

**Electronic Markets and their Valuation: A Review of Literature**

by

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## **ABSTRACT**

*Electronic Markets have grown in number over recent years as access to cheap technology and the Internet has increased. The potential for electronic commerce has fuelled a rush of companies setting up and commanding, at least until recently, very high prices for their shares. However, are these high prices justified when one considers the underlying economic principles of Electronic Markets? If open markets with easy access to a range of competitive prices and product offerings drive down seller margins, will the adoption of these markets really be as quick as predicted? It is clear that there are barriers to both buyers and sellers adopting Electronic Markets and there must, therefore, be questions concerning the sustainability of some business models.*

*Regardless of the exact nature of the market, the question of valuation is a vexing one: Electronic Markets consist mainly of “intangibles”, but the way in which these are valued and how their worth relates to share price is not established for this “New Economy” of Electronic Market start-ups.*

*This paper looks at some of the recent literature on Electronic Markets and valuation and offers some insight into the differing aspects of the questions concerning the nature and worth of these companies and also identifies areas for possible future research.*

## **INTRODUCTION: THE IMPORTANCE OF ELECTRONIC MARKETS**

“By 2002, there will be 62 million households online, and consumer E-commerce will hit \$22.6 billion a year according to Forrester Research Inc. That means the web will finally emerge as a mass medium for information, entertainment, and E-Commerce. And companies that now operate popular “portals” or that have proven their ability to sell online are set to start reaping the rewards” . A 1998 quotation concerning the perceived growth in commerce conducted through the Internet and expressing confidence in the relentless growth and sustainability of electronic markets. Yet in the same article, another quote: “Just when you thought Wall Street’s worship of the web couldn’t get any wackier, Internet stocks take off again – on another gravity-defying streak...The new prices have even enthusiastic analysts scratching their heads, trying to come up with valuation methods to explain them...” (Green et al., 1998).

The popular belief, expressed by the quotes above, that electronic commerce will grow massively and that Internet company values should be very high – despite not being profitable entities, has been modified recently through a more down to earth view of Internet commerce. Peter Drucker reflects this view in a recent interview in which he discusses the nature of Internet businesses: “The fact that some Internet start-ups take a long time to become profitable is fine. Amazon.com is typical. I am not worried about it. But very few of the Internet start-ups will have positive cash flow ever. And that’s not a business.” (Drucker, cited Daly, 2000).

Even though the initial love affair with Internet companies may have cooled, the predicted growth is still quite breathtaking. In a recent report for Credit Suisse First Boston Corporation concerning business-to-business electronic commerce, the potential for electronic commerce is estimated to be \$30 trillion. This excludes business to consumer transactions. (Vroom et al., 2000)

The Internet provides a technological platform for electronic markets and the Internet companies that facilitate E-commerce form the basis of these electronic markets – whether business-to-business or business-to-consumer. The fact that the predictions for the revenue potential of Internet electronic markets are so large and that these

companies have been valued so highly (even taking into account recent corrections) indicates that electronic markets are of some considerable importance in the business world and, as such, the topic should also be of importance to business researchers.

## **ELECTRONIC MARKETS**

### **Definition**

In the introduction to this paper, I have referred to “electronic markets”, but what exactly are these? An electronic market can be described as a marketplace of buyers and sellers brought together in the market by an information system that crosses organisational barriers (Bakos, 1997). However, that description alone is not enough to fully describe an electronic marketplace; a marketplace has to have a choice of buyers and a choice of suppliers to avoid it being an “electronic hierarchy” (Malone et al., 1989) - that is, a single buyer connected via an information system to a number of suppliers.

For the purposes of this paper, an electronic market is defined as a number of buyers and sellers coming together, facilitated by information systems, to exchange information about prices and products and to conduct transactions. Most commonly, the information system that facilitates these markets is the electronic network known as “the Internet”.

### **The nature of electronic markets: The Electronic Market Hypothesis**

Although the definition of what is an electronic market (EM) is reasonably straight forward and simple to understand, it is important to understand what the attraction of such markets is: What it is that attracts buyers and sellers to them – why it is that there appears to be such certainty that buyers and sellers will come to them.

The theory of electronic markets is rooted in what is termed the “Electronic Market Hypothesis” (Malone et al., 1989). Electronic Market Hypothesis (EMH) describes the principles, nature and evolution of EM s.

