



Research Article

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Scheme of Arrangement in the UK Takeover Market: Does it Make a Difference in Firms' Survival to be Tendered?

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Abstract

Compared with tender offers, bidders can easily obtain target firms in the scheme of arrangements. This study investigates the impact of deal and target characteristics on 803 firms' survival to be taken over by a scheme of arrangement or a tender offer in the UK takeover market, during the 1995 to 2018 period, through applying survival analysis, including continuous (PH Cox, Weibull) and discrete-time (complementary log-log) hazard models. The findings indicate that the explanatory variables of target and deal characteristics play a significant role in both the scheme of arrangement and tender offer deals. Firm size, financial crises, the takeover Code shock, and the termination fees paid by a target firm increase the probability of a takeover of the target firm to be implemented by way of a scheme. Acquirers who are publicly listed and own a large stake in the target firm before the takeover intend to reduce the target firm's probability of being schemed.

Keywords: *Survival analysis, scheme of arrangement, tender offer, continuous-time model, discrete-time model*

1. Introduction

Although schemes of arrangement or *schemes* in English law have been recognised for almost 150 years in debt restructuring, scheme transactions have significantly grown as widely observed phenomena in the UK takeover market in recent years (Payne 2014a, p.2). However, there has been increasing concern in the press and amongst UK regulators about whether bidders can implement a takeover transaction 'easily' and 'quickly' compared with the tender offer, which could impact shareholders' wealth.¹ To allow a bidder to acquire all 100% shares of the target firms through the court, a scheme requires the approval of a minimum threshold of 75% of the members in a target firm.² The target board plays a significant role in persuading the shareholders to approve a takeover

¹ The expression 'easily' has been used mainly in LexisNexis UK articles and in the book of Payne (2014), and the term 'quickly' has been used in the book of Brummer (2012) to discuss the advantages and disadvantages of implementing schemes in takeover transactions.

² [UK] Companies Act 2006, s.895 and 899(1)

bid.³ The scheme is only completed if the target board recommends the deal (Payne 2014a, p.102). In a tender offer, bidders need to achieve 90% of the shareholders' acceptance level to acquire 100% of the target shares and, if necessary, an offer that may or may not be endorsed by the recommendation of the target directors.⁴ In tender offers, bidders face a degree of uncertainty; there is a possibility of the remaining minority shareholders existing if the takeover ends up with an acceptance level of less than 90%, preventing bidders from practicing the statutory 'squeeze out' procedure.⁵

Increasing the level of acquiring most of the significant firms in the UK market, such as Selfridges and Cadbury, has been matched using the tender offer to implement takeover transactions, thus enabling the quick selling of virtually strategic English industries to foreign-owned firms (Brummer, 2012, p.121–122). English law is the *self-regulatory institution* that protects shareholders and ensures that they sell their shares at a fair price; bidders can buy target firms directly from shareholders (Kenyon-Slade, 2004, p.496). Indeed, the probability of structured deals being hostile bids is unsuitable in the scheme because the process depends on the success of the recommendation of the target's board and the shareholders' voting (Payne 2014a, p.102). However, the flexibility of implementing schemes could increase the risk of obtaining target firms easily, mainly if the bidder's primary objective is to achieve 100% of the target shares and the approval of the target's board is successfully received.⁶ It seems that the structure of a scheme transaction is a friendly process which allows for the interaction between bidders and the target board to be in the form of a *cooperative game*, in which the bidder and the target board can make binding agreements towards the same goal. They both want a transaction to go ahead. By contrast, communication and cooperation between parties are less forthcoming when implementing the transaction using tender offers because bidders can buy target shares directly from the shareholders.

Collaboration between target boards and bidders may become more common when a target firm is large. The larger companies tend to have more tendered shares, thus raising the risk of a bidder getting 100% of the target firms. Bidders require more participation from the target directory, which is minor in the tender offers process. The ownership of UK firms is mainly dispersed (Payne, 201b). Moreover, according to Gorton et al. (2009), the chance of a target being acquired diminishes as the target size grows larger because of difficulties in financing the big entities. This is self-evident, to some extent, as the difficulty level increases inexorably as financial leverage or exposure rises. Bidder cannot obtain financial aid from listed target firms, such as lending money or providing a guarantee to finance a transaction under the English law. Both takeover methods, schemes, and tender offers are subject to restrictions on different financial aids in takeovers. However, if the court permits in a scheme bid the financial assistance for bidders, target firms will help bidders to receive that financial assistance.⁷ The target size might be essential in deciding between alternative takeover methods, such as schemes and tender offers. As a result, using a scheme to implement a takeover transaction might effectively decrease the associated uncertainty that a bidder may encounter when a target firm is large, especially when the ownerships of target firms are dispersed. Moreover, Goodell et al. (2021) found that less economic uncertainty is linked with higher investment; also, they indicated that economic policy uncertainty is more critical in determining firms' cash holding than the policy uncertainty itself.

