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Valuing Announcement Options

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Abstract

This paper introduces a theory of corporate announcements based on the new concept of an *announcement option* which has not been previously recognized in the literature as an independently valuable real option de-coupled from strategy implementation. While contributing to the strategy and real options literature, the paper also bridges the corporate disclosure literature and theories of signalling. By conceptualising corporate announcements as real options, the paper provides a framework and focuses on a methodology for precisely valuing announcements. To illustrate the use and valuation of announcement options, the historical case of Prudential plc's announcements concerning its internet venture Egg is analysed.

Key Words:

Announcements; Real Options; Decision Making Under Uncertainty; Strategy and Firm Performance

Valuing Announcement Options

1. Introduction

In this paper I propose that a real options perspective can contribute to our understanding of a topical and important research question concerned with the opportunity for firms to release information to the marketplace -- including what, when, why and how they release it. The discussion of corporate disclosure in general and *voluntary* disclosure in particular has become increasingly critical in the aftermath of major corporate scandals such as Enron, Worldcom, Tyco, Winstar, Parmalat, Shell and others. The voluntary disclosure debate presents an alternative perspective to many of the standard propositions that optimal levels of disclosure should and can be set by regulators, carefully monitored and enforced.¹ The study of corporate disclosure, and more specifically what firms should be legally required to disclose to investors and the marketplace, has traditionally been firmly in the domain of accounting research (see Healy & Palepu, 2001, for a review of this extensive literature). Professional accounting bodies such as the Institute of Chartered Accountants of England and Wales (ICAEW) see *'improving information available to capital markets by improving business reporting'* as part of their ongoing remit.² More recently, however, the role of disclosure has also been investigated in the behavioural finance literature, which considers how firm's disclosure policies might affect competition and/or highlight or amplify financial market inefficiencies (Boot & Thakor, 2001; Admati & Pfleiderer, 2000; Lang and Lundholm, 1996).

Most importantly, across the various streams of research investigating corporate disclosure, there is a growing recognition that the various announcements that firms make are not simply disclosures of

¹ The 'established' versus the 'reformers' view is succinctly presented in the document *'New Reporting Models for Business'*, (2003) published by ICAEW. Internationally, understanding corporate disclosure and its role in the marketplace and use (and abuse) by firms is high on the agendas of trade associations (such as the National Investor Relations Institute in the U.S.) as well as regulators.

² <http://www.icaew.co.uk>

particular given ‘facts’, but have inherent strategic value in their power to influence external perceptions directly and firm performance indirectly. I extend this line of enquiry by proposing that corporate announcements are central to the strategic process of every firm³ and argue that strategic announcements should be more actively and centrally studied by strategy and business policy scholars. The paper thereby revisits the ‘conundrum’ presented by Richard Bettis (1983) which questions the discrepancies between finance and strategy research, namely that while ‘*modern financial theory suggests disclosing additional information about a project or strategy can positively affect the value of the firm, strategic management research has stressed only the value of such information to a firm’s competitors.*’ Rather than focussing on the disadvantages of releasing sensitive information to competitors (Heil & Robertson, 1991) or the negative effects of false announcements to deter competitors from entry (Bayus, Jain, Rao, 2001), this paper highlights the positive *real option value* of announcements used strategically by firms.

Here, I propose the concept of the *announcement option* that is the (real) option available to a firm to voluntarily disclose information (usually about itself) to the marketplace. Although it has not been previously considered as such, the conceptualisation of an announcement as an option bridges a number of streams of enquiry aiming to understand the role of corporate announcements by allowing the *precise quantification* of the value of specific announcements. The option to announce, or not announce, a strategic decision is a particularly powerful option available to firms because it influences investor perceptions and expectation about the present value of its future expected growth and opportunities. Thus it affects precisely the *intangible* component of market value which is so difficult to assess and evaluate.

The option to announce is naturally available to all firms and the value of corporate announcements is widely recognised by industry practitioners. Furthermore, the use of announcements in a way that strategically benefits the firm is not only commonplace but appears historically to be more prevalent

³ Further evidence of this is the dramatic growth of the investor relations industry and of advisory services both external and internal to firms which help firms understand and treat their announcements strategically.

in periods of high market and environmental uncertainty. This is consistent with real options theory which states that the value of an option increases with an increase in the underlying uncertainty. For example, from mid-1990 to the early 2000's announcements were regularly and widely used by start-up firms which were operating in conditions of extremely high environmental and technological (e.g. internet) uncertainty. Illustrative of the intrinsic value of announcements themselves is the exclamation of one dealer in December 1999 that '[the] *Internet is the magic word on this market right now. All we needed was the announcement and a flood of 'buy' orders started pouring in. Right now everyone's buying it, be they speculators or not*' as the Banca Nazionale del Lavoro (like so many others in the finance industry) announced that it had formed an internet unit called Newco.com.⁴ This paper will examine in detail a case study from this period to develop and illustrate a valuation methodology for announcement options with generalisable implications.

