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111 Sparks Street, Suite 500
Ottawa, Ontario K1P 5B5
613-233-8891, Fax 613-233-8250
csls@csls.ca

CENTRE FOR THE STUDY OF LIVING STANDARDS

# COMPETITIVE INTENSITY AS DRIVER OF INNOVATION AND PRODUCTIVITY GROWTH: A SYNTHESIS OF THE LITERATURE

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Andrew Sharpe and Ian Currie

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# Competitive Intensity as Driver of Innovation and Productivity Growth: A Synthesis of the Literature


## Abstract

The objective of the report is to survey and assess the existing economic theoretical literature and empirical evidence on the linkages between open and competitive markets (competitive intensity) and innovation and productivity growth. The report is divided into three main parts. The first part examines the state of economic theory on the relationship between competitive intensity, innovation and productivity. The second section examines relevant empirical work that has been done on the role of firm dynamics in sustaining a competitive environment. The third section surveys evidence of linkages provided by the international case studies of the effects of open and competitive markets on innovation and productivity. The report concludes that the weight of the evidence indicates that competitive intensity has a strong positive effect on innovation and productivity. Accordingly, Canada should pay closer attention to the competitive implications of public policy than has been the case in the past. The international experience provides strong support for this conclusion. While there can be negative implications for certain groups from such policy changes, the evidence shows that they are often smaller than anticipated. Restrictions on competition should only be allowed when it can be demonstrated that they are needed to achieve overriding societal interests.



## Résumé

L'objectif de ce rapport est de passer en revue et d'évaluer la littérature théorique ainsi que les études empiriques portant sur les relations entre les marchés ouverts et compétitifs (intensité de la compétition) d'une part et l'innovation et la croissance de la productivité d'autre part. Ce rapport est divisé en trois sections majeures. La première partie examine l'état de la connaissance économique sur la relation entre l'intensité de la compétition, l'innovation et la productivité. La deuxième examine les études empiriques portant sur rôle de la dynamique des firmes dans le soutien d'un environnement compétitif. La troisième section recense les études de cas internationaux ayant trait aux effets des marchés ouverts et compétitifs sur l'innovation. Ce rapport conclut qu'après pondération des preuves présentées l'intensité de la compétition a un puissant effet positif sur l'innovation et la productivité. Conséquemment, le Canada devrait porter plus attention aux conséquences sur la compétition découlant de ses politiques publiques qu'il ne l'a fait dans le passé. Les expériences internationales présentées dans ce rapport apportent un support solide à cette conclusion. Bien qu'il puisse y avoir des conséquences négatives pour certains groupes résultant de changements de politique, les études à notre disposition démontrent que celles-ci sont souvent plus petites qu'anticipées. L'imposition de restrictions à la compétition devrait être allouée que s'il peut être démontré que ces mesures sont nécessaires à l'atteinte d'objectifs sociaux primordiaux.

# Executive Summary

The objective of the report is to survey and assess the existing literature and empirical evidence on the linkages between open and competitive markets (competitive intensity) and innovation and productivity growth.

The report is divided into three sections. The first section examines economic theory and related empirical work on the relationship between competitive intensity and innovation. The second section reviews the literature on the role of firm dynamics, entry exit and expansion, in productivity growth. The third section surveys the international experience of governments in fostering open and competitive markets or increasing competitive intensity, and the effects of these measures on innovation and productivity.

**The Relationship between Competitive Intensity, Innovation and Productivity**

Much empirical work has been done on the relationship between competitive intensity, innovation and productivity. Many studies find that the relationships between competitive intensity and innovation, and innovation and productivity, are positive.

The traditional view of innovation relating to market structure, going back to the work of Schumpeter, holds that firms in a concentrated market should innovate to a greater extent. However, recent research has shown that there is a positive association between market competition and the degree of innovation. According to Geroski (1990), "it seems reasonable to conclude that actual monopoly has an unambiguously inhibiting effect, and that rivalry has an unambiguously stimulating effect on innovativeness."

Apart from identifying the sign of the relationship between competitive intensity and innovation, researchers are also interested in ascertaining the shape of that relationship, which may be non-linear. One possible shape that this relationship could take is an inverted U-shape. In practice, this would mean that in industries where competition is low, innovation would also be low. But when there are very high levels of competition, innovation will also fall off. However, empirical support for this theory is limited and subject to question. Moreover, its leading proponents, rather than arguing for the restriction of competition, emphasize the importance of sustaining competition to promote innovation particularly in industries that are close to the technological frontier

Finally, back to the work of Schumpeter, there is a view that large firms innovate more intensively than smaller firms. However, firm size has generally not been found to be a robust predictor for innovation. In fact, while large firms do spend more on research and development (R&D) than smaller firms, due to their size and greater profits, they may not be intrinsically more innovative. Indeed, small firms are found be more innovative per dollar of R&D. Yet, to fully realize the potential profits from innovation, small firms must often be acquired by larger firms, which benefit from easier access to

external funds, economies of scale and scope and more effective marketing of new products. In this context, small firms often act as "incubators" for innovative ideas.

**The Importance of Firm Dynamics for Innovation and Productivity**

Firm dynamics deal with competition as a process rather than as a state of affairs. A defining feature of competitive markets is freedom for participants to enter and exit markets. Through the process of entry and exit, and growth and decline of individual firms, resources are reallocated from less efficient to more efficient businesses.

Empirical work on firm dynamics provides strong support for open market policies as a means to promote productivity. The work indicates that entry, exit and expansion of firms play a key role in promoting productivity growth. As in the case of competition, entry appears to be particularly important in industries that are closer to the technology frontier.

**Competitive Markets as Driver of Innovation and Productivity: International Experience**

International experience, overall, supports the existence of a strong link between competitive intensity and innovation and productivity. This section of the report reviews the international experience related to open and competitive markets as enablers or drivers of innovation and productivity. It reviews research by the OECD and by government researchers in the United Kingdom, Australia, the United States, the European Union and other countries. It then examines the empirical evidence that has been gathered by the McKinsey Global Institute and Michael Porter and Associates on the role of competitive markets as drivers of innovation and productivity growth.

The OECD has done extensive work on the drivers of innovation and productivity. An important component of this work has involved the building of a set of quantitative indicators of product market regulation based on questionnaires sent to OECD member governments covering three domains: state control, barriers to entrepreneurship and barriers to trade and investment. The main conclusion from this OECD research is that regulatory reforms promoting competition tend to boost productivity.

Pertaining specifically to Canada, OECD researchers find that Canada's overall market regulation ranking fell from fourth to eighth among OECD countries from 1998 to 2003. Recent OECD research based on the indicators find that if Canada would have followed the reforms of the least restrictive country in 1995, productivity growth between 1996 and 2003 would have been 1 percentage point higher per year. This represents an almost 50 per cent increase relative to the actual level of productivity growth over that period.

The United Kingdom has the lowest level of product market regulation (tied with Australia, according to the OECD). A large quantity of research conducted in the UK

about competition, innovation and productivity, especially by the UK Treasury, the Department of Trade and Industry, and the Office of Fair Trading, finds that a competitive environment is beneficial to productivity growth and innovation because it provides strong incentives for firms to adopt best-practice techniques and engage in innovative activity and that harmful side effects of increased competition, which are often feared before implementing a reform, are found in many instances to not actually materialize. Reflecting the relationship between competition and innovation and productivity, this work supports the maintenance of a broad based competition policy dealing with anti-competitive private business practices and unnecessary government restrictions of competition.

Australia introduced a program to improve competition in 1995, called the National Competition Policy (NCP). The NCP recognized that competitive markets will generally serve the interests of the consumers and the community. However, it also recognized that in some cases, increased competition may not be desirable, and in these cases policies that moderate competition can be beneficial to the community.