The principles of electronic markets have their roots in the theory of Transaction Cost Economics (Williamson, 1981) in that one of the major benefits from using these electronic markets is seen as being a reduction in co-ordination (transaction) costs in two ways: Firstly, a reduction in Search costs (the cost of finding a buyer or seller in a market) and secondly, in terms of asset specificity; that is, it may no longer make sense for organisations to carry out some operations in-house because external suppliers of the particular goods or service will be easy to find. Allied to asset specificity is the idea that product complexity will be less of a barrier to buyers because they will more easily be able to compare products or services and so be able to make decisions based on product specification and price. Who is likely to gain the most from this? Most obviously, it would be the buyer: As search costs decrease through lower cost information technology and the amount of information about sellers' products increases, then like for like comparisons become easier and the market more competitive.

In terms of the nature of EM s, Malone et al. propose a clear evolutionary path: Starting from an electronic hierarchy (e.g. one buyer connected to multiple sellers) to an electronic market (many buyers connected to many sellers) and then through a number of evolutionary steps:

- Biased Market: Suppliers use technology to push customers towards their own product or service offering, whilst providing access to other sellers' product or service offerings.
- Unbiased Market: Equal access to all sellers' offerings.
- Personalised Market: In this stage, searches can be personalised to "filter" out offerings that do not closely match the buyer's requirements.

Malone et al. looked at the Airline ticketing industry and ILS (Inventory Locator System) which was an early EM for buying / selling aerospace spares; a lot has happened since this original study.

Although EMH provides a logical framework for the way in which EM s work, the original work did not cover the whole potential scope for electronic markets: For

example, differences between commodity and differentiated markets, where buyer and seller behaviour differs, and the effect EM s would have on prices, supplier attitude or the sustainability of the EM. The application of established economic models of search (Bakos, 1991) provided some insight into the potential for EMS s. Bakos put forward the view that the economic characteristics of electronic markets also included switching costs (costs associated with switching supplier and purchasing a product that is not exactly the same as the one previously purchased) and “uncertainty of benefits” (uncertainty concerning the tangible benefits to the various parties of using the EM).

### **The effect of Changes in Search Costs**

In particular, Bakos examined two areas: Search costs in differentiated and commodity markets and Strategic conduct in electronic marketplaces. Through the application of economic models, an understanding of both the conduct of participants in EM s and the consequences of changes in search costs could start to be understood.

For commodity markets, the concept of “Reservation price” (Rothschild, 1974; cited Bakos, 1997) was used. The concept of reservation price works on the principle that the expected gain from using an EM would equate to the previous cost of searching. Bakos argued that the resulting impact of search costs on commodity markets would be fourfold:

- Seller prices would decrease as search costs decreased.
- The amount of searching would increase as search costs decrease.
- The amount of searching would increase as seller prices become more dispersed.
- As sellers’ prices become more dispersed, buyers’ costs decrease.

For differentiated markets, Bakos utilised the “Unit Circle” model (Salop, 1979) which works on the basis of a buyer searching until a product or service close enough to their preference is located (see Figure 1); as search costs decrease, buyers become more and more demanding and are prepared to search for a product or service which

more exactly meets their ideal requirements. On this principle, as search costs decrease, price premiums and seller margins increase.