Moreover, the variable leverage level of target firms and whether a target firm starts a deal are used as proxies to measure whether the cost of inviting one more bidder to the takeover deal exists in the scheme process, whereby Aktas et al. (2010) find that target firms could be in a pressure to sell if the level of the debt is significantly high or if a target firm starts a deal. Because of this pressure, target firms with high debt levels or, if they initiate an agreement, will avoid more extended selling

³ [UK] Companies Act 2006, s.895(1)(b)

⁴ [UK] Companies Act 2006, s.979

⁵ [UK] Companies Act 2006, s979

⁶ LexisNexis UK

⁷ [UK] The Companies Act 2006, s.681(2)(e).

procedures, such as schemes.

The incentive fee is another crucial aspect that has been outlawed in the UK takeover market since 2011 to equalise the bargaining strength of the parties engaged in a transaction and safeguard the target's shareholders.⁸ To compensate for the restriction of the incentive fee, bidders may opt to utilise schemes rather than tender offers because bidders in schemes could be likelier to complete the deal if the courts accept the procedure. However, because of the considerable time it takes to complete a scheme process, the possibility of alternative bids appearing is significant, and a tender may be preferable.

Another characteristic of takeover deals that could be a reason for the differences in choosing between the two takeover methods is whether the acquirer's public status is listed or unlisted. Offenberg and Pirinsky (2015) argue that, compared with private bidders, public bidders are more motivated to complete a bid successfully. The impact of takeover failure seems to have fewer adverse consequences for private bidders than for public ones, whereby the latter could become a target for other bidders if a deal fails. The scheme process could be the preferred takeover method for public bidders because the bidders in a scheme are confident in acquiring the control of the target shares 100%, mainly when these firms are large.

This study includes other deal characteristics related to the UK Code regulation, which could impact the choice between tender and scheme, such as whether a deal occurs during the financial crisis (2007-2009). Payne (2014a, p.84) states that bidders seem to become more familiar with the amendments of the judicial process to implement a scheme during the financial crisis. This could be one of the reasons why bidders choose the 'easily' and 'quickly' process to implement a takeover transaction during the financial crisis. Moreover, many regulation shocks could impact the bidder's choices between schemes and tender offers, such as the considerable changes in the takeover regulations in 2012 following Kraft/Cadbury transaction. The other shock was when the takeover Code in March 2015 prohibited the cancellation scheme, preventing bidders from benefiting from some tax advantages.⁹

The critical question is whether the scheme's structure for implementing a takeover transaction is responsible for making bidders rational in choosing deals and target firms with a specific characteristic. In other words, it poses the following question: What factors cause a target firm in the UK takeover market to accept schemes and not tender offers?

This empirical work will investigate the time-varying factors that lead bidders to choose the scheme to be implemented in the UK takeover market of 803 takeover transactions by applying survival analysis, including the PH Cox and Weibull models (Seddik-Ameur and Treidi, 2018), during the 1995 to 2018 period. This study will also test whether deal and target characteristics affect the likelihood of target firms accepting the scheme, which, to our knowledge, is a first in the UK takeover literature. In addition, to investigate further the stability of our estimated models, we use a discrete-time complementary log-log (Cloglog) model as a robustness check (Zhang et al., 2018; Chawla, 2019; Dai et al., 2020).

After implementing the survival analysis, including the PH Cox and Weibull models, the principal results show that target size is considered one of the critical factors explaining why bidders choose differently between implementing a takeover transaction in schemes or tender offers. Compared with tender offers, Schemes give bidders a higher degree of certainty when the target firm is significantly large. The termination fees that a target firm must pay if a bid is not completed are higher in the scheme subsample than in tender offer ones, which could help bidders increase the certainty level of obtaining complete control of the target firms. Practically, the scheme method to implement a takeover transaction is considered a longer process than tender offers are. The scheme process during the financial crisis (2007-2009) is a favoured takeover method, and schemes continue to be a preferable method in the UK takeovers even after the code regulation shock and the reduction in the tax benefit of using cancellation schemes.

⁸ This is considered one of the significant changes in the UK's takeover regulation, particularly in the shadow of the American firm Kraft's aggressive deal with Cadbury's (Kastiel, 2014).