The strategic use of announcements, timed and worded in conjunction with market expectations, has often been dismissed simply as a form of market manipulation (Heil & Robertson, 1991). Indeed, there is evidence to suggest that announcements are more widely and heavily used (and mis-used) in industries where product development schedules and uptake are extremely difficult to predict such as the software and games industries (Bayus, Jain, Rao, 2001). A more positive interpretation however, of carefully timed and strategically used announcements, is that they provide an opportunity for managers to communicate to the marketplace that they are aware of, and up-to-date with, current investor demands and interests. For example, in their study of the market impact of e-commerce announcements, Subramani & Walden (2001) argue that the reason for the significant positive abnormal returns they found were in part because investors viewed the announcement of such initiatives as favourable signals of firm attributes such as "*forward looking, profit driven, and willing-to-innovate management*" [original italics] p.149. This type of argument suggests that being in tune with the marketplace and communicating with it – via strategic announcements – is an important and valuable option in its own right which can ultimately give firms a competitive edge over their rivals.

⁴ The announcement caused trading volume on BNL shares to triple and drove the price up 9.75 percent to 3.49 euros (Reuters Milan, 21 December, 1999).

The signalling nature of announcements has also been noted by Westphal and Zajac (1998), who while conducting an event study to measure the impact of announcements of changes in corporate practice, observed that the stock market reacted favourably to such announcements, *even if* the announced plans were not implemented. In the concluding sections where they develop the theory of *symbolic management*, they infer that the *announcement itself* sends a signal regarding the alignment of CEO and shareholder interests which is strong enough to affect market perceptions concerning the firm.

Archival and interview based evidence suggests that firms communicate with the external marketplace in a substantive and influential way through the disclosure of information released by means of corporate announcements. These send desired signals that both inform marketplace perceptions and guide market expectations. Although announcements are a commonplace characteristic of modern corporations, we do not to date have a strategic management *theory* which places *announcements* at the core of the management and strategic decision making process even though Heil & Robertson (1991) noted some time ago that the time for such a theory is long overdue.

This paper seeks to address this need by introducing a theory of strategic announcements and illustrating how, once conceptualised as options, they can be valued. While the theory and valuation model are generalisable, they can in present form be applied to specific cases such as the one illustrated below. To inform the theoretical discussion in Section 3 the paper draws on a number of divergent strands of literature including theories of signalling and the debate on corporate disclosure which is central to the accounting field, in Section 2. To illustrate the use of the proposed *announcement option*, a case study of the insurance company Prudential plc and its internet venture Egg is presented in Section 4. The historical context of the case is described in detail as is the specific use of announcements by the two firms involved to provide the detailed data used in the analysis. To value the announcements, real options analysis is applied. The final section of this paper concludes by arguing that given the wealth of anecdotal evidence and widespread practitioner recognition of their intangible value, as well as growing academic interest from a range of disparate directions, the time is

ripe for a theory focussed specifically on *strategic announcements* which is compatible with quantitative methods appropriate for their precise valuation. Other aspects of announcement options, such as environmental responses, timing and competitive implications, are explored in related research and developed in companion papers.

2. Review of Relevant Literatures

Corporate Announcements

Historical evidence from archival sources shows that firms release announcements pertaining to a range of strategic and organisational decisions. These include competitive pricing strategies, new product introductions, entry into new geographical markets, capacity changes, channel selections, various mergers, acquisitions and other alliances, and a range of detailed structural changes, such as corporate re-organisations, changes in management and in management structures. Since theoretically a firm can make an announcement about anything it chooses, the range of announcement applications is limitless. In practice, however, firms tend to make announcements only about key strategic and organisational events that could potentially and seriously affect their value, success, competitive position and ultimately survival (Bayus, Jain & Rao, 2001; Heil & Robertson, 1991; Steering Committee report 2001).

Most announcements are made for the benefit of a range of stakeholders and interested parties to a wide audience and in the public domain. Announcements can be made through press releases, trade association speeches, management interviews and large official launches. For example, *The Steering Committee Report on Business Reporting* (2001) identifies corporate disclosure (of which announcements are a critical and large part) as being made through a range of media such as annual and quarterly reports, SEC filings, press releases, fact books, presentations (and transcripts thereof) to shareholders, analysts, potential investors and company websites (p.5).

Signalling

Interestingly, while some announcements, such as quarterly and annual earnings announcements are legally required by local regulatory regimes, many more announcements are consciously and willingly made by firms outside legal and regulatory requirements. It has been suggested that such 'voluntary' announcements involve aspects of self-regulation through social mechanisms of control of reputational damage and deterrence of their manipulative use (Heil & Robertson, 1991; The Steering Committee Report, 2001) which is consistent with signalling theories (Akerlof, 1970; Spence, 1973).

The signalling value of announcements does not however come without its associated costs. As well as releasing potentially sensitive information to competitors, when questioned, many practitioners also point to the high reputational costs of mis-informing investors and the marketplace which can greatly outweigh any possible benefits of announcing.⁵ Such costs are entirely consistent with the 'handicap principle' (introduced by Zahavi, 1975, and first formalised by Grafen, 1990). This theory of signalling suggests that signals stay honest precisely because the costs associated with releasing information gratuitously and 'cheating' are so severe that they outweigh potential benefits. A falsely used signal is eventually discovered and will cease to be a signal in the future. Following this logic, an announcement of an internet venture launched by an incumbent (such as the BNL dealer's case cited above) can be interpreted as an option that the firm exercises to signal intangible sources of competitiveness at a highly uncertain time since its benefits should outweigh its costs (at that time). One might further propose that as more and more market participants take advantage of the signalling value of announcing in an increasingly dishonest way (as firms announcing IT ventures during the internet bubble did), the value of this signal declines.

