 692

Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
<i>EBIT_ASSET</i>	-0.312229	0.556619	-0.560937	0.5748
<i>IND_1</i>	0.898210	0.423973	2.118553	0.0341
<i>IND_2</i>	0.442772	0.566299	0.781870	0.4343
<i>IND_3</i>	0.631388	0.491427	1.284806	0.1989
<i>IND_4</i>	0.737610	0.440092	1.676073	0.0937
<i>IND_6</i>	0.055298	0.529326	0.104469	0.9168
<i>IND_7</i>	0.935563	0.425074	2.200942	0.0277
<i>IND_8</i>	0.810879	0.465309	1.742668	0.0814
<i>IND_9</i>	1.146579	0.413694	2.771563	0.0056
<i>IND_10</i>	0.770244	0.504381	1.527108	0.1267
<i>C</i>	-2.353799	0.370049	-6.360779	0.0000
McFadden R-squared	0.064317	Mean dependent var	0.050578	
S.D. dependent var	0.219293	S.E. of regression	0.218368	
Akaike info criterion	0.406465	Sum Squared resid	32.47319	
Schwarz criterion	0.478626	Log likelihood	-129.6370	
Hannan-Quinn criter.	0.434375	Deviance	259.2739	
Restr. Deviance	277.0958	Restr. Log likelihood	-138.5479	
LR statistic	17.82185	Avg. log likelihood	-0.187337	
Prob (LR statistic)	0.058044			
Obs with Dep=0	657	Total Obs	692	
Obs with Dep=1	35			

Appendix 1. Probit model results - 1° Regression

Dependent Variable: Y  
Method: ML – Binary Probit (Newton-Raphson / Marquardt steps)  
Sample: 1 692  
Included observations: 692  
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
<i>EBIT_ASSET</i>	-0.141301	0.596177	-0.237012	0.8126
<i>DIVIDEND_ASSETS</i>	-6.044158	5.583047	-1.082591	0.2790
<i>IND_1</i>	0.926376	0.427177	2.168600	0.0301
<i>IND_2</i>	0.476413	0.566039	0.841662	0.4000
<i>IND_3</i>	0.653138	0.495355	1.318526	0.1873
<i>IND_4</i>	0.750957	0.442408	1.697430	0.0896
<i>IND_6</i>	0.058405	0.532386	0.109704	0.9126
<i>IND_7</i>	0.981435	0.429486	2.285138	0.0223
<i>IND_8</i>	0.847469	0.469325	1.805717	0.0710
<i>IND_9</i>	1.165869	0.416697	2.797881	0.0051
<i>IND_10</i>	0.779371	0.506496	1.538751	0.1239
<i>C</i>	-2.312229	0.373898	-6.184112	0.0000
McFadden R-squared	0.069722	Mean dependent var	0.050578	
S.D. dependent var	0.219293	S.E. of regression	0.218269	
Akaike info criterion	0.407191	Sum Squared resid	32.39610	
Schwarz criterion	0.485912	Log likelihood	-128.8880	
Hannan-Quinn criter.	0.437637	Deviance	257.7760	
Restr. Deviance	277.0958	Restr. Log likelihood	-138.5479	
LR statistic	19.31981	Avg. log likelihood	-0.186254	
Prob (LR statistic)	0.055589			
Obs with Dep=0	657	Total Obs	692	
Obs with Dep=1	35			

Appendix 2. Probit model results - 2° Regression

Dependent Variable: Y  
Method: ML – Binary Probit (Newton-Raphson / Marquardt steps)  
Sample: 1 692  
Included observations: 692  
Coefficient covariance computed using observed Hessian

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>z-Statistic</b>	<b>Prob.</b>
<i>EBIT_ASSET</i>	-0.348134	0.622148	-0.559568	0.5758
<i>DIVIDEND_ASSETS</i>	-7.667545	6.056113	-1.266083	0.2055
<i>FIRM_SIZE</i>	0.069275	0.044441	1.558805	0.1190
<i>IND_1</i>	0.948724	0.428605	2.213514	0.0269
<i>IND_2</i>	0.440046	0.569928	0.772107	0.4401
<i>IND_3</i>	0.567454	0.500306	1.134214	0.2567
<i>IND_4</i>	0.638624	0.450662	1.417080	0.1565
<i>IND_6</i>	0.124112	0.530584	0.233916	0.8150
<i>IND_7</i>	0.936832	0.431783	2.169682	0.0300
<i>IND_8</i>	0.805130	0.474767	1.695844	0.0899
<i>IND_9</i>	1.153331	0.417993	2.759213	0.0058
<i>IND_10</i>	0.733794	0.510132	1.438439	0.1503
<i>C</i>	-2.647644	0.436632	-6.063785	0.0000
McFadden R-squared	0.078438	Mean dependent var	0.050578	
S.D. dependent var	0.219293	S.E. of regression	0.217834	
Akaike info criterion	0.406591	Sum Squared resid	32.21966	
Schwarz criterion	0.491872	Log likelihood	-127.6805	
Hannan-Quinn criter.	0.439575	Deviance	255.3610	
Restr. Deviance	277.0958	Restr. Log likelihood	-138.5479	
LR statistic	21.73478	Avg. log likelihood	-0.184509	
Prob (LR statistic)	0.040602			
Obs with Dep=0	657	Total Obs	692	
Obs with Dep=1	35			

Appendix 3. Probit model results - 3° Regression



Dependent Variable: Y  
Method: ML – Binary Logit (Newton-Raphson / Marquardt steps)  
Sample: 1 692  
Included observations: 692  
Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
<i>EBIT_ASSET</i>	-0.468895	1.204862	-0.389169	0.6972
<i>DIVIDEND_ASSET</i>	-17.20952	13.15846	-1.307867	0.1909
<i>FIRM_SIZE</i>	0.177214	0.093940	1.886455	0.0592
<i>INDEBTEDNESS</i>	-1.378342	1.126847	-1.223184	0.2213
<i>IND_1</i>	2.219911	1.093212	2.030632	0.0423
<i>IND_2</i>	1.133100	1.432226	0.791146	0.4289
<i>IND_3</i>	1.508972	1.248051	1.209062	0.2266
<i>IND_4</i>	1.461451	1.154381	1.266004	0.2055
<i>IND_6</i>	0.195289	1.424700	0.137073	0.8910
<i>IND_7</i>	2.193162	1.096394	2.000341	0.0455
<i>IND_8</i>	1.942847	1.171162	1.658990	0.0971
<i>IND_9</i>	2.659720	1.067366	2.491854	0.0127
<i>IND_10</i>	2.002702	1.255314	1.545379	0.1106
<i>C</i>	-5.160087	1.114839	-4.619577	0.0000
McFadden R-squared	0.084363	Mean dependent var	0.050578	
S.D. dependent var	0.219293	S.E. of regression	0.217828	
Akaike info criterion	0.407109	Sum Squared resid	32.17038	
Schwarz criterion	0.498950	Log likelihood	-126.8596	
Hannan-Quinn criter.	0.442629	Deviance	253.7191	
Restr. Deviance	277.0958	Restr. Log likelihood	-138.5479	
LR statistic	23.37666	Avg. log likelihood	-0.183323	
Prob (LR statistic)	0.037372			
Obs with Dep=0	657	Total Obs	692	
Obs with Dep=1	35			

Appendix 4. Logit model results – Full Model

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