⁹ The Companies Act 2006; amended s.641- Part 17

The remaining sections of this paper are organised as follows. **Section 2** discusses the empirical methodology. **Section 3** describes the datasets and how the sub-samples of schemes and tender offers are constructed. It also discusses the main variables in the literature that are relevant to the selecting takeover methods. **Section 4** presents the main empirical findings. Finally, **Section 5** concludes the paper.

2. Methodology of Event Study

Survival analysis is the process of investigating failure (hazard) time in a firm that starts or occurs at a particular event; such methods have been used and conducted in several disciplines, initiated with medicine to social sciences and machine learning (i.e., Aalen, 1988; Hao et al., 2021). This section presents the framework of survival analysis based on an event study. It begins with the life table process, followed by a description of the continuous-time model.

2.1 Life table method

The life table technique is a mathematical methodology of duration models used to estimate the circulation of survival times (Gehan, 1969; Jenkins, 2008). This procedure reveals life tables for firms in the takeover market associated with several sectors in the UK economy. The risk ratio is estimated through the maximum probability equation of:

$$\lambda_j = \frac{f r_i}{(1-f_j/2)(t_{j+1}-t_j)}, \quad (1)$$

where $f r_i$ is the hazard rate that measures the number of firms at risk over the sum of firms at risk at the start of the interval. Furthermore, the life table examines homogeneity among groups by the likelihood ratio, especially in economic sectors as groups in this study sample. The likelihood ratio is given by

$$\chi^2 = 2 \left\{ \left(\sum d_g \right) \log \left(\frac{\sum T_g}{\sum d_g} \right) - \sum d_g \log \left(\frac{T_g}{d_g} \right) \right\}, \quad (2)$$

Where g presents the number of groups, d_g is the sum of failures in the g group, and $T_g = \sum_{i \in g} T_i$, where i demonstrates the censoring times of failures (Lawless, 2011). Moreover, Schoenfeld (1981) applies the log-rank test as an alternative for homogeneity that examines the equality of survivor functions between groups.

2.2 Continuous-time method

The continuous time method is a duration model that depends on the conditional probabilities, such as PH Cox and Weibull models. The spell length of firms in continuous-time models is determined by T , in which the $F(t)$ can be given by

$$F(t) = \int_0^t f(r) dr = P(T \leq t). \quad (3)$$

The hazard function $h(t)$ is presented as

$$h(t) = \lim_{\Delta t \rightarrow 0} \frac{P(t \leq T \leq t + \Delta t | T \geq t)}{\Delta t} = \frac{f(t)}{S(t)}. \quad (4)$$

The proportional hazards (PH) form is applied in this study and is given by

$$h(t, x_{i,t}) = h_0(t) \exp^{\beta x_{i,t}}, \quad (5)$$

Where $x_{i,t}$ presents the independent variables (covariates), β is the coefficients at time t , and $h_0(t)$ is the baseline of the hazard function of a firm under particular factors of explanatory variables linked with the arrangement of a scheme in the UK takeover market.

The Weibull model is also conducted in this study. It is another form of the continuous-time model but has a different position of distribution, which can be represented as

$$h_0(t) = p \lambda t^{p-1}, \quad (6a)$$

$$h(t, x_{i,t}) = p t^{p-1} \exp^{\beta x_{i,t}}, \quad (6b)$$

Where λ computes the hazard at every (t); a rise in these values lead to higher hazard rate (Allison, 2014).

3. Data and Variables

3.1 Sample construction

The data of this study consist of a sample of 803 takeover transactions. Of these, 240 are structured as schemes, and 563 bids are structured as tender offers for the target listed firms on the London Stock Exchange by domestic acquirers, which could be private firms, public firms, or subsidiaries. The takeovers come from the SDC UK Merger and Acquisition Database and the LexisNexis Database, with announcement dates between January 1, 1995, and December 31, 2018.¹⁰ We consider that all deals should end up with more than 90% of the shares of a target firm. The acquirers must own prior to the date of announcement less than the level of 50% of the shares of a target firm.¹¹ The sample excludes deals such as recapitalisation, self-tenders and exchange offers, privatisation, and creditor schemes because scheme takeover regulations do not consider these. We further require that to control the firm size, as Alexandridis et al. (2013) suggested, the deal value must be at least £1 million. The data of firms was constructed from DataStream, Thomson One Banker, and the Worldwide Governance Indicators.¹²