⁵ This was the general consensus of senior practitioners participating in a round table discussion at the *Corporate Information Disclosure and News Management by Firms* Conference, Xfi Centre, University of Exeter, September 2004

Real options

In introducing the announcement option this paper aims to contribute to the ongoing exploration of corporate real options as well as to extend our understanding of what a strategic option can be, how it might be valued and where this value lies. As such, the paper answers the early call of Bowman and Hurry (1993) that *'more valuation studies and more studies that identify different options and their related strategies are needed'* by providing a new application of real options theory, not only from a conceptual perspective, but also as a valuation model and analytical tool.

Most current research in real options can be traced back to the seminal article by Myers (1977) extending the essential theoretical proposition that a firm's market value can be decomposed into the tangible assets that the firm already has in place and the intangible assets not yet in place, i.e. the present value of future growth opportunities. The main difference between these two components of firm value is that the value of *growth options*, unlike *assets in place*, requires and depends upon further discretionary investments. Precisely because they are discretionary, the amount invested depends on the net present values of opportunities as they arise in the future, and firms will invest if and only if environmental conditions are favourable. The radical proposition made by Myers was that in fact, *all* discretionary outlays can be seen as *"options the firm may or may not exercise..."* He gives examples that include *"continual effort devoted to advertising, sales, improving efficiency, incorporating new technology and recruiting and training employees..."* all of which have subsequently been explored in the growing real options literature.

Within the management and strategy literature, the concept of real options has most commonly been discussed in the context of international business. 'Growth' options have been interpreted literally as physical and international expansion that provides firms with a geographically diverse 'portfolio of options' which better enables them to exploit opportunities on a global scale and shift activities, operations and production with changes in environmental circumstances. These growth options have also been explored through the analyses of various sorts of corporate restructuring, including

acquisitions, joint ventures and strategic alliances (for example Bowman & Hurry, 1993; Kogut, 1991; Kulatilaka & Perotti, 1998).

Real options theory has also been fruitfully applied in other areas of strategic decision making where investment decisions are affected by particularly high levels of underlying uncertainty. This includes, for example, valuing the contribution of research and development programs (Huchzermeier & Loch, 2001; McGrath & Nerkar, 2004), entrepreneurship (McGrath, 1999), and venture capital (Hurry, Miller, & Bowman, 1992). The present paper extends this literature and the application of real options methods by conceptualising voluntary information release, in the form of a corporate announcement, as a valuable real option which can positively affect firm value.

Firm Value

As we know from classical corporate finance texts (see, for example, Brealey & Myers, 1996) firm value can be thought of in a number of different ways. On the one hand there is the firm's *fundamental value* which should be an accurate representation of its equity and debt relative to its human resources and physical capital. There is also have the firm's *market value* which is how the external marketplace currently values all the firm's assets, equity and debt. Corporate finance tells us that in perfectly efficient markets, fundamental and market valuations should be equivalent. However this is often not the case and it is precisely the perceived deviation between the two on which people trade the firm's stock. In recent years there has been increased discussion of this divergence. Much of the behavioural finance literature (for an introduction see Shleifer, 1999) has focussed on the *inefficiency* of the market place and its widespread inability to accurately incorporate *all* new information and therefore to determine fundamental firm value. This research shows that a firm's market value can be driven by investors' *expectations* (for example, about growth opportunities) and their current hopes and fears as much as by any fundamental analysis. This is particularly prevalent in periods of high uncertainty and has been most recently illustrated by the dramatic events of the internet bubble when firms' market valuations soared miles away from fundamental valuations.

A central argument of this paper is that it is precisely a firm's market value which announcements – used strategically – can affect. This market value, even when it diverges from 'true' fundamental value, is of importance to firms in both the short and the long-run. The way in which announcements affect firm value (and valuation) can be stated explicitly. Firstly, the most basic way in which a firm's value can be calculated is the net present value (NPV) of its expected net cash flows discounted at the appropriate (risk-adjusted) discount rate. Because announcements affect *expectations* about the firm, they affect the NPV through the analyst's choice of an appropriate level of risk adjusted discount rate and the expected cash flows to use in the calculation. Secondly, if a firm's market value arises mainly from a combination of its equity and debt values it is important to consider how announcements affect both of these. Announcements will affect equity valuation, for example, by changing investor perceptions and the effect of announcements on equity (i.e. stock) price has been the major focus of prior work (for example in research making use of event study methods). However we must also consider what the repercussions of announcements might be on debt costs. Related to the concept of risk, announcements may also change the probability of default of a venture. The risk of default is a major factor in the valuation of a firm's bonds issues and if, for example, a negative announcement is made which appears to increase the risk of default by the firm, then the value of the firm's corporate bonds will drop and its future borrowing power will decrease.

3. Outline of a Theory of Announcement Option Valuation

How do announcements affect the value of the strategic and financial options available to a firm? Firstly, following on from above we see that if announcements can affect the underlying equity and bond valuations then they will affect any financial option written upon these financial assets. The way in which an announcement affects *stocks* is by affecting *market perceptions* about expected future earnings and risk. The way announcements affect financial *options* is by affecting the *volatility* of the underlying stock or bond price returns. We know from Black-Scholes (1973) that the greater this volatility the higher the value of the financial option. Correspondingly with *strategic*, or so-called

‘real’⁶, options firms have the opportunity to benefit from the increased upside potential induced by *volatility* of the appropriate uncertainties. The converse is also true and as volatility decreases so does the value of a strategic option’s upside potential decreases. Note that increasing volatility has pretty much the opposite effect on measures of risk where greater volatility generally translates into greater risk while lower volatility means lower levels of risk. This treatment of volatility – a proxy for uncertainty – is precisely why NPV calculations and other discounted cash flow methods result in such different valuations from real options calculations. This is illustrated in detail in the Egg/Prudential case described in the following section.