**Figure 1 A Model with Product Differentiation:**

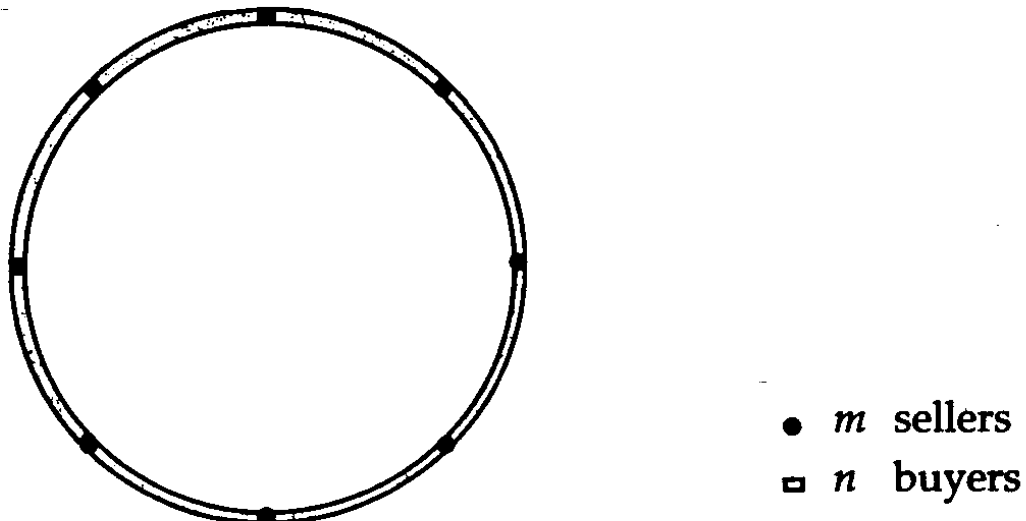


Figure 1: The Unit Circle Model (Salop, cited Bakos, 1991)

And the effect of these principles? Bakos concluded that the strategic conduct of EMs could be impacted in the following ways:

- There might be an early mover advantage.
- That the sustainability of intermediaries is likely to be greater where the EM controls the market transactions and access to customers.
- Information intermediaries are likely to enter individual markets with industry participants that provide industry specific expertise.

A later study on the effect of reducing search costs on the emergence of new markets or the maintenance of existing markets (Bakos, 1997) suggests that a seller's best strategy for EMs may be to control the type of system introduced; a system that emphasised product rather than price may enable some retention of margin and even command a fee for its use. He cites the airline industry as an example concerning ticketing, whereby lower search costs (for the consumer) are compensated for by making it difficult to compare prices due to complex fare structures, availability etc.

(Dahl & Miller, 1990; cited Bakos, 1997) and that a move by American Airlines to simplify fare structures was resisted by other airlines (Kleit, 1992 cited Bakos, 1997). Bakos argues that airline reservation systems fit the model of an EM in a differentiated market.

Given that there appear to be real reasons for sellers (at least) to be wary of the move to electronic markets, does EMH adequately describe what is observed?

### **Alternative views on EMH**

A study of computerised loan systems in the home mortgage market (Hess & Kemerer, 1994) concluded that either the full results predicted by EMH require a longer gestation period, or that it needs some modification to fully explain the observed results. The work looked at five case studies and observed that the best of those cases could best be described as an electronic hierarchy. Why should that be? Hess and Kemerer proposed some alternative views that provide some insight into why the take up of electronic markets may not be as easy or as rapid as EMH may indicate:

- Transaction risk: The risk of opportunistic behaviour by the other party to a transaction in an EM. This may indicate that buyers prefer to form more tightly coupled, cooperative relationships with suppliers. This equates to an amended form of EMH termed the “move to the middle hypothesis” (Clemons & Row, 1992; Clemons et al., 1993).
- Suppliers may refuse to participate in EMs because they perceive that most benefits would be captured by buyers and that there are declining marginal returns (Siedmann & Wang, 1993).
- There are “non-contractible investments” in any transaction that may lead buyers to limit the number of suppliers they engage (Bakos & Brynjolfsson, 1993)

This view that the adoption of electronic markets faces real barriers was strengthened by a study of Agricultural product markets (Lee and Clark, 1996) who identified several barriers to adoption, including transaction risk and, in addition, a lack of market power on the part of the EM to enforce the use of the electronic market. Other barriers identified concerned the nature of human behaviour in terms of Bounded Rationality and Opportunism (Williamson, 1981).

The conclusion was that member traders would have to be convinced of the benefits of participating in an electronic market. Further evidence that EMH does not fully describe the complexity of electronic markets is provided by a later study of ILS (Inventory Locator System); the study concluded that current models did not reflect the true complexity of EMs (Choudhury et al., 1998) and provides examples of the system helping buyers find better prices and of sellers obtaining a price premium through providing more detailed or accurate information about parts and their availability. The study also concludes that ILS has had little effect on the use of brokers in the industry, or on inventory levels. Figure 2 illustrates Choudhury et al.'s model of the affect of electronic markets on an industry.

