Flatter, wider, virtual corporations:
competition policy in the New Economy

Fabian Tassano
OXFORD FORUM [*]

1. Introduction

1999 was a record year for horizontal mergers, including many cross-border transactions. Among 'old economy' sectors alone, significant consolidation took place in the banking, automobile, insurance and pharmaceutical sectors. The intense restructuring activity recently seen appears to be related to two other industrial trends: first, the culmination of a decade of outsourcing; second, the increasing use of information technology. Much has been written about the revolution in e-business and its impact on the production and distribution of goods and services, but there has been relatively little analysis of the effects on industrial structure and the implications for competition policy.

Electronic information exchange – broadly defined as the transmission of information along the supply chain by electronic means – and particularly the internet have been enthusiastically proclaimed as harbingers of greater competition. The work of Thomas Malone among others (e.g. Malone, Yates and Benjamin, 1987, 1989) has generated an expectation that EIE will have an 'electronic market' effect, the net result of which is thought to be an intensely competitive business world. *Prima facie*, EIE represents a reduction in transaction costs, and hence might be expected to facilitate marketisation of interfirm trade and to reduce lock-in. The internet allows information to be both posted and accessed easily and inexpensively, making it possible for firms to 'shop around'. Companies, it is argued, will be less likely to form close, integrated relationships with their suppliers, preferring to form casual, temporary associations via the Web.

Such considerations look like a recipe for a closer approximation to Marshall's model of perfect competition. It is often forgotten, however, that competition in Marshall's sense – rivalry between homogeneous firms – is an incidental by-product of capitalism. It depends crucially on it being efficient to have a particular activity carried on by a large number of firms rather than by a few or only one. In the long run, this key condition may fail to hold.

To consider the likely effects of the internet on market structure, we need to consider how improvements in information exchange will affect efficient firm scale and scope. This topic has not been explored in detail in either the economics or management literatures. There has been some work on the effects on competition of network externalities, and of other types of increasing return that may apply to businesses in the IT and telecommunications sectors. However, little has been said about the effects of

EIE on the structure of old economy sectors. As the costs of managing firms, and of managing the relationships between firms, change, so the optimum structure of industry is likely to change. One possible direction for change is increasing concentration. This paper explores this possibility, and its implications for competition policy.

2. Optimum scale and scope

The efficient size and scope of firms can be said to be determined by three factors:

a) transaction costs, which are higher between two firms (external) than between two divisions of the same firm (internal);
b) fixed costs of production, which are duplicated by each firm operating in the same business;
c) managerial costs, which rise disproportionately with firm size, at least beyond a certain firm size.

The optimum, cost-minimising structure of an industry depends on the interplay between these three factors. Costs of type (a) increase with the number of inter-company gaps along the supply chain; costs of type (b) increase with the number of companies in the same sector duplicating production facilities; and costs of type (c) can be thought of rising superlinearly with the overall size of a firm (i.e. there are managerial diseconomies of scale).

We can conceptually divide the question of optimum industrial structure into issues of firm scale, scope and overall size. The question of efficient *scale* determines concentration within a sector, and hence competition and static efficiency. The question of efficient *scope* affects how focused a firm is, i.e. how many ancillary activities it internalises, and therefore determines the boundaries of firms. The issue of firm *size* is related to the question of managerial economies and diseconomies.

With regard to scale, when different companies operate in the same area of business, some duplication of costs is inevitable. *Prima facie*, therefore, there are potential efficiency gains (economies of scale) from expanding market share, or from simply merging with rivals, as this allows for inefficient duplication of fixed costs at each stage of production to be eliminated. In theory, one should always be able to do at least as well by having two similar businesses under common ownership. Since firms tend not to expand without limit, however, there are clearly countervailing forces at work. These have usually been supposed to operate at the managerial level.[1]

[1] As Ghemawat and Ghadar (2000) are the most recent to state, managerial problems can be particularly great in a firm created by merger. Hostile takeovers almost invariably damage employee morale, for obvious reasons, and many dispute that there is such a thing as a ‘merger of equals’. Clashes in corporate culture, bad feeling, inadequate or incompatible motives for the merger can all cause managerial problems that inhibit or prevent further expansion; the result can be an increase in what Scherer has called ‘the burdens of bureaucracy’.