Ten years after the introduction of the program, the Australian Productivity Commission found that NCP had contributed importantly to productivity increases and growth in household incomes; it reduced the prices of goods and services such as electricity and milk; it stimulated business innovation; and it helped meet some environmental goals such as the efficient use of water.

The United States was a first mover among OECD countries in deregulating previously regulated economic activity beginning in the mid-1970s when it deregulated the airline industries. It is today a world leader in recognizing the importance of competitive forces for raising production efficiency and consumer welfare. According to a survey by the Brookings Institution, the United States gained at least US$36 to US$46 billion annually ($1990) from deregulation, primarily in the transportation industries. From these findings, it is concluded that most industries should be deregulated, unless it can be shown that price and entry competition will not materialize.

Other researchers have also conducted important research on the relationship between competition and innovation and productivity. Michael Porter, whose work has focused on the importance of competition for innovation and productivity, shows that local competition and vigorous domestic rivalry promotes success in international markets. The McKinsey Global Institute (MGI) case studies have found that competition intensity has a positive effect on productivity. This effect comes from multiple factors, such as concentration (as long as it allows for intense competition), removal of trade protections and deregulation. Other factors such as minimum wages, work rules and zoning laws also had an indirect effect on productivity. The MGI also highlights the fact that competition increases managerial innovation, and that managerial innovation is a key factor for increased productivity.

## Case Studies

Two case studies are included in the appendices of the report. The first investigates the deregulation of the European air passenger transport. Three lessons are learned from this experience:

- competition can provide consumers with substantially lower prices, in turn stimulating demand and creating new markets;
- deregulation can produce major gains for consumers without damaging the long-term profitability of firms; and
- open and free competition is of crucial importance for productivity growth in an industry since it encourages entrepreneurial activity and industry innovation.

The second case study examines the reorganization of the Canadian wine industry after the introduction of the Free Trade Agreement with the United States in 1989. This transformation has shed light on how increased foreign competition can drive innovation and enhance the competitiveness of an industry. From a protected and inward-looking industry not recognized outside Canadian frontiers, the wine industry has now become internationally recognized for certain products of high quality.

## Conclusion

This report concludes that competition has a positive effect on both innovation and productivity. International experience provides strong support for this conclusion. While there can be negative implications for certain groups from such policy changes, the evidence shows that they are often smaller than anticipated. Restrictions on competition should only be allowed when it can be demonstrated that overall societal interests are not served by a competitive marketplace.

# Competitive Intensity as Driver of Innovation and Productivity Growth: A Synthesis of the Literature[1]

## I Introduction

The objective of this report is to survey and assess the existing literature and empirical evidence on the linkages between open and competitive markets (competitive intensity) and innovation and productivity growth. This report reviews and synthesizes studies on the relationship between market competitive intensity, innovation, and productivity.[2] It is not a comprehensive "literature review." Instead, it provides a selected synthesis of the literature, one that necessarily reflects the exercise of qualitative judgment by the authors. It highlights areas where considerable advances in our knowledge have been made, but also areas where our knowledge is much more tentative.

The approach, content, and conclusions reached within the empirical literature (both economic and business management streams) are shaped by diverse theoretical foundations, assumptions, and methodologies. The economic studies rely on many different economic models and theories, including Industrial Organization (IO) models.

The report is divided into three main parts. The first part examines the literature on the still evolving theory on the relationship between competitive intensity and innovation. While early theoretical work suggested there may be a negative relationship between competition and innovation, most empirical studies have found the relationship between competitive intensity and innovation, and between innovation and productivity, to be positive. Further, market concentration, when not accompanied by competitive intensity, is not usually found to be an enabling condition for innovation or productivity growth.

The second part examines the empirical literature on the role of firm dynamics in fostering productivity growth. A defining feature of competitive markets is freedom for participants to enter and exit as well as expand or contract in markets. This literature indicates that the entry and exit, and the growth and decline of individual firms ("firm dynamics"), by allowing resources to be reallocated from less productive to more productive businesses, plays an important role in enabling innovation and productivity growth. Accordingly, it emphasizes the importance of open trade and government

[1] This report was written by Andrew Sharpe and Ian Currie with contributions from Sharon Qiao, Bonnie Gunn, and Simon Lapointe, and with financial support from the Canadian Competition Bureau. The author would like to thank Sheridan Scott, Gernot Kofler and Mark Ronayne from the Competition Bureau for comments of earlier versions of the report. The views expressed in the report are that of the authors, and do not necessarily reflect those of the Competition Bureau.

[2] The report does not examine in detail the degree to which Canada's productivity and innovation would be enhanced by measures that boost competition, nor identify and analyze the markets where competition may be lagging.

policies that foster firm entry and exit as drivers of innovation and productivity growth and innovation.

The third part surveys the international experience of governments in fostering open and competitive markets or increasing competitive intensity, and its effects on these countries' innovation and productivity performance. This section includes discussion of the experience of the OECD countries, as shown through research work undertaken within the OECD, the United Kingdom, Australia, the United States, and the work of the McKinsey Global Institute and Michael Porter and Associates. The evidence in the section strongly supports a positive relationship between open and competitive markets and productivity and innovation.

**Measuring Market Structure, Conduct and Performance (SCP)**

There are various quantitative measures of market structure (number and size of firms in a market), conduct (behaviour of these firms) and performance (market outcomes):

- concentration ratios (CRs) are typically used to measure the proportion of sales or production that are accounted for by the largest firms in the industry. As described by Harrison and Rude (2004): "This ratio shows the percentage of total sales that are contributed by the largest firms ranked by order of market share. For instance the CR4 measures the market share of the four largest firms, while the CR8 measures the market share of the eight largest firms. ...The concentration ratio is effective in showing the dominance of the top firms, but it does not address the rest of the market nor does it account for the influence of a single firm";

- the Hirschman-Herfindahl Index (HHI) is one alternative measure of concentration and takes into account the number of firms and their relative size. It is calculated as the sum of the squares of the market shares of each individual firm. However, it is not always clear how the HHI should be interpreted. For example, in a small open economy, a strictly national measure of concentration may not provide much insight;

- price-cost margin (PCM) indexes are frequently used as a measure of competitive intensity. They attempt to measure to the firm's ability to set its prices above its marginal costs (i.e., the mark-up that firms charge). A widely used PCM index is the Lerner Index (usually defined as the difference between price and marginal costs relative to the price). However, marginal costs are seldom directly observable and proxies for marginal cost (i.e. average cost) carry their own drawbacks (i.e. they generally come from accounting data which may not accurately provide measures of cost);

- within the business stream of literature, alternative measures of competitive intensity are found. For example, Porter (2001) proposes fluctuations in market share among leading competitors, controlling for outside shocks, as a direct and "far more compelling indication of the intensity of competition"; and

- Ahn (2002) points out that, in measuring the degree of product market competition in a highly integrated international market, it may be necessary to consider concentration in world markets rather than to focus on domestic markets (hence a reliance on import penetration ratio's as a measure of foreign competition).

**Measuring Innovation**

A variety of different measures of innovation are commonly used, including R&D spending, patenting activity, innovation counts, and total factor productivity (TFP). Each of these is subject to its own limitations. For example:

- R&D expenditures are an input to, not an output from, innovation;
- the propensity to patent varies across firms and industries and the distribution of patents' economic value is uneven; and
- innovation counts (the number of "new" inventions introduced) are difficult to obtain, exhibit variability in quality, and requires subjectivity in choosing what to count.

Such quantitative indicators are also subject to criticism on the grounds that while they may (narrowly) capture the creation of new knowledge, they the do not capture its rate of adoption and diffusion through the economy.