As with any option, the value of the announcement option will depend on the underlying parameters which define its value. According to Black-Scholes (1973) option theory this includes the current value of the underlying uncertainty factors, the volatility of the underlying factors, the time to maturity, the investment costs or exercise price (strike) and the risk free rate of interest. As long as the Black-Scholes assumptions are valid, at least approximately, an indicative option value can be calculated. As well as using continuous time, stochastic (Black-Scholes) model, the value of the announcement option can also be calculated using methods such as decision tree analysis (Dempster, 2004) and simulation analysis (see e.g. Miller and Arıkan, 2004). The following section will illustrate how the announcement option can be valued for a specific case using classical option valuation methods.

4. Valuation Case Study

Background to Prudential’s Internet Venture Egg

Perhaps the best known success story in the UK internet banking arena is Prudential’s quirkily-named internet venture, Egg. Established as a banking subsidiary of the UK based insurance giant Prudential, Egg “*aimed at customers who wanted to do their banking over the internet*” (announced 6.10.98)⁷. With a clearly identified target market of “*the 15 million young, affluent and technology literate*”

⁶ Strategic options are known as ‘real’ because they are based on real assets as opposed to financially traded instruments.

(6.10.98), Egg immediately grabbed headlines with its unusual name and “*consumer orientated brand*” (1.11.98).

Egg’s announcements were characterised by (1) consistently addressing current market concerns (even if vaguely or negatively) e.g. ‘we’re not sure but we’re aware that this is an issue’ type announcements, (2) regularly updating the market regarding ongoing strategies e.g. future expansion such as entry into foreign markets, (3) often being ‘first to announce’ amongst its competitors e.g. offering cheaper and more extensive services (4) never renegeing on any of the major announcements made but treating announcements like promises made to marketplace and investors.

From the study of extensive archival data (see Dempster, 2004 for details) it becomes clear that the announcements made by Egg and its competitors at this time were important for a number of reasons. Announcements not only informed investors and market participants of the firms’ actions, but also signalled intentions, ideas, goals, strategic inclinations and intangible assets which might influence investor perceptions and by which the market could value a firm’s growth prospects. The announcements held vital information, both explicit and implicit, about the strategies chosen and reflected the position in which the firm found itself. For example, did the firm have slack financial resources to spend? Was it able to pre-empt competitors? Was it willing to take on extra risk? Like, Prudential and Egg, many firms that announced internet initiatives in the mid-1990’s (were reported in the press) as a signal to the marketplace that they were ready and willing to face the technological challenge, were competitive, innovative and had resources available to exploit new opportunities.

⁷ Henceforth all dates in parentheses refer the date of announcement made and included in the author’s database.

The history of Prudential's and Egg's announcements regarding their internet initiatives are illustrated in Figures 1 and 2, where each announcement (white point) is mapped onto the firm's stock price (black line) over time, with key dates highlighted (black triangles).⁸

[Insert Figure 1. Prudential's Announcement History]

Figure 1 shows how following its initial entry into Direct Banking in 1995 and vague aim to explore the internet, Prudential made few announcements regarding the internet until the late 1990s, after which it became strongly committed to internet-related technologies and developed its internet venture – Egg.

[Insert Figure 2. Egg's Announcement History]

Figure 2 illustrates how, as a subsidiary of Prudential, Egg made a number of announcements itself prior to being listed in 2000 and subsequently made a consistent string of announcements regarding its internet-based operations in a constant dialogue with the marketplace. The history of Prudential's internet strategy and Egg can therefore be understood through the prism of these announcements.

Four key turning points in Prudential's development of Egg delineate distinct stages in the strategic and organizational evolution of the venture and, as such, present both new opportunities and risks for Prudential as the parent firm. They are delineated in Figure 1 and 2 (black triangles) and described in detail as follows.

1. Prudential's entry into direct banking: 24th October 1995 (T_B)

Without the deregulation of the banking industry an insurance firm would not have been able to move into direct banking. This move represented a very important strategic diversification affecting Prudential's long-term opportunities and market positioning.

⁸ These graphs only take into account announcements made specifically regarding internet related ventures and are taken from a comprehensive database compiled by the author in which detailed information about each specific event .

2. The launch of Egg: 8th October 1998 (T_L)

The launch of Egg was a very significant date towards which Prudential had been working since its entry into direct banking. The on-line banking development and the Egg brand had been kept highly secret until its launch on this date.

3. The IPO of Egg: 12th June 2000 (T_{IPO})

The IPO of Egg had been predicted for some time in the media and eventually confirmed in February 2000 by Prudential (announced 23.02.00) prior to the actual IPO date. However there was a great deal of uncertainty surrounding the launch, including whether or not it would actually go ahead given deteriorating market conditions (1.06.00). Furthermore, details of the IPO, such as the number of shares to be sold, who was eligible to purchase them, and the share price (and thus Egg's market value), were not announced until just before the IPO date. Finally, the likely success of the offering was highly disputed and uncertain until the actual IPO, even though by this time Egg had a million customers with £8 billion in deposits between them (11.03.00).