The issue of scope has received considerable attention through the work of Coase, Williamson and more recently the property rights theorists (e.g. Grossman and Hart 1986). The key reason for internalising processes secondary to a business's core activity is generally agreed to be that of reducing 'transaction costs' – the incidental costs of contracting with independent parties. Most recently, these costs have come to be identified principally with inefficiencies that arise *ex post* because contracts are incomplete and therefore not capable of providing *ex ante* protection against opportunism. Williamson explained the breakdown of markets as occurring when it is difficult to write complete contracts, due to bounded rationality exacerbated by complexity and uncertainty. He discussed the terms of exchange between two companies once they had made investments specific to the relationship, regarding the change from a 'large numbers bidding situation' to a 'small numbers bargaining situation' as the 'fundamental transformation'.

Finally, on the question of the overall size of a firm, the neo-classical account posits that the decline in average unit cost reaches its limit when production has used up the best of everything (manpower, raw materials, sites) and inferior resources make manufacture less efficient. However, as increasing returns, network effects and less dramatically, intellectual property become more important, this becomes less observable in practice. An alternative explanation which is gathering increasing interest is the theory that managerial diseconomies are crucial to understanding the limits of firm size. The theory here is that the management function yields decreasing returns to scale above a certain size, and that this is the main reason why diseconomies of scale set in as firms expand market share. Managerial diseconomies may be due either to the fact that expanding firms require increasing spans of management, or to the information costs of communicating between different divisions in different locations. One way of interpreting these effects is by reference to bounded rationality. Williamson (1985), for example, argued that effective expansion ceases when 'bounds on cognitive competence' are reached, and also claimed (1996) that the 'added costs of bureaucracy are responsible for limitations in firm size'. Blau and Meyer (1987) also conceive large organisations as being prone to bureaucracy and as trying to solve their problems by imposing further structure, thus compounding the problem.

This idea has a long history. As early as 1923, Robertson argued that firm size was dictated by the problems of large-scale government, not large-scale technique. Simon (1976) observed that the managing of efficient decision-making is a greater problem than the management of efficient production. Communication and co-ordination are harder to organise in a big firm (Cooper 1964, Williamson 1996). Unwieldy administration becomes more necessary as firm size rises (Pondy 1969), and this bureaucracy increases costs (Williamson 1996.) There have been many attempts to calculate the optimum span of managerial control. The accepted conclusion has been that 'no organisation can afford to maintain a control structure satisfying the

requirements imposed by a fully bureaucratic design.' (Cordella and Simon 1997). Others, like Quian (1994) and Schumacher (1989) have argued that large organisations suffer from lack of employee effort, job satisfaction and motivation. Thus their output is less efficient and they have to pay higher wages (Scherer 1976).

Managerial diseconomies can take other forms: some theorists argue that large firms are prone to suffering internally the opportunism that Williamson (1993) originally conceived of as the principal transaction cost associated with outsourcing. For example, McAffee and McMillan (1995) argue that the employees of large firms try to exploit information asymmetries for their own advantage. The considerable body of work on bureaucracy and opportunism in large firms has made it clear that transaction costs are not entirely an inter-firm phenomenon. These conclusions, if correct, are quite striking, since, as observed above, such transaction costs have been stated as the key reason for internalising non-core processes.

Aggregating the effects of the three factors discussed above yields a basic theory of optimum firm size and scope. We can understand these as being a function of the trade-off between (a) production economies of scale, which favour 'wide' firms; (b) savings in transaction costs, co-ordination costs and information exchange costs from internalising inputs and ancillary functions, which favour 'deep' firms; and (c) managerial diseconomies of size, which favour smaller firms. Effects (a) and (b) make it expedient for firms to expand – horizontally and vertically, respectively – while effect (c) restrains them from doing so. Or, to put it another way, the need to keep managerial costs down can be achieved either by (i) reducing scale, which means economies of scale are lost and average production costs per unit rise, or (ii) vertical disintegration, which increases transaction costs, both those related to opportunism and those related to the logistics of co-ordination and information exchange.

In the real world, however, such trade-offs are not perfectly symmetrical. The *shape* of a firm has the potential to diffuse the impact of managerial diseconomies by preventing the development of bureaucracy and opportunism. Since the pioneering attempts by General Motors in the 1920's to stave off such managerial diseconomies by decentralising, the M-form or multidivisional style has been judged to be important but not entirely successful (Harris 1983, Hill 1985a, 1985b).

Recently however some, notably Cordella and Simon (1997), have written persuasively on the new potential of EIE to flatten the firm and facilitate the M-form style of management:

> [Information technology] should not primarily be used for supporting existing co-ordination mechanisms, but to reduce the need for co-ordination itself, thus emphasising flattening the organisational structure, i.e. reducing hierarchical depth (scalar chain length).