Economists sometimes use estimates of Total Factor Productivity (TFP) growth, sometimes called multi-factor productivity (MFP), as an indicator of technological change or dynamism. These estimates provide the residual output growth once the weighted contributions of changes in capital and labour inputs are accounted for.* However, Richard Lipsey and Kenneth Carlaw (2000, 2004) have argued that changes in TFP do not measure technological change, only the super-normal returns to investing in such change:

> "It seems to us that, whatever TFP does measure, and there is cause for concern as to how to answer that question, it emphatically does not measure all of technological change... While people are of course free to measure anything that seems interesting to them, the degree of confusion surrounding TFP, particularly the assumption that low TFP numbers imply a low degree of technological dynamism, would seem to us to justify dropping the measure completely from all discussions of long term economic growth. Even if that does not happen, as we are sure it will not, every TFP measure should carry the caveat: there is no reason to believe that changes in TFP in any way measure technological change."**

* Nicoletti and Scarpetta (2003) note that MFP growth estimates involve a number of assumptions concerning both the measurement of output and inputs and stress that estimates of MFP are problematic for a number of service industries, especially in level terms, because of the way in which both output and inputs are measured.

** Lipsey and Carlaw, 2000.

# II Economic Theory on the Relationship between Competitive Intensity and Innovation

This section reviews the literature on the economic theory related to the relationship between competitive intensity and innovation. Early economic thinking, based on the work of Joseph Schumpeter, posited that concentrated market structures are likely to lead to higher levels of innovation. In essence, concentrated market structures provide incumbent firms with both the means (e.g. financial standing) and the incentive (e.g. to protect their *existing* market power) to innovate. In the late 1950s Kenneth J. Arrow offered an alternative view: that a monopolist might be less innovative because, in bearing the cost of investing in innovation, it gives up the opportunity to continue to earn monopoly profits it could enjoy without innovating.[3]

Much of the empirical work over the past half-century has fundamentally been shaped by these two different views. In summary, the empirical studies show that:

- market concentration in and of itself does not necessarily create a situation of low competitive intensity;

- the relationship between competitive intensity and innovation, although generally found to be positive, may be "non-linear". There remains considerable uncertainty as to the actual non-linear "shape" (if any) that it may take and under what circumstances (i.e. there may be differences depending on the industries and technologies considered); and

- large and small firms have different innovation advantages they can draw upon, some of which are related to market structure and competitive intensity, and yet firm size has generally not been found to be a robust predictor of innovation performance.

## A. Market Concentration and Competitive Intensity

That market concentration in and of itself does not necessarily create a situation of low competitive intensity is widely recognized and finds its theoretical basis in contestable market theory. Contestable market theory suggests that even in a monopoly or oligopoly market structure, the incumbent companies will behave competitively should barriers to market entry be low. This point is prominently made within the "business management" stream of studies. For example, the McKinsey Global Institute (MGI), in a series of studies analyzing international productivity levels from a business management perspective, found that:

[3] More specifically, Arrow (1959:19) stated that: "The only ground for arguing that monopoly may create superior incentives to invent is that appropriability may be greater under monopoly than under competition. Whatever differences may exist in this direction must of course still be offset against the monopolist's disincentive created by his pre-invention monopoly profits."

> A high market share held by a small number of firms is not necessarily inconsistent with intense competition. Concentration can improve productivity through achieving economies of scale, and it can also boost productivity if it allows a small number of large firms to compete intensely with each other. (Kellison 2004:v)

## B. Market Concentration and Innovation

There is little empirical evidence to support the view that there is a positive association between a high degree of market concentration (in the absence of competitive intensity) and innovation. In contrast, three notable studies conducted during the 1990s that support (at least within some bounds) a positive association between market competition/competitive intensity and innovation, are those by P.A. Geroski, S. Nickell, and, more recently, by Blundell, Griffith, Howitt, Aghion, Disney and Van Reenen.[4]

Geroski (1990) found little support for assertions about the role of monopoly in stimulating innovation and that: "...our data suggest that the price which has to be paid for high levels of innovation may not include tolerating the growth of highly concentrated, imperfectly competitive market structures." Geroski's findings represent an important analytical contribution because he explicitly recognized that market power cannot be fully captured by just one variable. Geroski used a number of different measures of market power: the extent of market penetration by entrants; market share of imports; the relative number of small firms; the change in concentration; the market share of exiting firms; and concentration ratios. The measured direct and indirect impact of the market power variables on innovation (measured by counts of 4,378 "significant" innovations introduced in the UK over the period 1945 - 1983[5]) were found to be positive and, according to Geroski, "it seems reasonable to conclude that actual monopoly has an unambiguously inhibiting effect, and that rivalry has an unambiguously stimulating effect on innovativeness."

Nickell (1996) drew on micro-level panel data from 700 U.K. manufacturing companies (covering the period 1972-1986) to provide evidence that competition, as measured by increased numbers of competitors or by lower levels of rents (Lerner Index), is associated with a significantly higher rate of total factor productivity growth (TFP). In this context, TFP is taken as a measure of an economy's long-term technological change. Nickell also found differences in average TFP growth rates across different industries and

[4] Earlier contributions were made by such economists as Mansfield, Scherer, Nordhaus, Fisher, Termin and others.

[5] Geroski discarded the use of R&D expenditures as a proxy for innovation on the basis that: "R&D expenditures are not only likely to be a poor measure of total research activity, but they may actually mis-measure true research activity with an error which depends on the degree of monopoly." (p.589). Geroski (1990:589) also stated that "R&D expenditures are incurred almost exclusively by large firms whereas innovations are produced by large and small firms, suggesting that the research inputs of small firms are under-recorded." As summarized in Ahn (2002), from a more recent and much larger data set of around 143,000 UK establishments over the period 1980-1992, Disney *et al.* (2003) also found that market competition significantly raised productivity levels as well as productivity growth rates.

that these were correlated with differences in the level of market competition (measured by an index of measures of profitability and concentration) across industries.

Blundell, Griffith and Van Reenen (1999) drew on innovation counts as a proxy for innovation output. Based on data from 340 firms listed on the London International Stock Exchange between 1972 and 1982, they found that:

> Within industries it was the high market share firms who tended to commercialize more innovations although increased product market competition in the industry tended to stimulate innovative activity. A direct effect of innovation was also found in the stock market value model (in levels or differences). More interestingly, the higher market share firms tended to benefit most from innovations. This was confirmed when estimating all equations within a particular industry (pharmaceuticals) and when patents were used as an entirely independent measure of technological capability. (539)

## C. The Non-linear Relationship between Market Structure and Innovation

A great deal of empirical work has been on the theoretical proposition that the relationship between competition and innovation takes an "inverted U-shape."[6] As described by Howitt (2004):

> . . . [T]he theory predicts that industries in which there is little competition will not be innovative because firms in such industries can earn lots of profit even without having to innovate. Innovation will also be low in industries where there is so much competition that once one firm establishes a technological lead the followers are discouraged by their inability to earn profits until they climbed into the lead themselves, and the leader finds that because the followers are discouraged it does not have to innovate very frequently in order to retain the lead. Thus innovation typically takes place most rapidly at some intermediate degree of competition between these two extremes. This specific non-linear relationship is an extremely robust feature of UK manufacturing data."[7]

Aghion (2006) notes that the inverted U-shaped relationship between competition and innovation has a behavioural base. Firms have little incentive to innovate if they are not stimulated by competition, but too much competition discourages innovation as firms are not able to reap the benefits of their efforts. Aghion (2006:4) also points out that the significance of competition increases as industries approach the technology frontier:

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[6] The possibility of an inverted-U shaped relationship was also advanced by F.M. Scherer (1967).