3.2 Variables and summary statistics

Table 1 presents the summary statistics on the characteristics of target firms and deals across the scheme and tender offer sub-samples considered in the literature to be relevant to selecting takeover methods. **Panel A** shows several variables about the characteristics of the target firms across schemes and tender offer transactions. Most variables, such as the market value, total sales, leverage level, and intangible assets, are measured 12 months before the announcement. Target firms in the scheme process are significantly larger than those that do a takeover transaction through tender offers using the logarithm of the target firm's market value as a proxy for firm size, as Moeller et al. (2004). This finding confirms that the scheme process is a preferred takeover method for large targets. Moreover, target firms that choose schemes to implement takeover transactions seem not under pressure to sell compared to those that select tender offers according to Aktas et al. (2010). This finding could explain one of the main reasons bidders use a long takeover method, such as schemes when the level of debt is low. However, such a finding is not significant.

Panel B contains variables that describe the deal characteristics across the sub-samples of scheme and tender offer. The statistical analysis finds that acquirers in scheme transactions own around 6% of the target firms' shares (as toehold) 6 months before the announcement. Bidders in tender offer sub-samples own a significantly larger stake in the target firms by, on average, 17%. This finding is unsurprising where the strategy of stake-building is valuable in tender offers, and bidders can achieve the level of 50% of shares of a target firm. This will give the bidder significant control over a target firm. Bidders in schemes, in contrast, usually do not prefer to acquire a stake in the target firms. The main reason is that such a stake will not be included in the 75% voting power threshold (Payne 2014, p.128). Scheme bidders, compared with tender bidders, thus have fewer incentives to apply the strategy of stake-building before a transaction in the target firm.

In comparison, 8% of scheme transactions are initiated by the bidders, and the statically analysis is significantly different between the two sub-samples. These findings mean that most of the transactions structured through schemes are not under pressure to sell themselves (Aktas et al.,

¹⁰ The LexisNexis Database, which is published only by London Stock Exchange PLC, is used to inspect that a takeover transaction has been implemented through schemes or tender offers.

¹¹ The sample chooses the deals in which bidders can practice the statutory squeeze-out procedure to compare apple-to-apple transactions, whereby a scheme requires the approval of a threshold of 75% of the target firm's members to squeeze out 25% of the remaining shares.

¹² <https://databank.worldbank.org/source/worldwide-governance-indicators>.

2010). According to Payne (2014a, p.84), it also seems that the scheme process is an easy mechanism, particularly when the bidders become more familiar with the judicial amendments in case of implementing a takeover transaction during economic downturns; about 24% of deals occur during the financial crisis. While only 13% of tender offer transactions happen during the financial crisis, the statistical difference between schemes and tender offers is significant.

Surprisingly, more than 35% of scheme transactions happened after the Code regulation shock start from 2012, although the prohibition on the cancellation scheme prevented bidders from benefiting from some tax advantages. This finding could be consistent with the prediction of this study—although the Code regulation shock could decrease scheme benefits, the scheme process remains an easy and quick mechanism for a specific deal and target characteristics.

The target termination fees in the sub-sample of scheme deals are almost double those in the sub-sample of tender offers (23% versus 10%). The difference is statistically significant between the two takeover methods. This finding could conclude that target firms in schemes have low bargaining power in comparison with tender offers. Again, this finding could be consistent with the prediction of this study—acquirers believe that the schemes help them to be certain about the completion process. Bidders in the scheme process ask for termination fees to ensure that a target firm completes a takeover transaction whereby a scheme needs more time to be implemented, and this may increase the risk that the other bidder could exist.¹³

Moreover, the percentage of public acquirers who choose the scheme mechanism to implement takeover transactions is significantly lower than that who choose tender offer deals. This finding is the opposite of this study’s prediction, which states that schemes are preferable to implementing a takeover transaction for public bidders to avoid the adverse consequences if the deal fails. In schemes, public bidders seem certain to obtain complete control of target shares, mainly if a target firm is large.

Finally, the regulatory quality (RQ) indicator captures the government’s ability to formulate policies and regulations that enhance the development of the private sector. An advanced level of RQ reflects a motivated and strong private sector, which diminishes the hazard risk of the target firms being schemed. Thus, the level of RQ is a key to attracting capital to a country; however, established firms can benefit from regulatory capture, while small firms cannot hold in their presence (Bertelli and Whitford, 2009).