Davidow and Malone (1992) argue that traditional middle management's role has been to provide an information channel that top management can use to survey work and relay orders to the workers. They predict that EIE will have a flattening effect: 'computer networks can carry much of the information about the status of operations more efficiently and effectively than can people' (p.163). It can also be argued that the management of one process or core competence on a large scale is simpler, and less prone to hierarchical complications, than the management of many vertically integrated processes. An outsourced company, even if horizontally expansive, would find such managerial flattening easier to implement. Such arguments imply that some of the advantages of a small firm can be incorporated into a large but vertically disintegrated firm.

Vertical disintegration continues to increase, and outsourcing of what were previously regarded as key activities is becoming more common. Some of the most successful companies, such as Nike or Dell, are no longer involved in production and manufacture at all. This is relatively old news, but theorists are beginning to take the same thinking further. It is no longer just stages in manufacture that are being 'unbundled' as Hagel and Singer (2000) have put it, but parallel, complementary activities are being split up. The authors claim that customer relationship management, product innovation, and infrastructure are driven by conflicting economic processes – respectively, scope, speed, and scale. For example, a company might want to increase customisation to protect customer relations and so damage product innovation. Or cost-cutting and wage standardisation to protect the company's infrastructure might have the effect of driving away the most talented employees, further harming product innovation.

3. A model of efficient industry structure

A simple way of modelling the effects discussed above is as follows. Consider an industry whose size is measured in two dimensions: market size (horizontal) and span of value chain (vertical). Assume there are v separate firms along a single value chain, and n rival firms per sector. For example, in Figure 1 below, v is six and n is five, i.e. there are thirty firms in total.

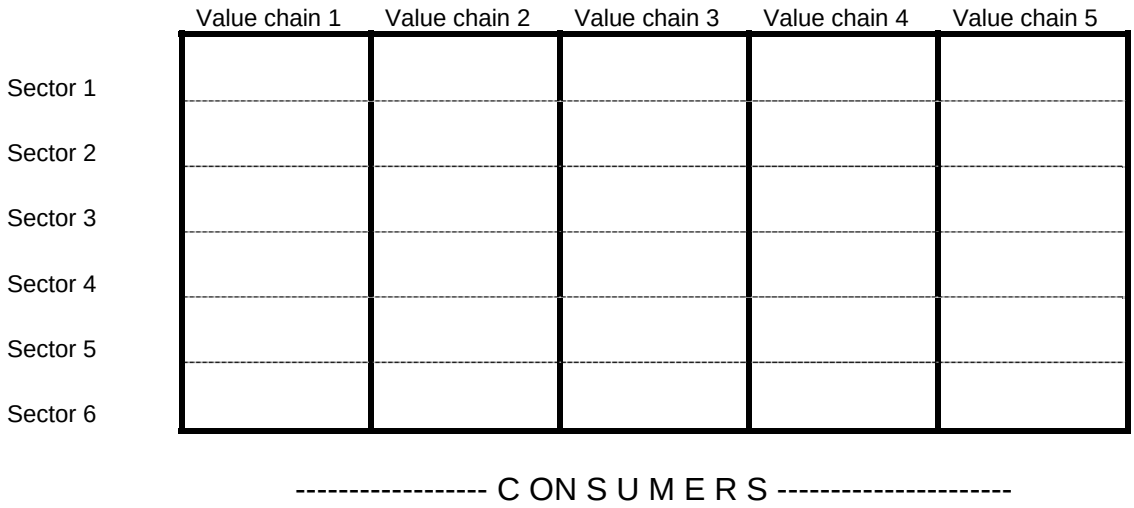

Figure 1. Schematic model of industry structure

In addition to direct production costs (e.g. raw materials, direct labour), we assume the following indirect costs.

1. An entire value chain calls for fixed production costs of *F* which are incurred by each chain. We assume that these are split evenly between the separate firms along a chain. Thus if there are *v* firms along a chain, each incurs fixed production costs of *F*/*v*.
2. Each firm-to-customers interface generates transaction costs which are proportional to the volume of trade. The total transaction cost per interface across the size of the industry is *T*. Thus if each value chain has *v* firms along the chain, the total transaction costs for the industry are equal to *vT* and the total transaction costs per value chain equal to *vT*/*n*.
3. Managerial costs rise quadratically with firm size.
4. There is a constant fixed cost of administration *A* per firm.