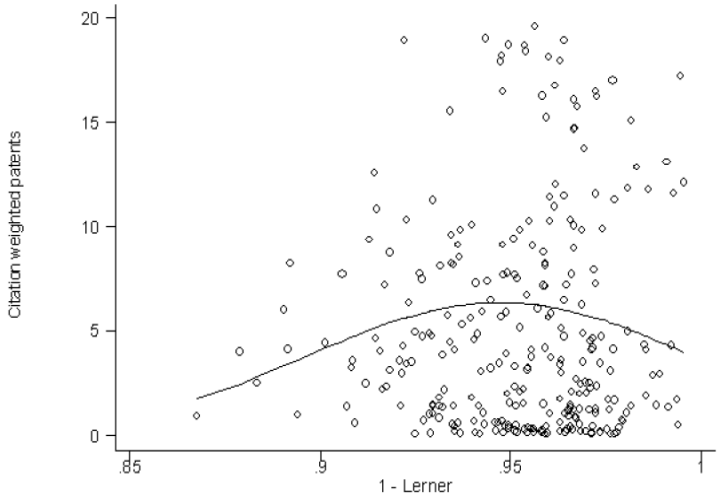
[7] More specifically, Aghion *et al*. (2005:702) propose that: "In this model both current technological leaders and their followers in any industry can innovate, and innovations by leaders and followers all occur step-by-step. Innovation incentives depend not so much upon postinnovation rents, as in previous endogenous growth models where all innovations are made by outsiders, but upon the *difference* between *postinnovation* and *preinnovation* rents of incumbent firms. In this case, more competition may foster innovation and growth, because it may reduce a firm's preinnovation rents by more than it reduces its postinnovation rents. In other words, competition may increase the incremental profits from innovating, and thereby encourage R&D investments aimed at 'escaping competition.'"

> … [I]f we restrict the set of industries to those that are closer to their world technological frontier, the upward sloping part of the inverted-U relationship between competition and innovation is steeper than for the whole sample. Thus the concept in terms of innovation, of having too little competition grows as the economy develops and gets closer to the frontier.

The existence of an inverted U-shaped curve is generally not seen, however, as supporting more restrictive government competition policies. In this regard, Howitt (2007:1) in his April 2007 commentary for the C.D. Howe Research Institute on innovation, competition and growth, unequivocally states that:

> Competition policy should not be relaxed in hopes of boosting innovation, because more competition actually strengthens the incentive to innovate. Recent empirical work points to a positive relationship between product market competition and productivity growth or innovativeness within a firm or industry.

**Figure 1**: **Is there an Inverted U-Shaped Relationship between Market Structure and Innovation?**




Note: According to Aghion *et al*., this figure plots a measure of competition in the x-axis against citation weighted patents on the y-axis. Each point represents an industry-year. This data is generated by matching the NBER patents database to accounting data on firms listed on the London Stock Exchange (from Datastream). The sample includes 311 firms spanning 17 two-digit standard industrial classification codes over the period 1970-1994. The scatter shows all data points that lie in between the tenth and the ninetieth deciles in the citation-weighted patents distribution.

Source: Aghion *et al.* (2005).

Etro (2004), while not positing an inverted U-shaped relationship between market structure and innovation, nevertheless suggests that monopolists/market leaders will usually try to innovate rapidly to retain their market share and profits. At the same time, Etro also suggests that this result will generally occur in markets where barriers to entry by rivals are low. However, as observed by *The Economist* (2004):

> If the world works in the way Mr Etro supposes, the fact that a dominant firm remains on top might actually be strong evidence of vigorous competition. However, observers (including antitrust authorities) may well find it difficult to work out whether a durable monopoly is the product of brilliant innovation or the deliberate strangulation of competitors. More confusing still, any half-awake monopolist will engage in some of the former in order to help bring about plenty of the latter. The ease of entry and the aggressiveness of the competitive environment are what spur monopolists to innovate so fiercely.[8]

Empirical studies suggesting that less than fully competitive markets may enable innovation (or at least may not constrain innovation) have come under criticism from outside of the economics profession. For example, Jonathon Baker (2007)**,** a professor of law at the American University and previously director of the Bureau of Economics at the US Federal Trade Commission, has written that:

> Recently, several economists motivated by concerns among researchers working in the field of endogenous growth theory have made an heroic effort to address many of the problems with the earlier cross-industry studies, and in doing so appear to have resurrected the "inverted U" result. But the modern studies still do not control satisfactorily for differences across industries in the extent and rate of growth of technological opportunity and in conditions of appropriability. In any case, one of the authors [Howitt] interprets this line of research as showing that, in general, for the industries studied, "a strengthening of competition policy is likely to have a positive overall effect on innovation," in contradiction to Schumpeterian theories.

**D. Firm Size as Predictor of "Innovation Performance"**

The relationship of firm size and innovation performance (usually defined in terms of R&D expenditures, patenting, or innovation "counts") is the second side of the Schumpeterian coin. A Schumpeterian view of the world implies that large firms will innovate more intensively than small firms. But firm size has generally not been found to be a robust predictor of "innovation performance." Although large firms may spend more on R&D in absolute terms because of their sheer size or profits (but not because they are dominant), a number of empirical studies suggest they may not be intrinsically more innovative (i.e. after controlling for firm size) than are small firms. Per dollar of R&D

[8] Other empirical studies casting doubt on the presence of an inverted U-shaped relationship across all industries or countries include Creusen *et al.* (2006) and Tingvall and Poldahl (2005).

expenditures, smaller firms may be more innovative than larger firms in some, perhaps many, industries.

One indicative study is that by Acs and Audretsch (1987). They report on the results of an innovation count for large and small firms over a sample of four-digit standard industrial classification (SIC) industries and standardized on the basis of employment and sales. They conclude that the average innovation rate for small firms was about 43% higher than that of large firms in 1982 (number of innovations divided by sales), but also that this finding:

> ... does not imply that the answer to the question, "Which firm size is more innovative" is unequivocally "the small firm." Rather [our findings] suggests that the correct answer is: "it depends – on the particular industry." For example, in the tires industry, the large-firm innovation rate exceeded the small-firm innovation rate by 8.46, or by about eight innovations per thousand employees. Just as the innovation rate is relatively higher for the large firms in the tires industry, chemicals, industrial machinery, and food machinery industries, it is relatively higher for the small firms in the scales and balances, computing equipment, control instruments, and synthetic rubber industries. (569-570)

Acs and Audretsch test the hypothesis that large firms have the innovative advantage in concentrated markets imposing significant entry barriers, while small firms should have the innovative advantage in markets more closely resembling the competitive model. They conclude that the relative innovative advantage of large and small firms is determined both by industry characteristics and by the extent to which a market is characterized by imperfect competition:

> Industries which are capital-intensive, concentrated, and advertising-intensive tend to promote the innovative advantage in large firms. The small–firm innovative advantage, however, tends to occur in industries in the early stages of the life-cycle, where total innovation and the use of skilled labor plays a large role, and where large firms comprise a high share of the market. *At least for these industries, the conclusion of Scherer (1980) that markets composed of a diversity of firm sizes are perhaps the most conducive to innovative activity is reinforced*. (573; italics added)

It remains that most empirical studies have found that small firms generate more innovations per dollar of R&D.[9] As stated by Scherer (1992:1422-3): "... the weight of the existing statistical evidence goes against Schumpeter's 1942 argument that large corporations are particularly powerful engines of technological innovation..."[10] However, as pointed out by Cohen and Klepper (1996), this leads to a pragmatic question: if large

[9] In addition, some studies suggest that large firm size is more closely related to process innovation than product innovation. Baldwin and Gu (2004b) for example, found that large firms had higher rates of process innovations than small firms, although there was no difference in product innovation rates between them.

