

# Market Structure and Incentives for Innovation

Bhaskar Sastry

June 2005

## Introduction

*“Innovation is the outstanding fact in the economic history of capitalist society or in what is purely economic in that history, and also it is largely responsible for what we would at first sight attribute to other factors”.*

These words were written by the great Austrian economist Joseph Schumpeter over sixty five years ago (Schumpeter 1939, 86). His words are as relevant to firms now as they were then. Schumpeter was the first thinker to emphasise the role of innovation as being central to firms’ productivity growth. He formulated the concept of *creative destruction* after observing the great merger waves of early 20<sup>th</sup> century America. Defined as a process whereby old ideas and industrial structures (products, processes and organisations) are continually replaced by new industrial activity, this is thought to be the source of continuous progress and improved living standards.

The benefits to society arising from innovation are universally appreciated. However, uncertainty exists over which market structures provide the most supportive environment for innovation and technological progress. The theoretical debate focuses on the polar

opposite market structures - monopoly and perfect, or near perfect, competition. Schumpeter (1976) realised, however, that there is little practical relevance in studying perfect competition, it being an idealised concept. A comparison of innovation in monopolies and competitive oligopolies would yield more meaningful results.

Schumpeter believed that there are stronger incentives for monopolists to innovate compared to competitive firms because firms can capture gains without being imitated by rivals. In reality, many innovations are made by firms with dominant market share, *Microsoft Corporation* in the computer software market being just one example. There have been various arguments for and against the proposition that monopolies provide greater incentives to innovate than competitive oligopolies. A striking feature of the debate is the lack of consensus on basic issues.

## Monopoly and Innovation

Initially, it appears logical to think that firms in competition would have more incentive to innovate because of the need to outperform rivals with new and improved products or services. Monopolists would not have to continually innovate because they have the cushion of total or almost total market share. This simplified view makes a number of assumptions, however. Monopolists certainly have the capabilities to innovate efficiently. They have large economies of scale due to diminishing unit costs. Along with the fact that they can charge prices well in excess of marginal cost, the potential profits are enormous. These profits can be re-invested into new technologies and processes to stimulate innovation. Research shows that monopolies do utilise these capabilities to innovate. For example, Blundell et al (1999) found in an analysis of British manufacturing firms that the monopolist's large size resulted in higher investment in research and development. Monopolists also have an in-depth understanding and experience of the economy in which they operate in, leading to precise innovative decisions being made. Often this involves incumbents enforcing their monopoly power by erecting barriers to entry to protect themselves.

Indeed, the ease of entry of potential entrants into the market is a crucial determining factor of monopolist behaviour. When barriers to entry are low or non-existent,

monopolists usually try to innovate rapidly to retain their market share and high profits. Etro (2006a) has shown that in a market where entry is free but a firm has leadership, the firm will act more aggressively than any firm in a competitive market. This is because their need to maintain market power is greater than competitive firms' need to outperform its rivals. This firm will produce a higher output, set lower prices and invest more in research and development. Smaller firms may not even enter the monopolist market as it is seen, paradoxically, as being too competitive. One estimate suggests that for a new firm to enter a monopoly-dominated industry, it would require assets greater than 40% of an industry's value (Parente and Prescott 1999), which could only discourage potential entrants from entering the market.

If the barriers to entry are high, the incumbent will have no immediate need to invest in new technologies as its existing monopoly is less likely to be challenged. Etro (2006b) finds, however, that this assumes that strategic investment by leaders will make potential entrants less aggressive. They can also react more aggressively and the outcome then is unclear. In the long-run, potential entrants should be able to invest in new technologies and innovate on a smaller scale. Despite large firms being proportionally more innovative than small firms, these small potential entrants are capable of "leapfrogging" the incumbents to gain a larger proportion of the market. This assumes that the technology required for innovation is available to all firms. Because of this, theory suggests that monopolists always have incentives to innovate whether barriers to entry are high or low.

Etro (2004) has viewed monopoly innovation favourably showing that the innovative process is naturally connected to the persistence of monopolies. Their investment in research and development would be beneficial to society as they advance new technologies. Hausman (1998) has earlier argued that the actions of monopolies with regards to price discrimination, particularly third-degree price discrimination, may not always be at the expense of consumers. Monopolies are capable of opening new markets, achieving economies of scale and higher efficiency and, importantly, increasing net social welfare.

A related issue is the reverse relationship of how continuous innovation influences market structure. The majority of evidence suggests that innovation eventually causes a drift towards monopoly. Geroski and Pomroy (1990) discovered that innovation increases the degree of competition in markets resulting in a steady fall in market concentration over time and the emergence of very few firms with large market share. Firms will want to innovate first so that they emerge as incumbents in the newly formed monopoly. This raises the question as to whether firms utilise their market share to innovate or whether firms innovate to gain market share. Empirical evidence suggests the latter occurs more often in practice, but in either case these two propositions are circular in nature with one logically leading to the other.