The total indirect cost *c* per firm is therefore as follows:

$$c = \frac{F}{v} + \frac{T}{n} + \frac{M}{n^2 v^2} + A$$

where *v* = no. of firms per value chain,
n = no. of firms per sector,
M = cost of management if industry were single monopoly,
A = administrative cost per firm.

Total industry indirect costs *C* = *nvc* is therefore given by the following expression.

$$C = nF + vT + \frac{M}{nv} + nvA$$

Minimising C with respect to n and v leads to the following relationship for optimum industry structure:

$$\frac{n_e}{v_e} = \frac{T}{F}$$

where n_e and v_e are, respectively, the efficient number of rival firms per sector, and the efficient number of separately owned stages of the supply chain. In other words, as T falls relative to F, the cost-minimising number of separate firms along the supply chain increases while the number of firms per sector declines. If T is high relative to F, n_e tends towards infinity, representing perfect competition. As T becomes negligible, n_e tends towards 1: the efficient industry structure is vertically separated but horizontally integrated, i.e. we have the conditions of natural monopoly.

To give a simple illustrative example of how changes in transaction cost can affect concentration, consider the industry structures shown in Figure 2 below. The value of industry indirect cost is given below each structure for T = 5, F = 3, M = 12, and A = 1.

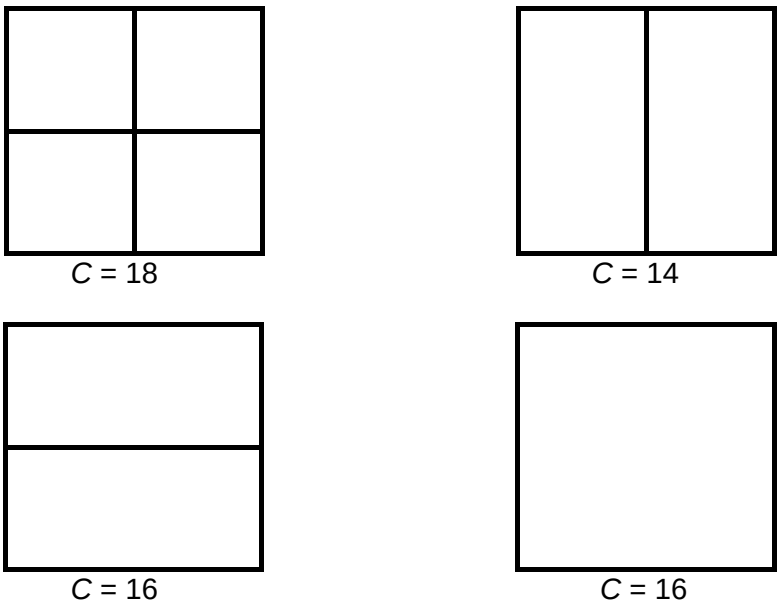

Figure 2: alternative structures (high transaction costs)

The optimum structure is one of two competing vertically integrated firms. Now consider what happens when the value of T drops from 5 to 1. Total indirect costs are now as shown in Figure 3 below.

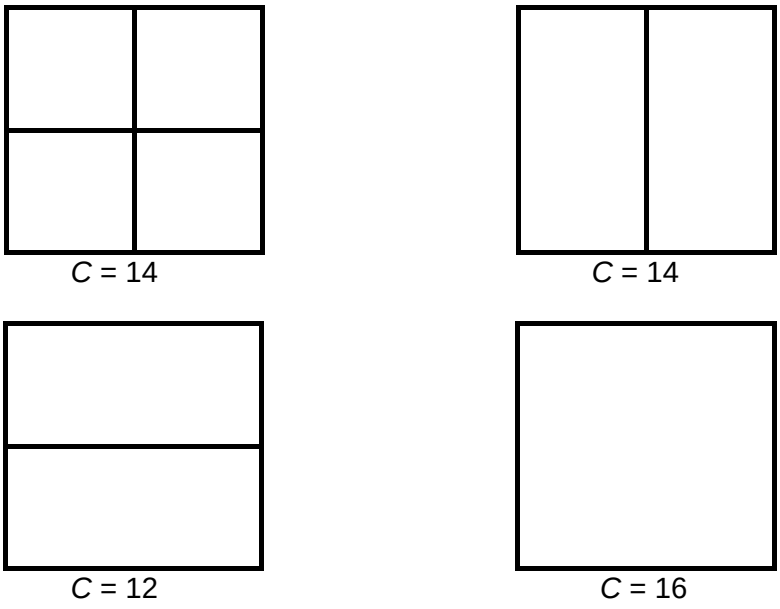

Figure 3: alternative structures (low transaction costs)

The cost-minimising industry structure is now one of upstream and downstream monopolies.