[10] Scherer also notes, however, that "doubts nevertheless remain."

firms generate fewer innovations per dollar of R&D than smaller firms, as has been found repeatedly, how can large firms survive and prosper, especially in R&D intensive industries? Cohen and Klepper (1996) propose that the larger the firm then the greater the output over which is can apply the fruits of its R&D (cost-spreading). However, there are other potential explanations for why large firms conduct "more" R&D than small firms. For example: Ahn (2002) notes that large firms may have strong advantages in particular elements of the commercialization of innovations, including marketing; there may be economies of scale and scope in the production of innovations; large diversified firms may be in a better position to exploit unforeseen innovations; and large firms may have better access to external finance (i.e., large firms may have an advantage in securing finance for risky R&D, because size and market power can increase the availability and stability of external and internal funds).

In this context, it is noteworthy that while many smaller firms are important incubators for good ideas with good commercialization potential, fully realizing that potential sometimes involves their acquisition by larger firms. As Keith Redpath, the Chief Executive Officer of the UK company Opal Drug Discovery, stated in his review of a recent book on the business of biotechnology (Pisano, 2006):

> Pisano contends that the [biotechnology] industry has a failed to deliver financially. He may be right, but his analysis is flawed. Many start-up companies with promising drug candidates or technologies are acquired by larger companies before making a profit, delivering good returns for founders and investors. In deciding whether biotechnology has delivered financially, Pisano considers the profitability of those that remain independent. But this is not necessarily the best measure, as those companies may be the ones that are doomed to fail. (Redpath, 2007:859)

**Figure 2: Responses to 2006 Canadian Biotechnology and Life Sciences Business Survey Question on "Likely Success Scenarios"**

| What do you consider to be the most likely scenarios for the typical successful Canadian life science or biotechnology business? (Rank top three) | First Choice | Second Choice | Third Choice |
|---|---|---|---|
| **Being acquired/merger** | **41** | **32** | **8** |
| **Build or maintain a sustainable business** | 14 | 5 | 18 |
| **Going public** | 14 | 18 | 31 |
| **Licensing or selling intellectual property** | 15 | 29 | 20 |
| **Other** | 2 | | 2 |
| **Grand Total** | 86 | 84 | 79 |

Source: PriceWaterhouseCoopers (2006)

Redpath's views on this subject find support in the results from a 2006 survey of Canadian biotechnology industry leaders sponsored by the industry association Biotech Canada (see Figure 2 above).

**E. Overall Assessment**

The view that market concentration promotes innovation does not find strong support among informed observers. [11] For example, Ahn (2002:5) concludes that:

> The claim that market concentration is conducive to innovation does not appear to be supported by recent empirical findings. Motivated by Schumpeter's conjecture that large firms in concentrated markets have advantage in innovation, many empirical studies have investigated the relation between market concentration and innovation. On the whole, however, there is little empirical support for the view that large firm size or high concentration is strongly associated with a higher level of innovative activity.

A review of the empirical literature for the European Commission, conducted by European Economics (2003)**,** concludes that:

> At a general level, there is some evidence in favour of an inverse-U shape between intensity of competition and innovation, indicating that innovation may be relatively less rapid at both very low and very high intensities of competition. However, there is insufficient practical guidance from the literature to develop these ideas into a general theory on this issue, which is perhaps best addressed on a case-by-case basis.

Other observers are even more cautious in finding empirical support for making a positive linkage between competitive intensity and innovation. For example, Gaëtan Nicodème and Jacques-Bernard Sauner-Leroy (2004:13) state that:

> The empirical literature on the link between product market competition and innovation has so far been relatively sparse and inconclusive. The reasons lay in the poor availability of comprehensive time series of product market indicators, in a "still-in-progress" theoretical framework, and in the difficulties of measuring dynamic efficiency given that it takes time to deliver its full effects and that innovation is difficult to measure. As surveyed by Ahn (2002), studies on the relationship between market power and innovation lead to mixed results. For example, some studies show that companies' size has no significant effects on innovation whilst other studies point to either a positive relationship between concentration and innovation, or an inverted U-Shaped relationship, or simply no effects when controlling for industry differences. Apparently, measurement and modelling issues blur empirical results as good proxies for innovation are difficult to find and regression methods fail to take into account "bounds" effects between R&D intensity and concentration.

[11] For a review of this issue, see Gilbert (2006).

Much of the empirical literature investigating the relationships between market structure, innovation and economic growth is based on a growth accounting framework (where economic growth is modeled on the basis of an aggregate production function). As described by Nicoletti and Scarpatta (2003), to the extent that many of the empirical studies within that framework yield ambiguous results, this is because:

- the direct measures of competition, such as indices of concentration or mark-ups, are plagued with problems of interpretation and accuracy; and

- direct measures are not easily interpretable in terms of policies (i.e. finding an effect of market power on productivity provides little direction on what policy should be followed to improve outcomes).[12]

It is for this reason that empirical studies on firm dynamics, which generally describe competition as a process rather than a state of affairs, are an important and complementary area of inquiry.

# III The Importance of Firm Dynamics for Innovation and Productivity

A defining feature of competitive markets is freedom for participants to both enter and exit. Through the entry and exit, and the growth and decline of individual firms ("firm dynamics"), resources are reallocated from less productive to more productive businesses. This is an enabling condition for innovation and productivity growth. This section reviews the evidence of the importance of firm dynamics, spurred by competition, for innovation and productivity.

A key characteristic of competitive markets is freedom for participants to both enter and exit markets. As stated in the OECD's January 2007 "Policy Brief on Competition and Barriers to Entry" (OECD, 2007a):

> Before a firm can compete in a market, it has to be able to enter it. ... Regardless of whether there is a consensus on a definition [of an entry barrier], or even whether the definition ultimately matters, it is undeniable that the concept of entry barriers play an important role in a wide variety of competition matters because it is vital to the analysis of market power. Entry barriers can retard, diminish, or entirely prevent the market's usual mechanism for checking market power: the attraction and arrival of new competitors. (1)

[12] Nicoletti and Scarpatta suggest that an alternative empirical strategy is to look more directly as some of the potential policies that affect competition rather than attempting to directly measure market competition. Yet, as these authors also observe, turning qualitative information concerning policies and regulations into quantitative data required for empirical analysis also involves assumptions, simplifications and subjective choices.

Empirical studies on firm dynamics complement the insights provided by the studies on competition, innovation and productivity relationships undertaken within the growth accounting framework. This is because much of the empirical work on firm dynamics, rather than relying on static measures of firm populations, seek to measure the amount of change taking place within these populations (Baldwin and Gellatly, 2006). As highlighted below, empirical work in the field of firm dynamics suggests that:

- firm dynamics, at least in developed countries, can be described with reference to a number of "stylized facts", including firm entry and exit and variation in sizes and market shares of continuing units (mobility);

- high levels of firm entry and exit is one indication of competitive markets doing their job in moving resources to where they can be used to greatest economic advantage. There are different views (and different empirical results) on whether the major contribution of firm dynamics to productivity growth is through within-firm efficiency improvements or through reallocation of resources across incumbents; and

- it remains uncertain what contribution the continual "churning" through entry and exit of firms may be to innovation performance either at the firm or economy-wide level.

## A. The Stylized Facts of Firm Dynamics and Canadian Findings

Drawing on literature reviews and empirical research by Bartlesman, Haltiwanger, and Scarpetta (2004) and Canadian findings reported by Baldwin and Gellatly (2006), there is a strong consensus on what may be called the "stylized facts" with respect to entry and exit and variation in sizes and market shares of continuing units (mobility). Baldwin and Gellatly point out with reference to their findings on the Canadian situation that while each of the turnover processes – greenfield entry (the entry of new firms via the building of new plants) and closedown exit (the exit of firms via the close down of plants), acquisition entry and divestiture exit, and continuing plant turnover – is important by itself, it is the joint effect of the three that is striking.

### i. Firm size and growth

Bartelsman, Haltiwanger, and Scarpetta (2004) find that:

- the probability of survival tends to increase with firm (or plant) size; but, conditional on survival, the proportional rate of growth of a firm decreases with size; and

- for any given size of firm, the proportional rate of growth is smaller the older the firm, but its survival probability is greater.