4. Egg moves into profit for the first time: 31st December 2001 (T_{BE})

At this key date, Egg plc being the first internet bank to move into profit. Prudential thereby proved that it could not only successfully set up and launch an independent internet bank, but that this offshoot could meet a target set when the UK bank floated in June 2000 to break even in the fourth quarter of 2001, while competitors had failed to meet such targets. Egg's move into profitability signalled that it was a viable business which was here to stay as a serious competitor for the long-run with a customer base of over 1.6 million (10.12.01). In its final results for the year 2001, Egg stated that net interest contributions from deposits were £15.4 million in 2001 (compared to £3.0 million in 2000) and its customer base was over 2 million. With 1.37 million credit card customers, card balances nearly doubled over the previous year to £1.77 billion (25.02.02).

Each strategic turning point, ushered in the next stage of the venture's development and can be seen as a decision point that was available to Prudential at the time and as such could be treated as a

strategic option. In addition, at one these key decision points Prudential's senior management had the announcement option of informing or not informing the public about their strategic move.

The whole series of strategic and announcement decisions can be viewed as a nested string of *compound* options similar to those widely used in finance (Geske, 1979). Because the analysis of compound options is both theoretically and technically much more complex than that of a single option, in this paper the valuation of an announcement will be illustrated with the analysis of a single stage option – namely, *the option to launch Egg* on 8 October, 1998 and its relation to the *option of making an announcement* about that launch. It is important to note that the main feature of any real option is its irreversibility and therefore valuation of the strategy without the announcement is a hypothetical case with data approximated from the previous stages.

Analysis of the Egg Launch Announcement

The aim here is to consider Prudential's announcements regarding its internet venture Egg and to compare the value of the strategy *with* and *without* the announcement option. We know from archival evidence and historical commentary that it was believed that the value of Egg's strategy would be affected by the information disclosed about its strategy. For example, writing in January 2001, the authors of the INSEAD Case 201-031-1 summed this sentiment up, writing '*the value of Egg will be very sensitive to announcements by Prudential, its parent, about its willingness to provide additional financing in the future*' (p.38).

How can the value of the announcement option regarding the launch of Egg be unbundled from the value of the launch itself? If we had the precise value (or an estimate) of the volatility of Egg's returns was available *with* the announcement and *without* the announcement, the Black-Scholes European option model could be applied directly to valuing the follow-on option to launch Egg for each strategy using the two volatilities. Calculating the *difference* between the two launch strategies, would give an approximation of the *value of the announcement* itself. For this purpose the alternative options will be valued at Prudential's direct banking entry date, taking the Egg launch and IPO dates as fixed.

In terms of the option calculation, the important dates are therefore the date of Prudential's entry into direct banking (T_B), the date of the launch of Egg (T_L) and the date of the IPO of Egg (T_{IPO}), the timings of which are given in Figure 3. Clearly, the valuation of the announcement option should take into account spending on advertising and marketing the corresponding investment decision which will slightly modify the value of the investment option. From information available in the public domain, we know that Prudential spent £8 million on the actual announcement of Egg's launch together with its marketing and advertising (see Dempster, 2004 for details).

[Insert Figure 3. Time Line Diagram for the European Option to Launch Egg]

When Prudential announced their decision to set up an internet venture, it was also reported that Egg's start-up costs to Prudential would be an estimated £77 million. It was subsequently reported that it would cost Prudential a further £175 million to develop Egg from its launch to IPO. After its initial investment of £77 million, Prudential had the right but not the obligation to continue with the development of Egg (in effect a *call option*) for an added investment of £175 million, at the (pre-specified) launch date (*European style*) of 8th October 1998. It could alternatively abandon this project and lose only the sunk initial costs of £77 million.

Using NPV analysis Prudential would only continue with Egg if it believed that the present value at the launch date (T_L) of Egg's estimated future cash flows were worth more than £175 million (the costs of Egg's development) and would abandon Egg if it valued its future at less. The payoff of the European follow-on option at launch date is given by:

$$\max(PV_{T_L} - K, 0) .$$

In other words, at launch date T_L Prudential should choose the higher value between zero and the present value of the Egg venture minus the investment cost to the firm of continuing with Egg's development K (strike price). The payoffs of the launch option can also be visualised using a classical

payoff diagram as shown in the Figure 4. For a standard calculation of the European follow-on real option see, e.g., Brealey and Myers (1996, pp.590-591).

[Insert Figure 4. Payoff Diagram for Option to Launch Egg]

The classical Black-Scholes no-arbitrage option cost is a function of five variables:

$$C = f(PV_{T_B}, T, K, \sigma, r),$$

where PV_{T_B} is the present value at T_B of the full of underlying investment, T is the time to option maturity, K is the investment or strike price at T_L , σ is the volatility of underlying present value from T_B to T_L , and r is the (risk-free) interest rate in this period. In order to value the follow-on option using standard Black-Scholes methods we need data to specify these variables.

Note that from the historical data available to us under our assumptions we can extract a value for the *strike*, *time to maturity* and *interest rate*. However, because Egg was not publicly traded from the start of the ventures life, finding an accurate initial value of the *underlying* and the *volatility* of the evolving present value of the investment is much more problematic.

Such problems with parameter estimation are extremely common in real option analysis. Unlike financial options which are visibly and continually traded in financial markets, many real options, such as new technology ventures, do not have easily observable underlying values and volatilities. The estimated value of the Egg venture at T_B (if it was calculated at all) would most likely only be available to those inside the firm and would not be released into the public domain. The volatility (σ) of Egg's value growth rate would be even less obvious and would also most likely be based on estimates made by managers close to the project.