Table 1: Summary Statistics

Variable	Full sample		Scheme		Tender offer		Differences
	Mean	N	Mean	N	Mean	N	
Panel A: Target Characteristics							
Age (year)	15.523	803	17.628	240	14.626	563	3.002***
(log) Market value	4.092	797	4.958	239	3.722	558	1.235***
(log) Total sales	11.106	803	11.6236	240	10.885	563	0.738***
Leverage	20.142	803	19.861	240	20.261	563	-0.400
Uncertainty	0.704	803	0.7923	240	0.667	563	0.125***
Panel B: Target Characteristics							
Value of transaction (millions of pounds)	422.99	803	983.022	240	184.259	563	798.762***
Completion days	61.505	803	99.95	240	45.117	563	54.832***
Toehold (%)	0.138	111	0.062	15	0.170	96	0.108***
Target initiated (%)	0.049	40	0.079	19	0.037	21	0.041**
Financial crisis (%)	0.165	133	0.241	58	0.133	75	0.108***
Code regulation shock (%)	0.136	803	0.358	240	0.042	563	0.0315***
Target termination fee (%)	0.134	108	0.225	54	0.095	54	0.129***
Public bidders (%)	0.402	323	0.325	78	0.435	245	0.110***
Regulatory quality (RQ)	1.8438	790	1.767	240	1.8773	550	-0.110***

Notes: The statistical significance between schemes of arrangement and tender offers at the 1%, 5% and 10% levels is denoted as ***, ** and *, respectively.

¹³ According to table 1, the scheme of arrangement needs to be completed by, on average, 100 days compared to the tender offers that need, on average, only 45 days.

4. Results and Discussion

The main aims of this study are threefold. The first part will show the preliminary investigation of the time-varying factors that could lead bidders to choose schemes to implement a takeover transaction in the UK market, including the life table and smoothed hazard estimates. The second part will discuss continuous-time findings. The third part will present the robustness check results, using discrete-time with unobserved heterogeneity models.

4.1 Preliminary analysis

The results of the life table method are unconditional, as the survival time data are observed in group form; in this method, the baseline of the hazard rate and the survivor function are based on the previous time and the hazard (failure) events for each target firm that accepts to implementing a takeover transaction by the way of scheme. The purpose of applying the life table model is to determine whether the risk of the hazard rate is higher for schemes than for tender offer transactions, with no controlling for the differences in the explanatory variables. Furthermore, the method indicates that the longer a firm has functioned, the less likely it is to fail (Zorn, 2000). **Figure 1** depicts the unconditional estimate of survivor rates for scheme and tender offer events.

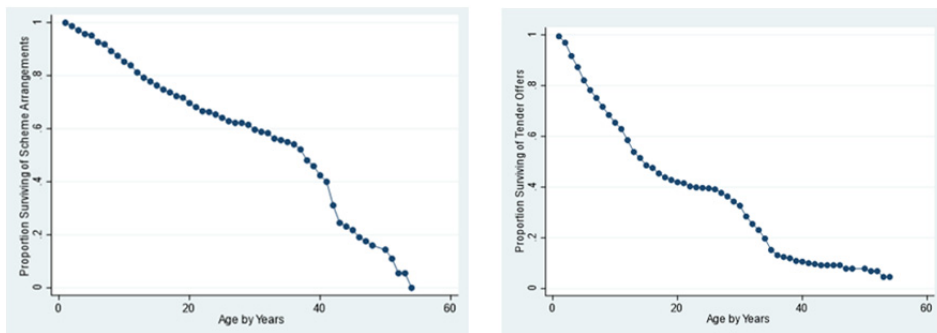


Figure 1: Survivor function by schemes of arrangement and tender offers (derived using the life table method)

By looking at **Figure 1** it can be observed that the survival rate of schemes, which is at about 0.2, is higher than that of tender offers until about 45 years of duration time of the sample; the proportion of the survival rate in tender offers, which is at about 0.4, dropped sharply with a shorter duration of survival time (less than 20 years), whereas that in the scheme transaction is at more than 0.6 at 20 years of duration time. Statistically, the p -values for the chi-square test are as follows: 402.63 (0.000) and 319.03 (0.000); this result enhances the motivation behind the use of the scheme process as an event variable to explore the impact of the target and deal characteristics of target firms on the hazard rate.

To further examine the validity of the data sample in this study, the log-rank test and the smoothed survival rate of target firms in each industrial sector are investigated. As presented in **Table 2**, according to the log-rank test, the null hypothesis on the industrial sector equality of the consumer goods, health care, industrials, technology, telecommunications and utilities sectors is rejected. In addition, as the dashed line in **Figure 2** shows, the technology sector shows the highest survival time of takeover transitions in the takeover UK market, followed by the industrials and consumer goods sectors. Conversely, the telecommunications and health care sectors present the lowest rates of survival time.