These findings are consistent with firm dynamics in Canada. Baldwin and Gellatly (2006) find that small firms tend to gain market share and grow over time and large firms tend to lose market share and decline over time. For example, greenfield entry of firms that entered from 1970 to 1979 accounted for, on average, 16.1 per cent of 1979 industry shipments; in 1970, firms that were to close by 1979 accounted for 18.2 per cent of industry shipments. Greenfield entry, close down and exit therefore have a significant cumulative impact when measured over time.

### ii. Firm entry, exit and turnover

Bartelsman, Haltiwanger, and Scarpetta (2004) find that:

- there is a high degree of total firm turnover (entry plus exit rates) for firms with over 20 employees, between 3-8 per cent in most industrial countries and more than 10 per cent in some of the transition economies; and

- these data confirm previous findings that in all countries net entry (entry minus exit) is far less important than the gross flows of entry and exit that generate it. This suggests that the entry of new firms in the market is largely driven by a search process rather than augmenting the number of competitors in the market.

In Canada, Baldwin and Gellatly (2006) find that firm turnover is a significant feature of the Canadian economy, with both entry *and* exit rates reflecting a rational "experimentation process" undertaken by firms within competitive marketplaces. For new firms in both goods and services industries in Canada, only one in five new firms survives beyond its first decade of life. There are large differences in the initial survival rates across industries, but over 10 years these differences are substantially reduced. High exit rates reflect rational choices that are influenced by the magnitude of experimentation costs.

### iii. Reallocation of outputs and inputs

Bartelsman, Haltiwanger, and Scarpetta (2004) find that there is a high pace output and input reallocation across businesses that:

- is largely within narrowly defined sectors;

- differs substantially across sectors and firm characteristics (e.g., there is much more churning among young and small businesses than among old and large ones); and

- where entry and exit of businesses account for a substantial fraction of the variation and the positive correlation between gross entry rates and gross exit rates across industries helps account for the differences in churning rates across sectors.

Baldwin and Gellatly (2006) find that in an average industry, 44 per cent of all market share is shifted from decliners to growers over a decade. By itself, this testifies to the importance of competition for shifting resources to more productive uses. The size of the turnover process increases with the period of time over which death and renewal via entry are measured. They note that over a decade, 35 per cent of jobs in manufacturing disappear because of either exit or decline in incumbents. Over a period of forty years, 80 per cent of jobs disappear. An equally high percentage of jobs appear because of the birth of new plants or because of the expansion of existing plants.

## B. Firm Dynamics and Innovation

The empirical work on the role of innovation within the firm in shaping the survival probability is of recent vintage. The available studies suggest that, perhaps especially for small and young firms, their ability to innovate is likely positively related to their probability of surviving.

Cefis and Marsili (2005) find that the firms most likely to exit and disappear from the market are small and young firms. The effect of size and age is shaped, however, by the extent firms do engage in innovative activities. In general, their results show that the ability to innovate increases survival probabilities for all firms and across most industrial sectors. They label this as the 'innovation premium' associated with survival. In particular, this premium is highest for small and young firms. They find that small, young firms that "innovate" have a 23 per cent greater chance of surviving than those that do not innovate.

One set of Canadian studies probing the relationship between firm dynamics, innovation and productivity is that produced by John Baldwin and collaborators from Statistics Canada over the past decade. Baldwin and Gellatly (2006:33) summarize the results of this study program as follows:

> Moreover, simple prescriptions related to the need for more R&D can obscure an important fact: the dimensionality of innovation is not invariant to basic differences in the operating environment. Our research has found that innovation strategies tend to be context-bound, that is, the sets of strategies and activities that firms rely on to develop and support innovation will depend, in substantive ways, on the competitive dynamics that define the market place in which these firms compete. Innovation profiles are not necessarily interchangeable from market to market.

## C. Firm Dynamics and Productivity Growth

Numerous growth accounting studies have shown that total factor productivity and labour productivity are largely accounted for by the reallocation of outputs and inputs

from less productive to more productive businesses. Studies of firm dynamics strongly support this finding and underline the importance of competitive intensity to this result. It has also been found that, at least with respect to the entry of new firms, a positive impact on productivity is unlikely to emerge in the short run. As previously mentioned, many entering firms may be "experimenting" and may not have initial productivity levels on par with existing incumbents.

One focus of recent research attention, and the continuing subject of inquiry and vigorous debate, is the relative contribution to labour productivity growth of "within-firm" or "between-firm" effects of resource allocation. Baldwin and Gu (2006a) note that many empirical studies have shown that substantial resources are reallocated across producers as a result of the growth and decline process that is continuously transferring market share from some firms to others (Dunne, Roberts and Samuelson, 1988; Baldwin, 1995; Mata, Portugal and Guimaraes, 1995; Caves, 1998; and Davis, Haltiwanger and Schuh, 1998). Baldwin and Gu note that a number of studies examining the reallocation of resources through firm dynamics find that it accounts for very little of *aggregate labour productivity growth* and that, instead, the main source of labour productivity growth comes from labour productivity growth within plants. However, Baldwin and Gu (2006a:8-9) suggest that these past studies are flawed:

> ... [W]e argue that most previous studies underestimate the contribution of competition to labour productivity growth. The literature on competitive advantage and corporate strategy views competition as a process whereby businesses gain markets from their competitors. It focuses on the various corporate strategies related to the development of marketing, advertising, and technology that contribute to the growth of successful corporations (Porter, 1985). These strategies are aimed at gains in market share. However, most of the existing studies on 'reallocation' focus not on product markets but on labour input markets. In this paper, we argue that this leads them to incorrect conclusions. Firms do not compete for their share of labour markets; they compete over their share of product markets. If we are to understand the impact of competition in product markets, we need to examine the effect of turnover directly in these markets.

They go on to provide their own estimates of aggregate productivity growth for both the 1979-to-1989 and 1989-to-1999 periods for manufacturing industries (but not service industries) in Canada. For both periods, they find about 70 per cent of aggregate productivity growth was due to output reallocation arising from net entry and the growth and decline of continuing firms. The remaining 30 per cent is accounted for by productivity growth at continuing firms.

Nevertheless, the debate over the relative importance for productivity of "between firm effects" and "within-firm effects" of resource allocation as shaped by firm dynamics is not yet settled. For example, Foster, Haltiwanger, and Krizan (2002) note that most evidence on the connection between reallocation and productivity dynamics for the U.S. and other countries comes from the manufacturing sector. Drawing on an establishment-

level data set of U.S. retail trade businesses, they find that virtually all of the productivity growth in the U.S. retail trade sector over the 1990s is accounted for by more productive entering establishments displacing much less productive exiting establishments but that "much of the between-establishment reallocation is a within, rather than between-firm phenomenon." (2)

### D. Overall Assessment of Firm Dynamics

We now know a considerable amount (or at least more than we knew even ten years ago) about the "stylized facts" of firm dynamics both internationally and in Canada. The evidence continues to mount that competitive markets increase dynamism (defined in terms of entry and exit, turnover and churning, and mobility) and efficient resource reallocation. For example, Bartelsman, Haltiwanger, Scarpetta (2004:3-4**)** conclude that:

> A rapidly growing number of studies provide evidence of heterogeneity in firm behaviour, even within narrowly-defined industries or markets. As such, the efficiency of an economy in dealing with such reallocation is important not only for the productivity dynamics of the economy, but also for the dynamics of the labour market. For all these reasons, firm-level dynamics appear to be crucial for the relative success of developed economies and also for the trajectories and emerging economies as they develop and open up markets.