4. Implications of the model

Our model implies that, if transaction costs fall, businesses can achieve efficiency gains through a combination of outsourcing and horizontal integration: becoming 'flatter' and 'wider'. Both outsourcing and horizontal mergers could therefore be seen as consequences of declining transaction costs. Why might transaction costs be falling? The property rights school would most likely see a rise in outsourcing as indicating an improvement in the ability of firms to write complete, contingent contracts. However, empirical evidence does not support this contention – the trend appears to be for managers to write less detailed contracts with employees and suppliers (Kanter 1989, Piore 1989).

An important source of transaction cost in practice is information exchange between firms and their suppliers. Subject to some exceptions[1], the potential losses from imperfect information exchange have received little attention from economists – although there is some recognition of the issue in management and engineering literatures (see e.g. Calinescu *et al*. 1998). As Casson (1996) argues, 'transaction cost theory has paid insufficient attention to information costs.' Indeed, the term 'transaction cost' has become so closely identified with asset specificity and opportunism that some authors are now using other terms to cover those costs of transacting that have nothing to do with opportunism. Malone *et al*. (1987), for example, refer to 'coordination costs', which they define as 'the transaction (or governance) costs of all the

[1] See e.g. Radner (1996), Casson and Wadeson (1998).

information processing necessary to coordinate the work of people and machines that perform the primary processes.'

Since coordination of this kind involves communicating and processing information, it is highly likely that the use of EIE reduces this particular type of transaction cost, as Malone's group of researchers have suggested. EIE, properly implemented, can reduce human error, shorten buyer-supplier communication delays, and speed up the flow of goods and services along supply chains. It can reduce the costs of data storage, communication and processing. A number of researchers (e.g. Malone *et al*. 1989, Michael Hammer[1]) have already observed and documented the link between outsourcing and EIE.

Hagel and Singer (2000) forcefully advocate the 'unbundling' of businesses, stating that the emergence of specialised niche players means that the traditional companies will be left behind unless they focus on one core business. The authors claim that:

> …we are on the verge of a broad, systemic reduction in interaction costs throughout the world economy. Electronic networks, combined with powerful PC's, are permitting companies to communicate and exchange data more quickly and cheaply than ever before. (p. 149)

As early as 1987, Malone, Yates and Benjamin also explained the increase in outsourcing in this way. They claim that since coordination costs are, by definition, the costs of communicating and processing information, it seems reasonable to suppose that the appropriate use of information technology can reduce them. They point out that theirs is a very simple argument, as all it claims is that a reduction in the cost of coordination, which is the major disadvantage of markets, should lead to an increase in the amount of economic activity conducted by markets. Thus:

> This simple argument does not depend on the specific values of any of the costs involved, on the current relative importance of production and co-ordination costs, or on the current proportion of hierarchical and market coordination.

5. Is concentration increasing?

As EIE increases the efficiency of doing business with external parties, horizontal mergers are likely to become more attractive and therefore more prevalent. Even without the possibility of economies of scale, EIE in effect makes horizontal expansion possible by enabling outsourcing as a way of avoiding managerial diseconomies, and hence may also facilitate mergers that simply generate market power.

[1] Michael Hammer, Lubbock Lecture 1999, Said Business School, University of Oxford.

As firms become flatter as a result of outsourcing, they will be tempted to expand horizontally, and many will seek to do so through mergers. This effect is already becoming visible: wider, flatter firms are starting to become the norm. The restructuring of Unilever, an FMCG[1] company that owns a range of brands including Birdseye, Wall's and Persil, is a good example. In the last twenty years the company has been steadily changing, outsourcing much of the production and transport that it used to provide itself, while swallowing up other FMCG companies. Unilever's UK co-chairman Niall Fitzgerald is representative of many old-economy company managers when he comments, 'we're not a manufacturing company any more. We're a brand marketing group that happens to make some of its products.'[2] Recently Unilever was said to be planning to sell a quarter of its manufacturing sites and to be looking for new companies to acquire.