Table 2: Log-rank test of industries for the equality of survivor functions

Industry	Log-rank test
Basic Materials	0.00 (0.991)
Consumer Goods	7.72 (0.005)
Consumer Services	0.20 (0.656)
Financials	0.24 (0.625)
Health Care	4.78 (0.028)
Industrials	8.02 (0.005)
Oil and Gas	1.02 (0.312)
Technology	26.17 (0.000)
Telecommunications	10.03 (0.001)
Utilities	2.71 (0.099)

Notes: (p-values in parentheses)

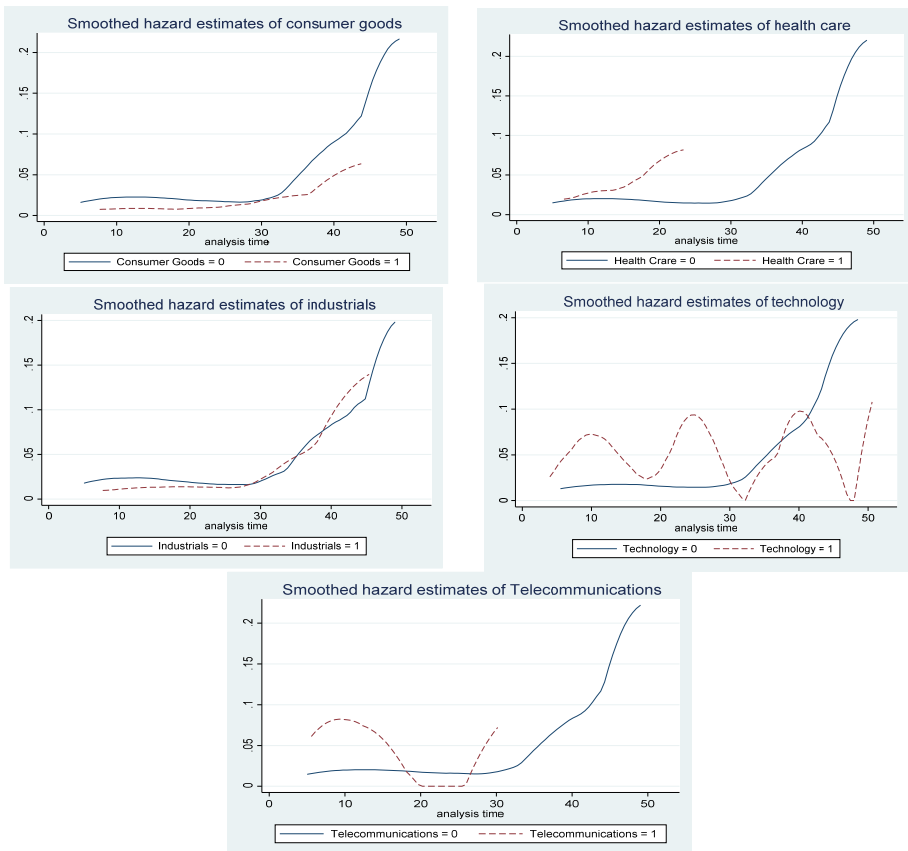


Figure 2: Estimated smoothed hazard rate for each sector

hazard rate of about 0.38, signifying that the logarithm of the market value increases the probability of firms with scheme transactions. This finding is consistent with the main prediction of this study that a larger target firm size increases the probability of that target being sold in the scheme process; this also confirms the conjecture that the scheme technique provides greater certainty to bidders to obtain the complete control of the target's stock shares when it is necessary.

The estimated coefficient of the leverage covariate with the hazard rate of target firms that choose to accept transactions by way of schemes is also positive, but it is statistically insignificant in all estimated models. The coefficient of the logarithm of the total sales is significant and in line with the study's expectation of firms' diminished probability of coping with the scheme process at approximately -0.33, indicating an upsurge in this covariate decreases the hazard rate of scheme transactions. Notably, the estimated coefficient of intangible assets has a very significant positive link with the risk of scheme transactions, implying that the uncertainty level has about a 1.5 risk of hazard rate to increase the probability of scheme transactions.