In this case the present value (PV) of the Egg venture at Prudential's initial entry date into direct banking (T_B) is estimated at £196.0 million. This figure is calculated by discounting the estimated

future PV from the launch date T_L using various sources such as Prudential's 1999 and 2000 annual reports. The valuation process, including the estimated present value of Egg at its launch date (T_L) of £238.1 million, is illustrated in Figure 5.

[Insert Figure 5. European Option Valuation of Prudential's Egg Announcement Strategy]

To evaluate the option to launch Egg *without the announcement* we must consider a comparable hypothetical strategy (which did not happen in reality) and estimate the volatility of the evolving underlying present value without the announcement. We know from historical data that because making announcements changes market perceptions, announcements affect the volatilities associated with the market value (i.e., stock-price returns) of the announcing firm. This is in fact precisely what happened to Prudential: the value of the volatility of Prudential's stock price returns changed from 30% per annum on average prior to its announcement Egg's launch to a much higher 42% afterwards (calculated from *Datastream*). So the actual volatility of Prudential's stock price returns during the two different stages were as follows:

T_B to T_L : 30% p.a.

T_L to T_{IPO} : 42% p.a.

Of course the volatility of Prudential's stock price returns is not the same as the volatility of the growth rate of the value of the Egg venture.⁹ Nonetheless, since Prudential was the full owner of Egg at the time, it seems reasonable to assume that the volatility of the Egg venture returns was in part incorporated into Prudential's stock valuation. It is also reasonable to assume that the market value of the volatility of the Egg value growth rate would be higher than Prudential – in other words *at least* higher than 42%, which could serve as a suitable lower bound to the *actual* 44% p.a. value for the volatility of Egg post-IPO stock returns.

⁹ See INSEAD Case 201-031-1 (2001) for a much more detailed cash flow based real options analysis of the value of Egg in December 2000.

In any case, we know that historically the volatility of the underlying value growth rate for Egg changed with its announcement. The volatility of the strategy which was accepted by management, i.e. launch *with* announcement, is taken to be the volatility of the Egg venture's *growth rate of value*¹⁰. The volatility of the hypothetical strategy, i.e. launch without announcement, is taken to be the volatility of Prudential's stock price returns prior to the announcement of Egg. Thus all historical data as well as estimated parameters necessary for the calculation of the alternative real options are shown in Table 1.

[Insert Table 1. Data for Valuation of the Follow-on Option to Launch Egg]

We are now in a position to use the Black-Scholes formula for a European call option to value Prudential's alternative follow-on options to launch Egg. These are calculated using the data provided in Table 1 to give:

The **real option value** at entry of the launch *without announcement*

(and a value growth rate volatility of 30% per annum) as **£65.5 million**

The **real option value** at entry of the launch *with announcement*

(and a value growth rate volatility of 42% per annum) as **£75.0 million**

Thus the **expected value** of the **announcement option** as **£9.5 million**.

The real option values above can be compared to a **NPV** calculation of expected cash flows which yields a much lower value at:

$$196 - 144 = \mathbf{£52.0 \text{ million}}$$

Here £144 million represents the present value at entry of the £175 million investment costs at launch.

Figure 5 illustrates visually how this model values the option of launching Egg. Of interest is the alignment between managers' actual expenditures and the values given by the real options calculation. Notably the *calculated* real option value of the Egg launch with the announcement of £75 million agrees precisely with Prudential's *historical* estimate of the initial investment cost for the venture. Also of interest is that the calculated value of the announcement option at £9.5 million which is *net* of

¹⁰ Measured annually, the growth rate of value is defined as this year's value minus last year's value divided by last year's

the actual amount of £8 million spent on Egg's launch announcement by management is more than a 100% return on these costs.

Future Research

Ideally the various strategic options associated with the Egg venture described above (e.g. Launch, IPO, etc.) and their related announcement options would be valued as a string of compound American options with flexible expiration dates and strike prices. While such a calculation is beyond the scope of this paper, it could potentially be achievable using a binomial tree-based real options calculator. Such a model, methodology and its implications are explored in related research. However, the complexity of such a calculation in the context of a real-life case lies both in the need to obtain values and/or realistic estimates of the various parameters (as in the simple European option model above) and in the need to account for *different volatilities* of the underlying at each stage of the venture's history.

5. Conclusion

This paper explores the fascinating relationship between firm's decisions and the strategic announcements made to the marketplace. Because decisions regarding corporate announcements complement many other strategic (real) option decisions, such as the option to expand, acquire, research and develop (and others commonly discussed in the management literature), announcements give their users (i.e. managers) the opportunity to affect the value of related strategic options. For example, in this paper, the value of the announcement option is illustrated in relation to Prudential's option to launch and develop its internet venture, Egg. The financial data used in this example were compiled from a combination of publicly available sources and estimations, but the general approach could be adapted to value the announcement options of different types of firms, in various markets, as well as in the case of specific firms and their managers' needs.

value and is unit free. Multiplied by a hundred the growth rate can be expressed in percentage terms.