There are many other examples of increasing horizontal integration. The UK pharmaceuticals sector, for example, has seen significant consolidation in the last twelve years. SmithKline and Beecham started the process in 1989, followed by Glaxo and Wellcome in 1994, to produce two closely competing giants. This year the two competitors are in the process of merging with each other. In the same sector we have seen Zeneca merge with Astra, and Celltech Chiroscience merge with Medeva to become Celltech Group. Cost savings, generated by avoiding duplication of R&D and sales efforts, appear to be the motives behind these mergers, but such savings are only possible because EIE allows firms to outsource vertically and hence to expand horizontally.

It is notoriously difficult to measure consolidation, but Table 1 below compares a simple measure of concentration for six key UK industries in 1999 with that in 1995. The measure used is the proportion of the turnover of the top ten companies accounted for by the turnover of the top four. The figures show that, on this measure, concentration has increased in each of the six sectors over the period considered.

[1] Fast moving consumer goods
[2] *Financial Times*, 23 February 2000.

SECTOR	C O N C E N T R A T I O N		
	1995	**1999**	**change**
Retail – food and drug	0.58	0.74	+ 28%
Retail – general	0.79	0.84	+ 6%
Food producers	0.66	0.73	+ 11%
Brewers and distillers	0.79	0.84	+ 6%
Chemicals	0.83	0.86	+ 4%
Pharmaceuticals	0.86	0.99	+ 15%

Table 1: Concentration in six UK sectors

Some authors question the observation that concentration is increasing in line with globalisation. Ghemawat and Ghadar (2000) claim that post-war globalising industries have shown a steady decrease in concentration. However, their data is not conclusive. They calculated a Herfindahl index based on the market shares of the top ten companies in three sectors. The oil industry shows an increase in consolidation in first 5 years of the last decade and a slight downturn in the second three. The automobile industry shows an increase in the last decade. Only the aluminium industry shows a clear recent decline, although notably the authors concede that there would have been an increase had the APA and Alcoa Reynolds mergers been approved.

The increase in mergers certainly seems beyond dispute, although Ghemawat and Ghadar criticise the trend, claiming that ‘management appears to suffer from one or more of several motivational and cognitive biases towards mergers’ (p.69). The number of cases the European Commission has had to review has more than quadrupled over the last seven years; from 60 in 1992 to 272 last year. In the USA, Hart-Scott-Rodino transactions have tripled since 1991, from 1529 to 4642 in the fiscal year 1999. As Parker and Balto (2000) point out, the motivation for mergers is increasingly related to competitive position. As companies get bigger, the effect snowballs; the deals get bigger too. The value of Hart-Scott-Rodino mergers has increased eleven-fold during the same period, from $169 billion to $1.9 trillion.

6. The efficiency defence

Competition policy is founded on the observation that monopoly generates allocative inefficiency, by charging too high a price for its product and producing too little. This leads to the related – though less well supported – thesis that competition is generally desirable. There may be cases, however, when a firm's actions promote efficiency in one sense, but potentially undermine competition. In such instances regulators face a conflict between two types of efficiency. In practice, this conflict is often masked because legislation tends to concern itself exclusively with competition.[1] Williamson (1968) was one of the first to elaborate the concept of the trade-off between efficiency and competition, and to observe that the potential efficiency gain of a merger is an important consideration. He argued that when the efficiency gain is prioritised over competition and the merger in question permitted, the net welfare gain will generally be positive, unless the new firm gains considerably increased market power and exploits this by putting prices up very significantly.

As our analysis in section 3 suggests, *ceteris paribus* it is inefficient for many firms to replicate the same fixed costs at every stage of production. If a merger eliminates this inefficiency, this should be a consideration in whether the merger is permitted. We suggest that the efficiency factor is likely to play a more important role in future mergers, as outsourcing and cross-border EIE facilitate greater exploitation of economies of scale. It is of course far from certain that any given merger will lead to increased efficiency, even where there is potential for elimination of fixed cost duplication. Clashing company cultures, incompatible management styles, and adaptation problems can combine to outweigh the benefits. However, as industry changes in response to e-business, potential efficiency increases need to be considered more carefully. The efficiency defence may come to be a useful criterion for distinguishing a socially beneficial merger from a harmful one.

The status of the efficiency defence in merger policy has historically been uneasy. Indeed, authorities have been prone to regard increased efficiency as an 'offence' rather than a 'defence'. More recently, however, we have started to see more of a debate about the weight that should be given by merger regulators to productive efficiency relative to protecting competition (e.g. Hovenkamp 1994). Williamson's model, despite its flaws and limitations as a practical tool for merger regulators, is beginning to be taken more seriously (Camesasca 1999).