Ahn (2002:8) has also recognized the importance of firm dynamics for productivity (although he is less definitive with respect to its contribution to innovation performance):

> Firm dynamics (i.e., birth and death, growth and decline of individual firms) make an integral part of dynamic competition. An increasing number of theoretical and empirical studies focussed on firm-level or plant-level dynamics show that aggregate productivity of an industry is significantly affected by compositional changes in the industry due to firm dynamics. Dynamic competition incessantly weeds out less efficient firms from more efficient ones and reallocates productive resources from shrinking/exiting firms to entering/growing firms.

## IV Competitive Markets as Drivers of Innovation and Productivity Growth: International Experience

The first two sections of this report focused on the general relationship between competitive intensity and innovation and on the importance of firm dynamics for innovation and productivity. This section of the report reviews the international experience related to open and competitive markets as enablers or drivers of innovation and productivity.

The first sub-section reviews the work that the OECD had conducted on the sources of economic growth in OECD countries, which identified competition as a main

driver, and as well as the OECD work on the impact of competitive intensity on economic performance. The second sub-section discusses the UK experience. Identified by the OECD as the member country with the lowest degree of product market regulation (tied with Australia), the UK offers many lessons as a country that has focused on open and competitive markets to drive innovation and productivity. The third sub-section examines the Australian experience, again a country with a very high level of competitive intensity given its very low degree of product market regulation (tied with the UK for lowest in the OECD). The impact of National Competition Policy (NCP) reforms on Australian economic performance is synthesized. The United States, which the OECD ranks third lowest in terms of the degree of OECD product market regulation is discussed in the fourth sub-section, the European Union in the fifth sub-section, and other countries (Ireland, Finland, and Sweden) in the sixth. The next two sub-sections look at the empirical evidence that has been gathered by the McKinsey Global Institute and Michael Porter and Associates on the role of competitive markets as drivers of innovation and productivity growth. The final sub-section presents case studies of the Canadian wine industry and the European passenger air transport industry.

Despite conflicting views and empirical results on specific matters, the overall weight of various studies on the international experience supports drawing a positive association between competitive markets, innovation and productivity growth. Nonetheless, it also appears that actual results of any given government policy, including those that may be "competition friendly," may be accompanied by unanticipated economic consequences no matter what their theoretical impact may be on innovation and productivity.[13] As Giuseppe Nicoletti and Stefano Scarpetta (2003:18) observed in their empirical study on regulation, productivity and growth in OECD countries:

> Assessing and comparing across countries the friendliness of regulatory policies to competition involves conceptual and interpretative issues. While it is relatively easy to point out broad policy measures aimed at increasing market openness and competitive pressures (e.g. trade liberalisation, administrative simplification), the impact on incentives and competition of some aspects of regulatory reform is less easy to assess. For instance, the extent to which privatisation increases market pressures on the management of privatised firms is somewhat controversial.

[13] Economic theorists will recognize this statement as reflecting the insights derived from the "theory of the second-best." In this regard, Richard Lipsey (2007:362) has written that: "When the intuitive appreciative approach is used, both to defend the market economy and to assess policies, it is easier to spot counter productive advice. According to the appreciative approach, since the competitive market economy is the best known method of allocating resources, departures from it through either public policy or private behaviour, are regarded as *prima facie* undesirable, unless justified by well-reasoned arguments and persuasive evidence. This is sufficient to rule out the kinds of massive tariffs that used to be found in many developing countries, but not to rule out carefully designed, administered and sunsetted infant industry tariffs. It also rules out private sector actions in restraint of competition, again unless there are very good reasons for them. Highly elaborate theory is not necessary in these cases and many others like them. What is needed is a good appreciative understanding of how the price system works, as well as understanding the cautionary warning from second best theory that any policy may have unexpected and undesirable consequences in apparently unrelated parts of the economy that need to be watched for and mitigated where necessary. Useful piecemeal policy advising is not impossible; neither can it be determined purely scientifically; instead it is an art, assisted by good economics, both theoretical and empirical."

Similarly, the jury is still out on precisely which regulatory policies are conducive to stronger competition in industries where potentially-competitive markets coexist with elements of natural monopoly. Moreover, turning qualitative information concerning regulations into quantitative data necessary involves assumptions, simplifications and subjective choices.

## A. OECD Work on Product Market Regulation, Competition and Economic Performance

Since the late 1990s the OECD has undertaken a major research program on the relationship between product market regulation and economic performance.[14] One major output from this research was published in 2003 by Niocletti and Scarpetta ("Regulation, Productivity and Growth: OECD Evidence") and its results were updated by Conway, Janod and Nicoletti in 2005.[15] Their 2003 report identified the main elements of the "sweeping product market reforms" implemented over the past two decades in many OECD (and non-OECD) jurisdictions over the 1984-1998 period as:

(i) privatization;
(ii) entry and price liberalization of potentially competitive domestic markets;
(iii) pro-competitive regulation of natural monopoly markets (e.g. by regulating access to networks); and
(iv) liberalization of international trade and foreign direct investment.

The intended results of these reforms, as Niocletti and Scarpetta note, were to increase competition and improve corporate governance. Together, these outcomes should foster an environment that is conducive to economic growth. Nicoletti and Scarpetta set out to determine if this is the case through the construction of a new set of economy-wide and industry level regulatory indicators that involved "turning sparse and mostly qualitative information into cardinal values that allow ranking countries' regulations according to their potential impact on governance and competition" (30).

The indicators developed by Nicoletti and Scarpetta are derived from the results of questionnaires sent to OECD member governments. They are policy focused,

[14] This research work has also contributed to the large OECD research program on economic growth (published in the documents Sources of Economic Growth (OECD, 2003) and Understanding Economic Growth (OECD, 2004c)). The OECD growth project analyzed the sources of economic growth based upon aggregate data and using cross-country regression analysis, with a particular emphasis on the ways in which policies affect outcomes. At the macro level, the OECD growth project identified education, innovation, deregulation and investment as the basic determinants of productivity growth. It has also identified inflation, fiscal policy, international trade, and the financial system as policy and institutional determinants of growth. At the industry and firm level, the OECD has identified market conditions, competition, and innovation and R&D as key productivity drivers. See Sharpe (2006) for a synthesis of the growth project findings.

[15] Other OECD working papers on product market competition and economic performance have been published for specific member countries including: France (Hoj and Wise, 2006), Canada (Maher and Shaffer, 2005), Germany (Fuentes, Wurzel and Reindl, 2006) and the United States (Suppanz, Wise and Kiley, 2004).

economy-wide, and 'objective' in the sense that they were not based on opinion surveys and did not incorporate information about market outcomes. The indicators cover three policy domains: state control, barriers to entrepreneurship, and barriers to trade and investment. Using this same set of indicators, Conway, Janod and Nicoletti's updated 2005 analysis found that:

- regulatory impediments to product market competition have declined in the OECD area in recent years. The extent of government involvement in product markets and barriers to international flows of capital and trade has fallen considerably. The fall in barriers to entrepreneurship has been slightly less significant. Notwithstanding recent progress in product market reform, across virtually all countries a 'hard core' of regulations that impede competition still persists in some areas, such as barriers to entry in non-manufacturing industries;

- product market regulation has become more homogenous across the OECD in the past five years, as countries with relatively restrictive product market policies have moved towards the regulatory environment of the more liberalized countries. However, despite a degree of convergence in product market regulation, differences between broad groups of countries that have 'relatively liberal' and 'relatively restrictive' regulatory environments are still significant;

- the overall approach to product market regulation has become more consistent across regulatory domains within many OECD countries, suggesting that recent reform efforts may have been focused on areas where regulation was previously particularly heavy. Also, countries with restrictive overall product market regulations tend to have a more heterogeneous approach to competition across different policy areas, which may imply additional efficiency losses; and

- as was the case in 1998, cross-country correlations between different aspects of product market regulation are also apparent in the 2003 indicators. Domestic impediments to competition tend to be lower in countries that have lower barriers to foreign trade and investment suggesting a link between a country's degree of openness and domestic policy reform. In addition, restrictive economic regulations still tend to be associated with burdensome administrative environments, and legal barriers frequently block new entry into sectors in which publicly-controlled companies operate. Product market regulation also appears to be linked to employment protection legislation, raising the question of whether policies in the two regulatory areas are 'political complements.'