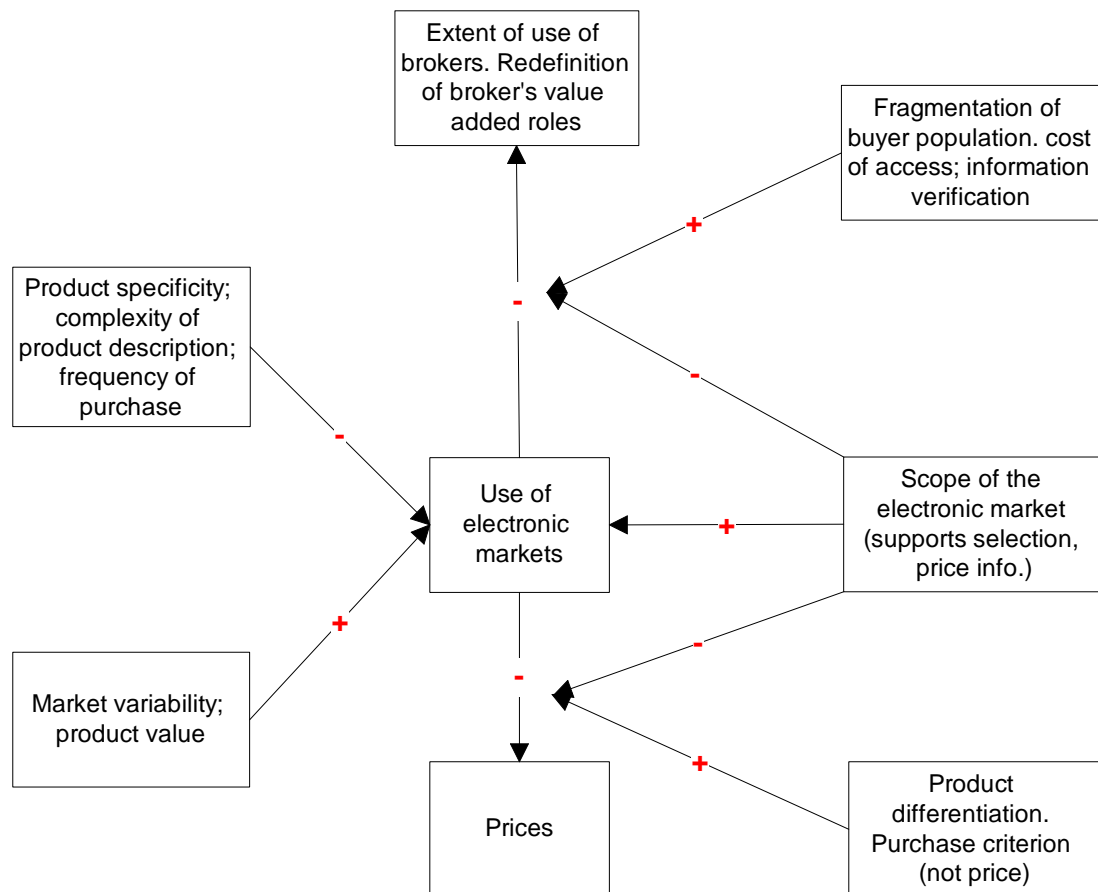


Figure 2: The effect of electronic markets; (Choudhury et al., 1998)

The evidence from the various studies suggests that the general proposition of EMH may hold true, but that evidence for the complete picture of EMH is lacking or that EMH itself over simplifies the way in which electronic markets work in reality. This is not entirely surprising, because open (unbiased) electronic marketplaces have not been widely available for very long (certainly not to the general consumer); also the decision concerning whether or not to use an EM often resides with the individual buyer or seller and a number of factors could affect that decision.

This view is supported by a study of retail financial services and the music industries (Daniel and Klimis, 1999) that compared EMH to the observed status of EMs in those markets. The study made a number of conclusions:

- EMH is generally valid and that it can be expected that both industries will evolve toward personalised markets and that there might be two variants of these markets: Regionalised personal markets (buyers prefer suppliers that are not very remote or who do not have established credibility – financial services)
- Reverse markets (suppliers bid to win business from published buyer requirements) this is a concept that had previously been proposed (Hagel & Armstrong, 1997)
- There was a lack of evidence of unbiased marketplaces and that this might be due to factors such as a lack of numbers of retailers that have transitioned to EMs, the persistence of customer preferences to shop in the physical world or customers remaining loyal to suppliers instead of searching EMs.

### **Conclusions on the nature of electronic markets**

From the work presented, it is possible to conclude that studies of a variety of industries indicate that EMH does not fully describe the observed facts. However, EMH can still be a useful framework for studying EMs, as it is rooted in the theory of transaction cost economics and, if modified as suggested by a number of the studies cited here, can be used as a benchmark to measure the actual development of electronic markets. One has to bear in mind that EMs are still relatively new in terms of their availability to large numbers of people and companies.