As well as providing a conceptual and theoretical model for announcement option valuation, this paper shows how this model can be applied to real-life cases. Of course the use of an historical example has both benefits and drawbacks. With the benefits of hindsight the timing and magnitude of investment decisions by Prudential/Egg and the resulting deterministic cash flows were taken here as *historically given* and the options concerning the launch of Egg is valued at the moment Prudential enters direct banking using an approximate continuous time stochastic (Black-Scholes) model. This model and its extensions allow the approximate valuation of the announcement strategy in a manner consistent with discrete time decision tree models which are explored in related research. As such, the present work highlights useful directions for future development of quantitatively complex option valuation techniques. Clearly, even in the case of historical examples which are no longer competitively sensitive, not all data is easily available in the public domain. Consequently, the data for some of the model parameters must be estimated and other data, which is available in the public domain, must be used under the appropriate assumptions. This paper therefore also illustrates the difficulties of applying real options analysis and techniques to actual cases.

The main aim of this paper is to introduce a *theory of announcements as options* in which this new type of option can be both illustrated and quantitatively valued. By identifying corporate announcements as independent options, the paper provides a *tangible* means of valuing the contribution of firm-market communication to corporate strategy. A second aim is to position the discussion of announcements, and corporate disclosure in general, more centrally within management research. A number of relevant literatures were briefly discussed and there is clearly much more scope for developing complementarities between disparate fields to develop our understanding of announcement options.

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Figure 1: Prudential's Announcement History