## Arguments against Monopoly-Driven Innovation

The first economist to identify flaws in the Schumpeterian analysis of innovation was Kenneth J. Arrow who, in a seminal paper, questioned the common view that monopoly stimulates innovation (Arrow 1962). His point was that a pre-innovation monopolist has a weaker incentive to innovate than a firm operating in a competitive market. For a monopolist, innovation simply replaces one profitable investment with another, something that Arrow called the “replacement effect”. Incumbents may thus be resistant to change or unable to respond to radical innovation due to organisational inertia. The monopolist may actually receive a lower net return from introducing a new innovation that displaces activities of the old one. This is because the opportunity cost of innovation adds to the actual cost arising when the incumbent’s capital stock is locked into a particular technology, slowing response to a new more profitable innovation. Arrow stated that when there is competition to innovate, monopolists innovate at a slower rate than competitive firms, who in turn innovate below the socially optimising level. This has been confirmed empirically in a study of innovation in transition economies which concluded that new firms drive innovation and that for these firms competitive pressures raise innovation (Aghion et al 2002). Policies to encourage product market competition were found to assist both old firms before transition and new firms who would be spurred to innovate because of the potential increased profits derived from outdoing competitors.

Geroski (1990) has defined two further reasons why monopolies could have a negative effect on innovation. Firstly, the absence of competitive forces could reveal a behavioural disadvantage of monopolies who may relax in the knowledge that they have large current market share and high profits. Secondly, in a competitive market, more firms are searching for innovations, therefore the probability of an innovation being discovered in any time period is high. Monopoly and the presence of entry barriers may then lead to inefficiencies in innovation. Hoppe and Lee (2000), who studied entry deterrence and innovation in monopolies for durable goods, found that the durability of a good either acts as an entry barrier itself or creates opportunities for incumbents to deter entry by limit pricing. This results in underinvestment in innovation when the incumbent chooses not to innovate. It also leads to inefficient innovation whether the incumbent chooses to innovate or not.

A further concern is that even if monopolies do allow plentiful innovation and technological advances, their existence means that consumer welfare is not maximised. This contradicts the evidence provided by Hausman (1988) and Etro (2004), amongst others. In a recent paper, it has been shown that the social welfare benefits of innovation are illusory because these are captured by the monopolist as extra profits (Reksulak et al 2005). Despite the fact that some of the benefits of innovation are transferred to consumers when the monopolist expands output and lowers prices, the deadweight welfare loss to consumers increases. The opportunity cost of monopoly expansion is loss of consumer welfare because the progressive monopolist limits output below the competitive level proportionately more after innovating than before.

## Case Study and Discussion

Schumpeter was far ahead of his time in considering the role of market structure in innovation. His notion that large firms with market power advance the rate of innovation through creative destruction has been shown to be accurate at times, particularly when his thesis was written, despite the fact that statistical evidence for Schumpeter's hypothesis has been shown to be "fragile" (Cohen and Levin 1989).

*Microsoft Corporation* in the computer software market is an interesting example of the interaction of monopoly structure and innovation (The Economist 2000). *Microsoft* is a firm at the forefront of economies that have been increasingly knowledge-centred over the past twenty years. *Microsoft* has invested heavily in technology and labour to remain at the forefront of software production and have realised the benefits in the millions of software packages that have been sold. There are large economies of scale explaining the function and persistence of monopolies where costs are a major barrier to entry.

This begs the question of whether anti-trust authorities should limit monopoly behaviour. The information economy is an exception to the general rule in that knowledge-based monopolies are short-lived because of technological change and the presence of diffusion and vigorous competition. In addition, the phenomenon of increasing returns may spur monopolies to raise output further and lower prices. To prevent potential entrants taking over, monopolies must consistently innovate to maintain efficiency and market share. This self-preserving system appears to negate the idea that antitrust must actively enforce market standards against monopolies, particularly those marked by technical innovation. There is, therefore, an argument for stronger patents and licenses which can encourage innovation. Etro (2006b) believes that the behaviour of monopolists depends crucially on the presence of barriers to entry. If barriers are high, the monopolist would maintain high prices; if barriers are low, then normal competitive prices would exist implying that antitrust enforcement should focus on the elimination of barriers to entry, rather than aggressive monopolists. Romer (1990) already established that competition policy should be emphasised in times of rapid technological progress because this is when incumbents will always try hardest to stifle the innovation of potential entrants. This finding was the basis of the legal battle between the United States Department of Justice and *Microsoft*. The US government accused the firm of using its prodigious market power and immense profits to harm other firms (Oracle and Sun Systems) that could intensify competition against it. Innovations potentially benefiting consumers were said to never occur because they are not in *Microsoft's* interests. The firm was also accused of harming consumers with its pricing behaviour implying that monopolies can result in inefficiencies and reductions in social welfare as Reksulak et al (2005) have highlighted. *Microsoft* was

forced to split into a Windows company and a separate applications company, although each firm has the freedom to operate freely in the competitive market.