Perhaps the dichotomy of electronic markets and EMH can best be summarised by a paper (Grover and Ramanlal, 1999) written to discuss ways in which sellers can survive the intensely competitive environment foreseen by EMH. The paper presents a provocative view in terms of six myths and counter-myths of IT and markets. The conclusions are uncertain: If EMs are effective markets facilitated by IT, then there are four drivers towards price competition:

- Reduction in transaction costs
- Reduction of perceived product complexity
- Reduction in Asset Specificity
- Increase of free information flow

However, it may be possible for suppliers to utilise information technology for their own benefit and that EMs may not always work in the customer's favour. Examples might include making price comparison difficult or exploitation of small niches.

Overall, it may be that the range of EMs studied and the limitations on the time span over which they have been able to be studied are inadequate to conclusively prove or disprove EMH. Consequently, there are many opportunities for further research relating to electronic markets.

Although the work cited here helps us with understanding the impact of EMs on markets and predicting possible future outcomes for buyers and sellers, little has been seen that would help answer questions concerning the value of an EM or the best way of measuring that value. Looking at the nature of an EM, much of it is intangible: By its very nature an EM is simply a means of facilitating bringing together buyers and sellers and the provision of information, rather than concrete or physical assets. Therefore, one could say that the value of an EM is related to its financial performance and the value of its intangible assets or intellectual capital. So, how should EMs be valued?

## **THE VALUATION OF ELECTRONIC MARKETS**

### **Current Valuations**

By looking at the market valuation of a range of electronic markets, one can see a wide range of values and ratios (Fox, 2000). For example, ranges in the change of share price since the company's Initial Public Offering (IPO) of between -93% to +29487% and share price to sales ratios ranging from 0.65 to 7600. These are huge variations and for companies that, in essence, have intangible assets as their main resource.

Therefore, if we consider these companies to mainly consist of intangible assets (or intellectual capital) how should they best be valued? Why is the fact that "intangible assets" are valued at all not enough? The answer to this latter point lies in the accounting standards used in the UK: the valuation of intangible assets is carried out in accordance with Financial Reporting Standard 10 (FRS 10, 1998); this standard only allows for intangibles to be accounted for if they are purchased or form a part of a purchase (Booth, 1998)

### **Valuation of intangibles and the relationship with share price**

Many studies have been conducted of possible methods by which intangible assets can be related back to share prices or valued in their own right. One such study considered whether or not the principles of financial management would provide some insight into the management of intellectual capital (Drew, 1996) and concluded that the various financial allocation models examined (Discounted cash flow, Capital Asset Pricing Model, Economic value analysis and Shareholder value analysis) could provide "metaphors and a useful lens" in approaches to managing intellectual capital. A formal study of firms during the period 1987 to 1995 and the way in which they capitalised software development and the relationship with "Capital market variables and future earnings" (Aboody and Lev, 1998) indicated that there was a positive association with stock returns and the cumulative software asset reported on the balance sheet. Aboody & Lev used regression analysis of software capitalisation intensity on five years' of company data, and therein lies one of the problems

concerning the valuation of electronic markets: There often is not five years of data to look at, as many such companies have only existed for one or two years and some make the journey from inception to IPO in a year or even less.

A study of 350 Australian companies between the period 1991 and 1995 was undertaken (Barth & Clinch, 1998) and examined the association with share price and with a non-market based valuation based on future earnings of the revaluation of various types of asset, including tangible and intangible. The research concludes that the association is significant and, in particular, “the intangible assets findings are striking in their strength and consistency”.

A review of Barth and Clinch’s approach (Easton, 1998) concerns the effect of scale that might occur if a company issues more shares and thus affects the share price; however, Easton concludes that there are ways to overcome the scale effect but that results obtained during studies may vary according to the economic trend at the time. That is probably not important for a simple comparison, but means that any study must be sensitive to the overall economic climate and possibly even the industry sector climate.

A study of using the Shareholder Value Analysis Model to predict share prices (Finnegan, 1999) found that the SVA model produced values per share that were highly correlated with market price. However, care has to be taken over the time period studied, the predicted growth rate used and the industry sector in that consistency appears key to obtain a relevant result.