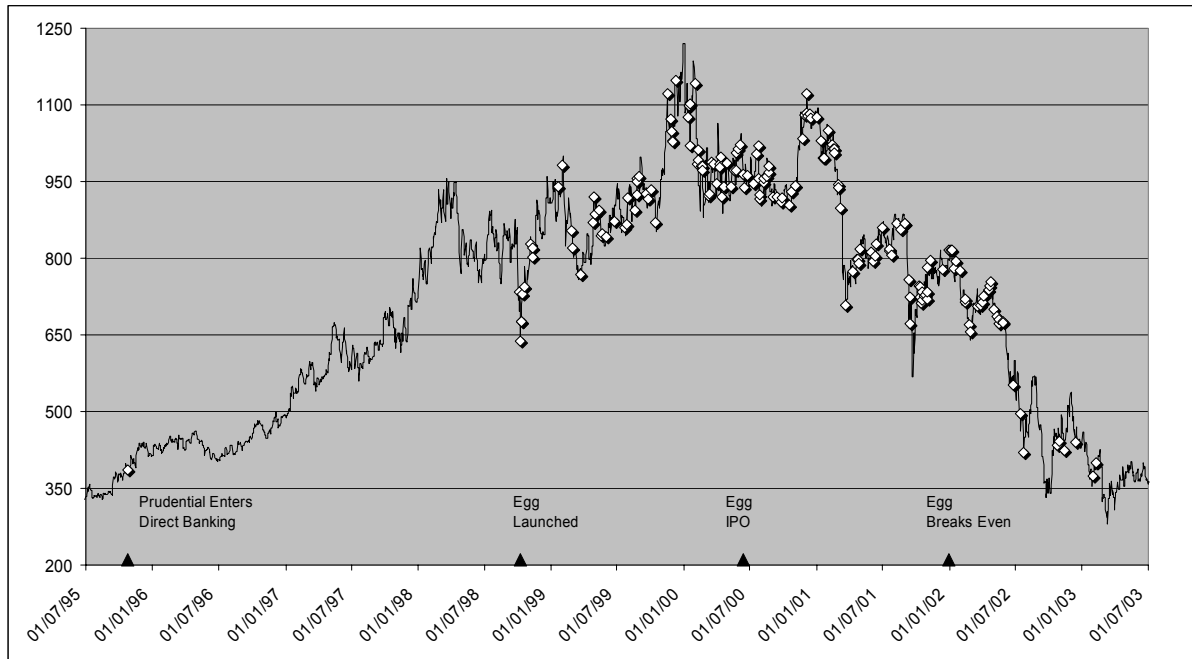


Figure 2: Egg's Announcement History

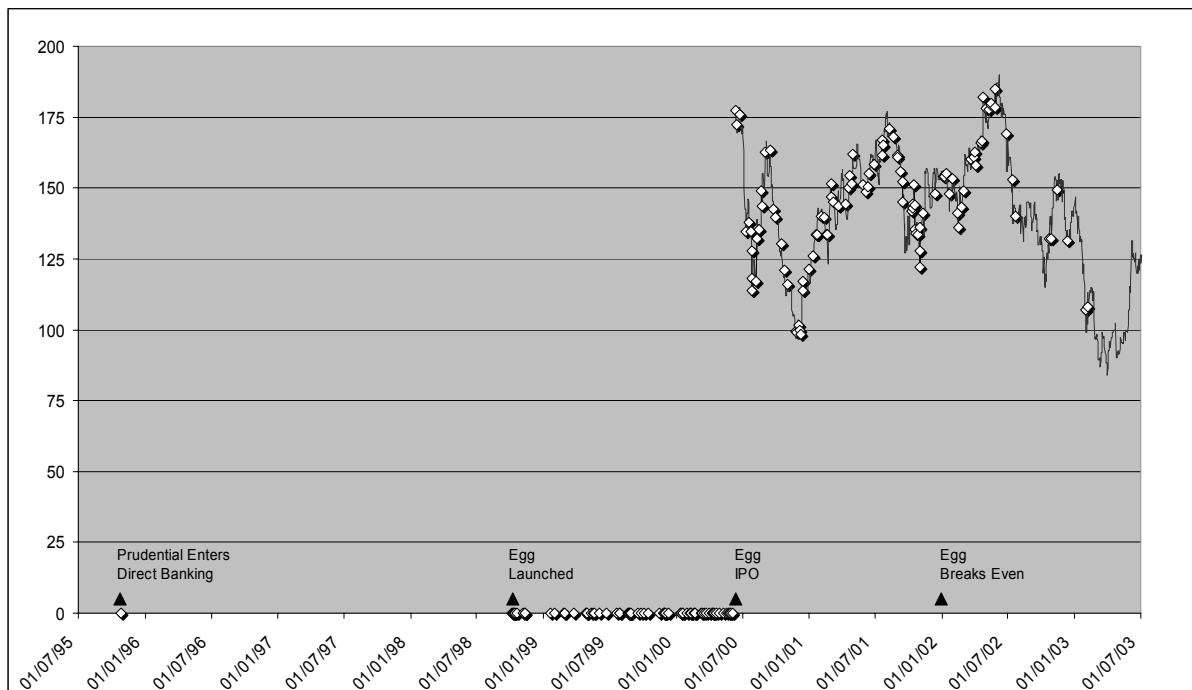


Figure 3 Time Line Diagram for the Option to Launch and Announce Egg

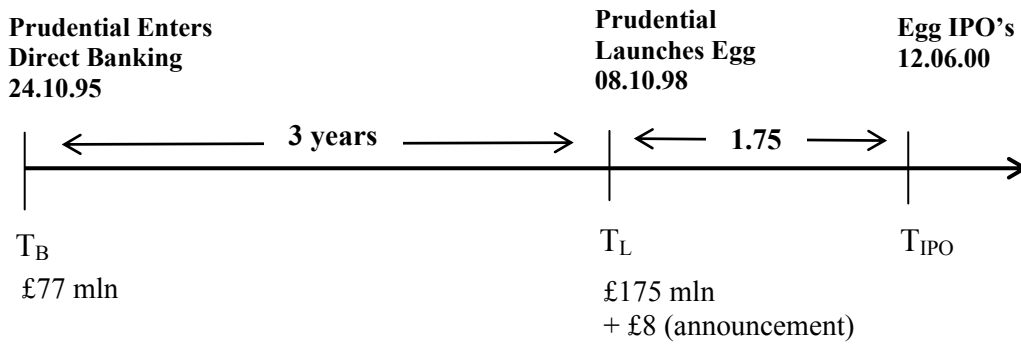


Figure 4. Payoff Diagram for Option to Launch Egg

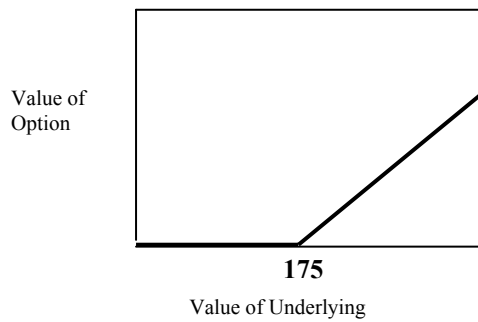


Figure 5. European Option Valuation of Prudential's Egg Announcement Strategy

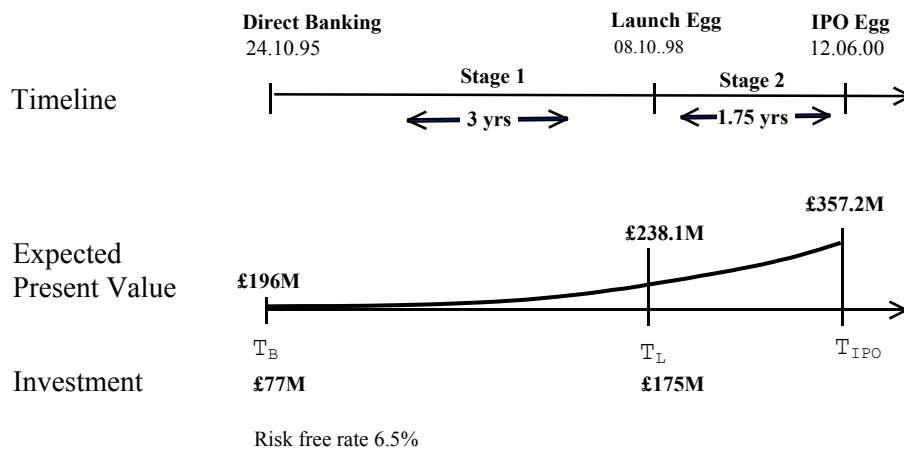


Table 1. Data for Valuation of the Follow-on Option to Launch Egg

Parameter	Symbol	Data	Value
Value of Underlying	PV_{T_B}	The present value of Egg (estimated present value of its cash contribution to Prudential from launch to IPO after costs)	196.0 (£ mln)
Exercise Price / Strike	K	The investment cost to Prudential of continuing with Egg's development	175.0 (£ mln)
Time to Maturity	T	Time from entry into direct banking (T_B) to possible launch date of Egg (T_L)	3 (years)
Interest rate	r	Taken as the risk free rate at entry (T_B).	6.5 (% per annum)
Volatility of Underlying without announcement	σ_1	Volatility of the underlying proxied with the average volatility of Prudential's stock price returns pre-launch date (T_B to T_L)	30 (% per annum)
Volatility of Underlying with announcement	σ_2	Volatility of the underlying proxied with the average volatility of Prudential's stock price returns post-launch date (T_L to T_{IPO})	42 (% per annum)