The overall effect of market structure on innovation is complex. Theory has generally supported Schumpeter's hypotheses. The empirical evidence in favour of Schumpeterian innovation dynamics, on the other hand, is weak. The relationship most likely depends on the characteristics of the industry under consideration (particularly the number of firms in the market and the level and availability of technology). Geroski (1990) has stated that the role of rivalry in stimulating innovation is considerable but is nowhere near as important as that of technological opportunity. Monopolists are capable of doing this due to higher profits and the ability to feed off past innovations. The benefits are offset by the possible negative effects of social welfare loss to consumers and the squeezing out of competitors; problems that are avoided in a competitive market. Nicholas (2003) concludes that competition, not market power, encourages firms to innovate. Institutions and government policy are significant. Technological change and productivity growth has been known to occur more freely when the government sets a favourable climate for change (Acemoglu et al (2002). Also important is the enacting of appropriate antitrust legislation. From a policy perspective, antitrust interventions must examine carefully and individually the cases of firms abusing monopoly power and should not always act to eliminate the incentives for innovation. It is these incentives that are the source of many economic and social advances that monopolies contribute to society.

## Bibliography

Acemoglu, D., P. Aghion and F. Zilibotti (2002). “Distance to Frontier, Selection and Economic Growth”. *MIT Economics Working Paper*, No. 04-03.

Aghion, P., W. Carlin and M. Schaffer (2002). “Competition, Innovation and Growth in Transition: Exploring the Interactions between Policies”. *William Davidson Working Paper*, No.151.

Arrow, K.J. (1962). “Economic Welfare and the Allocation of Resources for Inventions”, in Nelson, R.R. (ed.), *The Rate and Direction of Inventive Activity: Economic and Social Factors*. Princeton University Press. Princeton.

Blundell, R., R. Griffith and J. van Reenen (1999). “Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms”. *Review of Economic Studies*, Vol. 6, No. 3: 529-554.

Cohen, W. and R. Levin (1989). “Empirical Studies of Innovation and Market Structure”. *Handbook of Industrial Organisation*, edited by R. Schmalensee and R.D. Willig, 1059-1107. London: North Holland.

Economist Magazine (2000). “*Knowledge is Power: Do we need a new Competition Policy for the new Economy*”, September 21<sup>st</sup>.

Etro, F. (2004). "Innovation by Leaders". *The Economic Journal*, Vol. 114, No. 495: 281-303 (23).

\_\_\_\_\_ (2006a). "Stackelberg Competition with Endogenous Entry". Mimeo. INTERTIC.

\_\_\_\_\_ (2006b). "Aggressive Leaders". Forthcoming in the *Rand Journal of Economics*, Vol. 37 (2), Spring Issue.

Geroski, P.A. (1990). "Innovation, Technological Opportunity and Market Structure". *Oxford Economic Papers*, New Series, Vol. 42, No. 3: 586-602.

Geroski, P.A. and R. Pomroy (1990). "Innovation and the Evolution of Market Structure". *Journal of Industrial Economics*, Vol. 38, No.3: 219-314.

Hausman, J.A., and J.K. MacKie-Mason (1988). "Price Discrimination and Patent Policy". *The RAND Journal of Economics*, Vol. 19, No. 2: 253-265.

Hoppe, H.C. and I.H. Lee (2000). "Entry Deterrence and Innovation in Durable Goods Monopoly". *Econometric Society World Congress 2000 Contributed Papers*, No. 0610.

Parente, S.L. and E.C. Prescott (1999). "Monopoly Rights: A Barrier to Riches". *American Economic Review*, Vol. 89 (5): 1216-1233.

Reksulak, M., W.F. Shughart II and R.D. Tollison (2005). "Innovation and the Opportunity Cost of Monopoly". Submitted to *Journal of Industrial Economics*, refereed.

Romer, P. (1990). "Endogenous Technical Change", *Journal of Political Economy*, Vol. 98: 71-102.

Schumpeter, J.A. (1939). *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York: McGraw Hill.

\_\_\_\_\_ (1976). *Capitalism, Socialism and Democracy*, 5<sup>th</sup> Edition. London, Allen and Unwin.