Regarding the deal characteristic covariates of the PH Cox and Weibull estimated models in **Table 4**, all estimated coefficients are significant, except if the bidder is a public firm covariate that shows an insignificant negative impact on the hazard rate. Moreover, the coefficient of whether a target initiates a deal has a significant positive effect on the hazard ratio at around 0.40, which increases the chance that firms undergo scheme transactions in the UK takeover market. The toehold variable, as expected, has a negative relation with the hazard rate at -0.82, indicating that an increase in this covariate reduces the probability for UK firms to go through scheme processes (and vice versa). The relationship between the covariate of whether scheme transactions occur during the financial crisis and the hazard ratio is positive, indicating that the financial crisis increases the hazard ratio by about 0.60. In addition, the coefficient of whether scheme transactions occur after March 2015 and whether target firms will pay inducement fees also positively impact the hazard rate at around 0.8 and 0.6, respectively. Meanwhile, the RQ has a strong negative impact on the hazard rate of schemes at approximately -4.1, signifying that RQ substantially diminishes the hazard rate of the targeted firm to have schemed. The last specification of the estimated model, shown in **Table 4**, comprises deal and target characteristic covariates; the estimated coefficients of all variables mostly have a similar influence on the hazard ratio in the deal and target characteristic specifications separately.

Table 4: Variables of the target and deal characteristics

Model	PH Cox			Weibull		
	Target characteristics	Deal characteristics	Deal + Target characteristics	Target characteristics	Deal characteristics	Deal + Target characteristics
(log) Market value	0.3704*** (0.0512)		0.274*** (0.053)	0.386*** (0.0512)		0.273*** (0.0533)
Leverage	0.0011 (0.0033)		0.0015 (0.0035)	0.00065 (0.0033)		0.00189 (0.0035)
(log)Total sales	-0.337*** (0.044)		-0.273*** (0.043)	-0.330*** (0.044)		-0.265*** (0.043)
Uncertainty	1.488*** (0.272)		0.925*** (0.271)	1.649*** (0.270)		0.953*** (0.269)
Target initiated		0.441* (0.2424)	0.453* (0.246)		0.4014* (0.2417)	0.387* (0.2454)
Toehold		-0.818** (0.270)	-0.741*** (0.271)		-0.857** (0.2701)	-0.7612** (0.2708)
Financial crisis		0.575*** (0.1783)	0.398** (0.180)		0.639*** (0.1778)	0.459** (0.180)
Code regulation shock		0.888*** (0.1633)	0.639*** (0.179)		1.052*** (0.1561)	0.808*** (0.173)
Target termination fee		0.637*** (0.1804)	0.549*** (0.184)		0.642*** (0.1799)	0.565*** (0.184)

Model	PH Cox			Weibull		
	Target characteristics	Deal characteristics	Deal + Target characteristics	Target characteristics	Deal characteristics	Deal + Target characteristics
Public bidders		-0.0404 (0.1408)	-0.086 (0.147)		-0.033 (0.141)	-0.063 (0.147)
RQ		-4.143*** (0.579)	-3.984*** (0.598)		-4.242*** (0.573)	-4.129*** (0.592)
Constant				-4.58*** (0.438)	2.014** (1.039)	2.747** (1.102)
Ln_p				0.374*** (0.049)	0.339*** (0.0482)	0.387*** (0.0491)
P				1.454	1.404	1.473
Log L	-1262.461	-1236.515	-1208.425	-514.44	-476.0001	-449.928
Log rang chi squared	84.47	141.27	184.12	94.85	172.52	214.43
N	797	790	784	797	790	784

Note: (***) denotes $p < 0.01$, (**) denotes $p < 0.05$ and * denotes $p < 0.1$. The explanatory variables are based on firm age by year since the establishment year.

4.3 Robustness check using the discrete-time method

To further examine the robustness of the estimated duration dependence parameters derived from continuous-time models, a discrete-time model complementary log-log (Cloglog) model is applied (Zhang et al., 2018; Chawla, 2019; Dai et al., 2020). The function is represented as

$$P(y_{i,t} = 1, x_{i,t}) = h(t, x_{i,t}) = 1 - \exp(-e^{x_{i,t}\beta + j_{t-t_0}}), \quad (7)$$

where $x_{i,t}$ is the covariates denoted in Equation (5), with a modification in the j_{t-t_0} component of the interval; thus, to solve Equation (5), the Cloglog model is used:

$$\text{cloglog}(P) = \text{cloglog}(h_{i,t}) = \log[-\log(1 - h_{i,t})] = q_t + \beta'x_{i,t}, \quad (8)$$

where q_t is the log of the integrated hazard. The Cloglog model is also a method of duration intervals linked to firms' target and deal characteristics. Furthermore, the estimated models of Cloglog have to be examined to assess an unobserved heterogeneity or frailty problem in error term (u), if any, by generalising the Cloglog PH model (Jenkins, 1995) in the following equation:

$$\text{cloglog}[p(t, x|\beta, v)] = BH(t) + \beta'X + u, \quad (9)$$

where v corresponds to u, and $BH(t)$ represents the baseline of hazard function.