Currently, the position of EC merger policy on the question of efficiency is ambiguous. While efficiencies cannot officially be used as a defence once dominance has been established, an examination of the case law strongly suggests that efficiency considerations do have an impact on decisions. In the 1991 *De Havilland*[1] case, the defence counsel argued that one of the aims of the merger was to reduce costs. This argument was rejected, but on the

[1] The UK's old regime based on 'public interest' was a notable exception.

[1] *Aérospatiale-Alenia/De Havilland* (1991), EC 91/619.

grounds that the cost savings under discussion would have negligible impact. The validity of a cost-saving argument as a defence *per se* was not questioned.

The *De Havilland* case suggests that the Commission requires efficiency gains to be considerable and specific, but is at least prepared to take them into account. However, by not having an explicit policy on efficiency, the Commission lays itself open to accusations of bias. Furthermore, the situation is potentially open to abuses: in the absence of clear guidelines, dubious mergers may be granted on efficiency grounds. Camesasca (1999) has criticised the lack of transparency in European merger regulation, in particular the lack of adequate decision review procedures, pointing out that it leads to suspicion and wild speculation about the role of efficiency considerations. As Neven and Seabright (1993) point out, proper regulation is needed to make the defence valuable. Arguments about potential efficiency gains should enter explicitly in the investigation. They conclude that 'an efficiency defence, if based on a proper audit mechanism, would be a valuable part of Merger Regulation.'

7. Conclusion: implications for competition policy

The conventional vision of internet-engendered markets implies that easy access to a wide range of facts about companies' products will dramatically increase competition. We have argued that this vision is likely to be incomplete at best. We predict that horizontal merger activity will continue to flourish, further increasing concentration. If our model is correct, merger authorities need to acknowledge this phenomenon, and to recognise that static rivalry may come under significant threat in the current decade.

More scope for efficiency-driven mergers between firms with substantial pre-existing market share calls for more explicit recognition of an efficiency defence. Some jurisdictions, notably Canada, already do so without this having led to any noticeable deterioration in competition. Interestingly, Canada's Competition Bureau has adopted a so-called 'total welfare' approach to the issue, as opposed to a more 'consumer-oriented' approach. This means that, whether considering efficiency or competition, the Bureau looks at the net effect on the economy and ignores transfers of surplus between parties. This approach is more consistent with economic principles than one that merely looks at the effect on consumers. It also allows authorities in a merger case to make a more meaningful comparison between the cost of having less competition and the benefit of greater production efficiency.

A reduction in static rivalry will not necessarily lead to a reduction in competition. As Baumol, Panzar and Willig (1982) have argued, concentration need not be harmful so long as barriers to entry are low: the mere threat of competition can make companies behave competitively. As firms become flatter and more virtual as a result of outsourcing, the cost of setting up in

rivalry with any one firm falls. By reducing communication costs, EIE further helps to lower entry barriers and increase contestability.

Merger authorities are likely to have a complex task on their hands over the next few years, as the transition to the 'new economy' generates increasing consolidation. Protecting competition in the traditional sense will become harder. However, if regulators become more permissive of mergers, they can gain some comfort from the fact that compensating factors are likely to assist in the prevention of monopoly: lower entry costs, better-informed customers and more dynamic markets.

References

Arthur, W.B. (1996) 'Increasing returns and the two worlds of business', *Harvard Business Review*.

Baumol, W.J. (1982) 'Contestable markets: an uprising in the theory of industry structure', *American Economic Review*, 75.

Baumol, W.J., Panzar, J. and Willig, R. (1982). *Contestable Markets and the Theory of Industry Structure*, New York: Harcourt Brace Jovanovitch.

Blau, P. and Meyer, P. (1987) *Bureaucracy in Modern Society* New York: McGraw Hill

Brynjolffson, E., Malone, T.W., Gurbaxani, V. and Kambil, A. (1994), 'Does information technology lead to smaller firms?', *Management Science*, 40.

Brynjolfsson, E. (1993) 'An incomplete contracts theory of information, technology and organization', *Management Science.*

Calinescu, A., Efstathiou, J., Shirn, J., and Bermejo, J., (1998), 'Applying and assessing two methods for measuring complexity in manufacturing.' *Journal of the Operational Research Society*, 49.

Camesasca, P.D. (1999) 'The explicit efficiency defence in merger control: does it make the difference?' *European Competition Law Review*.