Another perspective is that financial reporting in its current form is losing its relevance where intangible assets such as information, technology and skill are key assets, yet are not reported on company balance sheets except as a “catchall” called intangibles (Svielby, 1998); (Low et al., 1999) and that the association between share prices and financial statement data is becoming less and less relevant (Stewart, 1998).

Svielby proposed that the intangible part of a balance sheet could be classified in terms of:

- Individual competence
- Internal structure (Patents, concepts, models computer systems etc.)
- External structure (Relationships with customers, suppliers & brand names)

Figure 3. illustrates the Svielby view of the value created by a firm.

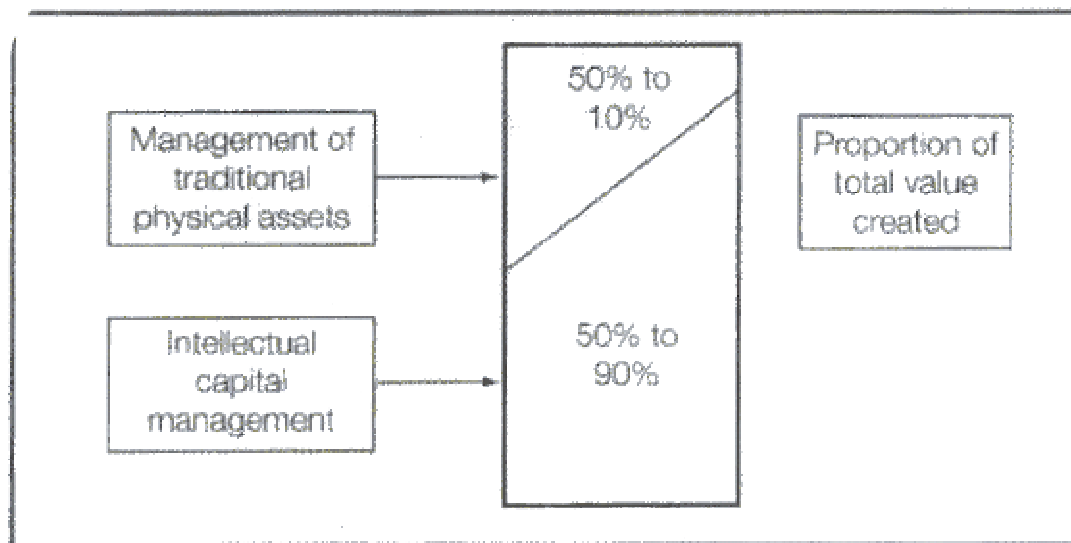


Figure 3: The value created by the firm (Svielby, 1998)

Edvinsson, at Skandia, applied a balanced scorecard approach to Svielby's theory and published it as a supplement to Skandia's accounts. He used the term "Intellectual Capital" (Edvinsson, 1997). The Skandia "Business Navigator" that Edvinsson developed, classified Intellectual Capital into:

- Financial Focus
- Customer Focus
- Process Focus
- Renewal and Development Focus
- Human Focus

(Edvinsson cited Barsky & Marchant, 2000)

Barsky and Marchant's paper argues that traditional financial measures tell investors little about the true performance of a company which consists mainly of "intangibles".

A development of Edvinsson's concept has been proposed which modifies the notion of intellectual capital equating to Market Value minus Book Value to the total capital of a company being the sum of Tangible assets, intangible assets and intellectual capital (Roslender, 2000) although the detail of the concept is not described.

A further alternative could be to view the electronic market simply as a brand and undertake a valuation based on brand accounting (Murphy, 1989). However, such an approach would also rely on cash flows over a significant period of time.

### **Conclusions on valuation**

Whichever method of valuing intangibles is adopted, the ideal would be to directly relate the valued intangibles back to the share price and be able to predict how a change in the value of the intangible asset base (or Intellectual Capital) would affect the share price. A major challenge concerns the adoption of any Intellectual Capital Valuation method not re-enforced by statutory accounting standards; to that end, FRS 10 represents a barrier in its current form.