Our findings in **Table 5** support the view that target and deal characteristic covariates significantly impacts on the hazard rate of target firms that accept schemes to implement takeover transactions, excluding the coefficients of the level of leverage and whether the bidder is a public firm. Although both show similar effects on the hazard ratio, in **Table 4**, they are still insignificant.

Table 5: The estimate of discrete-time models

Model	Cloglog			Cloglog with Unobserved Het		
	Target characteristics	Deal characteristics	Deal + Target characteristics	Target characteristics	Deal characteristics	Deal + Target characteristics
Log t	0.415*** (0.0761)	0.367*** (0.0714)	0.438*** (0.075)	0.415*** (0.0761)	0.453** (0.205)	0.718*** (0.2221)
(log) Market value	0.394*** (0.0513)		0.280*** (0.053)	0.394*** (0.051)		0.381*** (0.094)
Leverage	0.00075 (0.0033)		0.0020 (0.0035)	0.00075 (0.0033)		0.0048 (0.0046)
(log)Total sales	-0.329*** (0.0446)		-0.2632*** (0.0437)	-0.329*** (0.0446)		-0.350*** (0.0781)
Uncertainty	1.643*** (0.270)		0.936*** (0.269)	1.644*** (0.270)		1.282*** (0.394)
Target initiated		0.409* (0.242)	0.390* (0.2453)		0.452 (0.290)	0.558* (0.347)

Model	Cloglog			Cloglog with Unobserved Het		
	Target characteristics	Deal characteristics	Deal + Target characteristics	Target characteristics	Deal characteristics	Deal + Target characteristics
Toehold		-0.861*** (0.270)	-0.765** (0.271)		-0.937*** (0.327)	-1.005*** (0.358)
Financial crisis		0.639*** (0.1778)	0.456** (0.180)		0.703*** (0.242)	0.6172*** (0.248)
The Code Regulation Shock		1.078*** (0.156)	0.831*** (0.172)		1.160*** (0.249)	1.082*** (0.274)
Target termination fee		0.654*** (0.179)	0.569*** (0.183)		0.701*** (0.225)	0.681*** (0.247)
Public bidders		-0.027 (0.141)	-0.066 (0.147)		-0.0274 (0.154)	-0.141 (0.189)
RQ		-4.225*** (0.572)	-4.126*** (0.591)		-4.547*** (0.934)	-5.136 (0.995)
Constant	-4.172*** (0.427)	2.392** (1.031)	3.167** (1.098)	-4.172*** (0.426)	2.704** (1.29)	4.35*** (1.54)
Lnsigzu				-10.51 (12.95)	-1.59 (2.39)	-0.325 (0.853)
Log L	-1119.345	-1079.419	-1053.688	-1119.34	-1079.31	-1052.13
LR chiz	124.31	202.75	246.15			
Wald chiz				128.99	50.39	55.25
Obs.	12,452	12,216	12,210	12,452	12,216	12,210
Id.				797	790	784

Note: Standard errors in parentheses; (***) denotes $p < 0.01$, (**) denotes $p < 0.05$ and * denotes $p < 0.1$. The explanatory variables are based on firm age by year since the establishment year.

5. Conclusion

In the UK takeover market, concerns about whether using a scheme mechanism to implement a takeover deal will benefit bidders to acquire target firms "easily" and "quickly" compared to the tender offer process. Yet direct evidence of whether the scheme mechanism helps bidders acquire target firms "easily" and "quickly" does not exist. This study has used survival analysis to investigate the main factors that cause a target firm in the U.K. takeover market to accept schemes, not tender offers. After controlling for time-varying covariates of the firm, through the age of each firm, by applying continuous-time models (PH Cox and Weibull) and discrete-time model (Cloglog) as a robustness check. This paper finds that large target firms and whether the target firms will pay termination fees if a transaction is not completed are significantly more likely to lead bidders to use schemes to implement takeover transactions. It could be argued that bidders are rational in the UK takeover market; schemes give bidders a high degree of certainty when the target firm is significantly large than tender offers as predicted. Bidders learn more about the benefit of the mechanism, particularly during the financial crisis period. Although the Code regulation of takeover band the scheme cancelation and reduce the tax benefit of using the cancelation scheme, the scheme's probability increased. Bidders are rational in not building a stake in the target firms before the transactions.

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