Casson, M. (1996), 'The comparative organisation of large and small firms: an information cost approach', *Small Business Economics*, 8.

Casson, M. and Wadeson, N. (1996) 'Information strategies and the theory of the firm'. *International Journal of the Economics of Business,* 30.

Coase, R. H. (1937) 'The nature of the firm', *Economica*, 4.

Cooper, A. (1964) 'R&D is more efficient in small companies' *Harvard Business Review*

Cordella, A. and Simon, K. (1997), 'The impact of information technology on transaction and coordination cost', *Proceedings of the 20th IRIS Conference*.

Davidow, W. and Malone, M. (1992), *The Virtual Corporation*, New York: Harper Collins.

Efstathiou, J., Tassano, F., Sivadasan, S., Shirazi, R., Alves, J., Frizelle, G. and Calinescu, A. (1999) 'Information complexity as a driver of emergent

phenomena in the business community', *Proceedings of the International Workshop on Emergent Synthesis*.

Ghemawat, P. and Ghadar, F. (2000) 'The dubious logic of global megamergers', *Harvard Business Review*.

Grossman, S. and Hart, O. (1986) The costs and benefits of ownership: a theory of vertical and lateral integration. *Journal Of Political Economy*, 4.

Hagel, J. and Singer, M. (2000), 'Unbundling the corporation' *The McKinsey Quarterly*.

Harris, B. (1983), 'Organisation: the effect on large corporations', Ann Arbor: UMI Research Press.

Hill, C. (1985a), 'Oliver Williamson and the M-form firm: A critical review', *Journal of Economic Issues,* 19.

HIll, C. (1985b) 'Internal organisation and enterprise performance: some UK evidence' *Managerial and decision economics,* 6.

Hovenkamp, H. (1994), *Federal Antitrust Policy: The Law of Competition and its Practice*, St Paul.

Kanter, R.M. (1989) 'The future of bureaucracy and hierarchy in organisational theory: a report from the field' *Harvard Business School working paper # 90-035.*

Knight, F. (1933) *Risk, Uncertainty and Profit*, London School Of Economics Series of Reprints, No. 16.

Malone, T.W., Yates, J. and Benjamin, R.I. (1987), 'Electronic markets and electronic hierachies', *Communications of the ACM*, 30.

Malone, T.W., Yates, J. and Benjamin, R.I. (1989) 'The logic of electronic markets', *Harvard Business Review*.

McAffee, R. and McMillan, J. (1995) ' Organisational diseconomies of scale' *Journal of economics and Management strategy,* 4.

Neven, D. and Seabright, P. (1993) 'Sensible centralisation', *European Economic Perspectives*, 2.

Neven, D., Nuttall, R. and Seabright, P. (1993) *Merger in Daylight: The Economics and Politics of European Merger Control*. Centre for Economic Policy Research.

Parker, R. and Balto, D. (2000), 'The evolving approach to merger remedies', *Antitrust Report.*

Piore, M. (1989) 'Corporate reform in American manufacturing and the challenge to economic theory', *Sloan Management Review.*

Pondy, L. (1969) Effects of size, complexity and ownership on administrative intensity' *Administrative Science Quarterly,* 14.

Quian, Y. (1994) Incentives and loss of control in an optimal hierarchy' *Review of Economic Studies* 61, 527-544

Radner, R. (1992) 'Hierarchy: the economics of managing', *Journal of Economic Literature,* 30.

Robertson, D. (1923) *The Control of Industry*, London: Nisbet

Scherer, F (1976) Industrial structure, scale economies, and worker alienation', in *Essays on Industrial Organisation in Honour of Joe S. Bain* ed. Masson, R. and Qualls, P, Cambridge, Mass: Ballinger.

Scherer, F. and Ross, D. (1990) *Industrial Market Structure and Economic Performance*, Houghton Miffin.

Schumacher, E. (1989) *Small is Beautiful*, New York: HarperCollins.

Simon, H. (1976) *Administrative Behaviour,* New York: Free Press.

Williamson, O.E. (1968), 'Economies as an antitrust defence: the welfare trade-offs', *American Economic Review*, 58.

Williamson, O.E. (1985) *The Economic Institutions of Capitalism: Firms, Markets, and Relational Contracting*, Simon & Schuster.

Williamson, O. (1993) 'Opportunism and its critics' *Managerial and Decision Economics,* 14.

Williamson, O (1996) *The Mechanisms of Governance* New York: Oxford University Press.