## **DISCUSSION AND CONCLUSIONS**

A review of the literature concerning electronic markets demonstrates that the theory underpinning such entities is rooted in transaction cost economics (Williamson, 1981) and elements of search cost (Bakos, 1991) and brought together under the general theory of the electronic market hypothesis (Malone et al., 1989). Studies designed to test EMH (see previous sections) appear to be inconclusive concerning the validity of EMH; the studies indicate that EMH is a good general framework to describe electronic markets, but that observation of real EMs indicate that the hypothesis is oversimplified and requires modification. The studies cited in this paper indicate that the number of industries looked at have been relatively limited (Airline ticketing, aerospace spares, music, financial services and agriculture) and have been almost independent of considerations such as the electronic market business model, industry economic climate or degree of competition. That is, these studies have not looked at

the value propositions of EMs within their marketplaces that impact on their success or failure from a quantitative perspective. Although Bakos looked at models for search costs in differentiated and commodity markets, his hypotheses were not extensively tested. A major reason for this lack of data may be the fact that electronic markets, facilitated by the ease of access provided by low cost IT (the personal computer) and access to the Internet, have until recently been few and far between. However, with huge predictions of growth in electronic trade, many EMs can be found across a broad range of industries (Vroom et al., 2000). Given the current number of EMs in existence, there are many opportunities to revisit EMH and assess its validity.

Although EMH is accepted as a good general framework underpinning the operation of electronic markets, the many arguments identifying barriers to their adoption raise questions over the sustainability of these entities: For example, if sellers perceive them as a threat to their margins or buyers are afraid of possible “transaction risk” and adopt the “move to the middle hypothesis” (Clemons & Row, 1992; Clemons et al., 1993), then the ability of independent electronic markets to generate sustainable revenue will be reduced either through declining margins or through a lack of business volume.

The idea of the huge potential growth of electronic trade (electronic transactions) has led to some high valuations for electronic markets operating through the Internet (Green et al., 1998) although this has been tempered more recently. However, there is still a wide range of values for share price performance since IPO (Fox, 2000).

Given the possible consequences of EMH or of a poor adoption rate for these markets, combined with the fact that most consist of “intangible assets”, the question of how to reasonably value such companies seems very relevant. There are many tried and tested methods available for valuing companies, such as Discounted Cash flow, CPAM, EVA and SVA, however, many of the established methods require a reasonable history of cash flow; however, one of the key points concerning many of the electronic market companies is that they do not have much of a history to work with. Therefore, many methods are not appropriate. Other methods of valuation have used regression analysis to determine the relationship between intangible assets

(amongst others) to share price (Barth and Clinch, 1998; Easton, 1998); these methods have found a significant relationship and may form the basis for looking at EMs in a broad context in terms of prediction of share price for a change in the intangible asset value; however, they do not offer a means of actually valuing the intangible asset (Intellectual Capital) base itself.

An alternative to straight financial measurement of EM value is provided by the work that has been conducted on the measurement of Intellectual Capital (Svielby, 1998; Edvinsson, 1997) which has partly been driven by the belief that current methods of Accounting and financial reporting do not adequately describe a company's worth or activities where they consist mainly of intangibles (Low et al., 1999). Methods such as the Skandia Business Navigator may provide a real alternative when calculating an EM's value. Such a method may provide the key to being able to obtain a viable means of classifying and reporting Intellectual Capital, but the limitations of Accounting Standards (FRS 10) may limit the availability of such information to investors.

On the basis of the evidence presented, perhaps there is a path to an "ideal", whereby it is possible to value intangibles (Intellectual Capital) through the use of the Edvinsson model and also to be able to relate their worth to share price using the methods described by Barth and Clinch etc. However, the validity of such a proposition has yet to be proven and may form the basis of future research.

## **FURTHER RESEARCH**

Recommendations for further research based on the content of this paper are:

- An evaluation of EMH against a range of Internet enabled electronic markets, limited to a single business model or industry group, with the objective of validating EMH in a modern day context.
- An examination of pricing models in the context of Transaction Cost Economics or Search costs to determine the effect of prices and the sustainability of revenue models, building on Bakos' work.

- An examination of the relationship between the value of electronic markets' intangible assets and their share price; limited to a single business model or industry sector.
- An examination of the relationship between the valuation of electronic markets' Intellectual Capital (utilising the Edvinsson model) and their share price; limited to a particular business model or industry sector.
- The relationship between an electronic market's business model and its value, based on the models and results of the further research documented above.

## **APPENDIX**

### **LIST OF ABBREVIATIONS USED IN THIS PAPER**

**CAPM** – Capital Asset Pricing Model

**DCF** – Discounted Cash Flow

**EM** - Electronic Market

**EMH** – Electronic Market Hypothesis

**EVA** – Economic Value Analysis

**IPO** – Initial Public Offering

**SVA** – Shareholder Value Analysis

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