**Figure 3: Product Market Regulation across OECD Countries, 1998 and 2003**

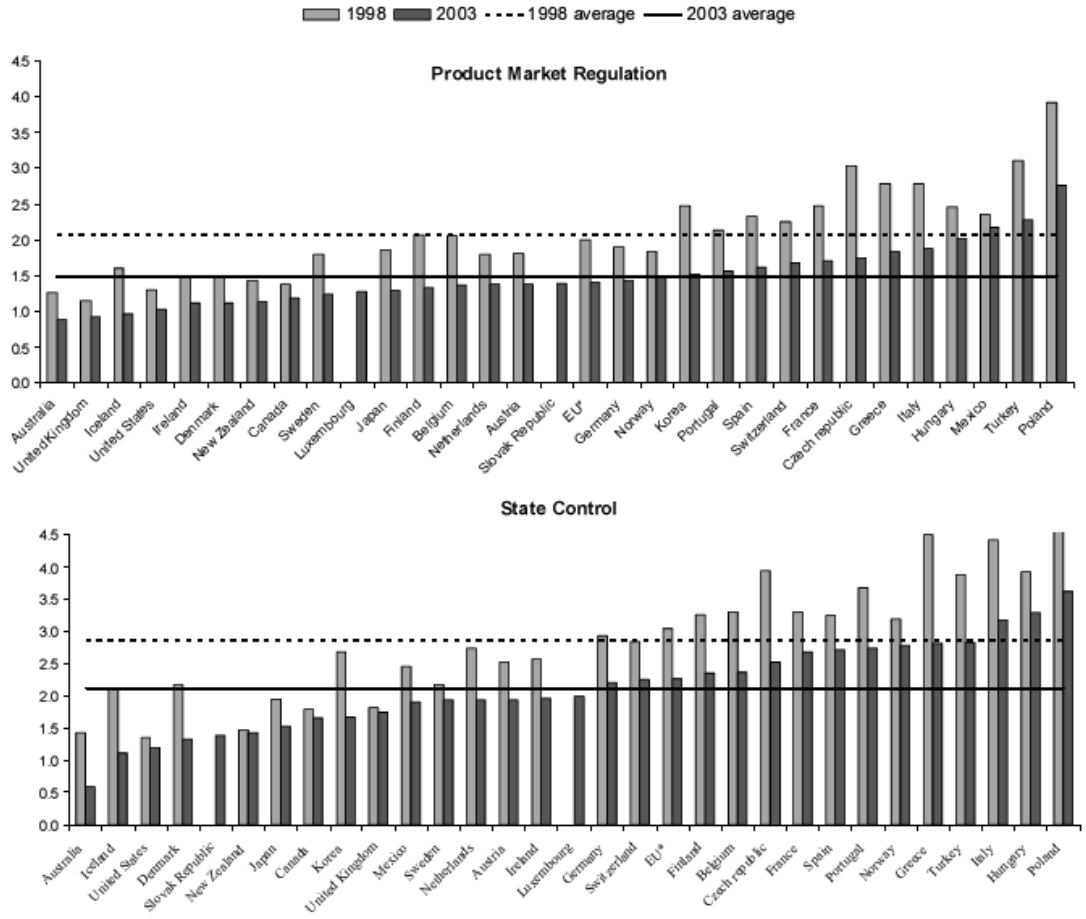
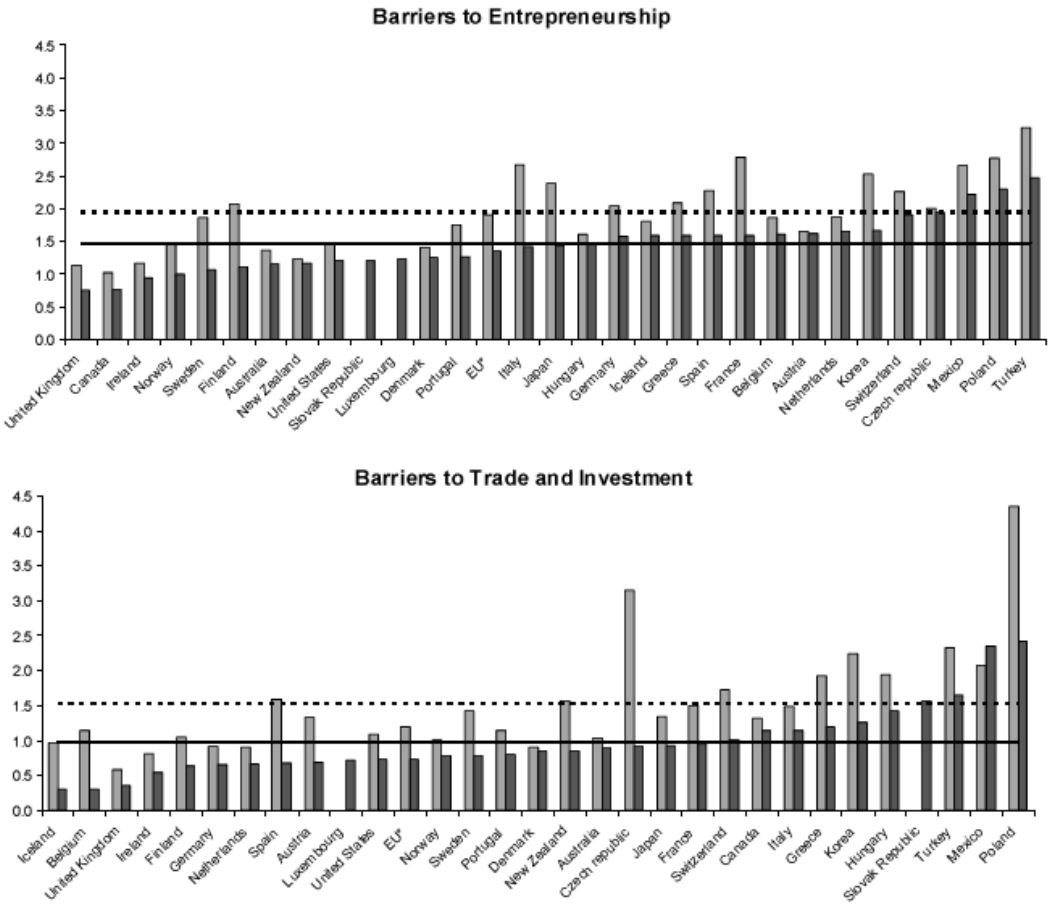


**Figure 3 (continued):**
**Product Market Regulation across OECD Countries 1998 and 2003**




Note: Sorted by 2003 values. The scale of indicators is 0-6 from least to most restrictive of competition.

* EU 15 (simple average)

Source: Conway, Janod, and Nicoletti (2005)

Nicoletti and Scarpetta pointed out in their original 2003 study that regulatory reforms in OECD countries (as proxied by their regulatory indicators) are important explanatory variables for multifactor productivity growth rates (and divergence between) OECD countries and concluded:

- regulatory reforms promoting private governance and competition (where these are viable) tend to boost productivity. Both privatization and entry liberalization are estimated to have a positive impact on productivity;

- In manufacturing the gains from product market reform are greater the further a given country is from the technology leader, suggesting that regulation limiting entry may hinder the adoption of existing technologies, possibly by reducing competitive pressures, technology spillovers, or the entry of new high tech firms; and

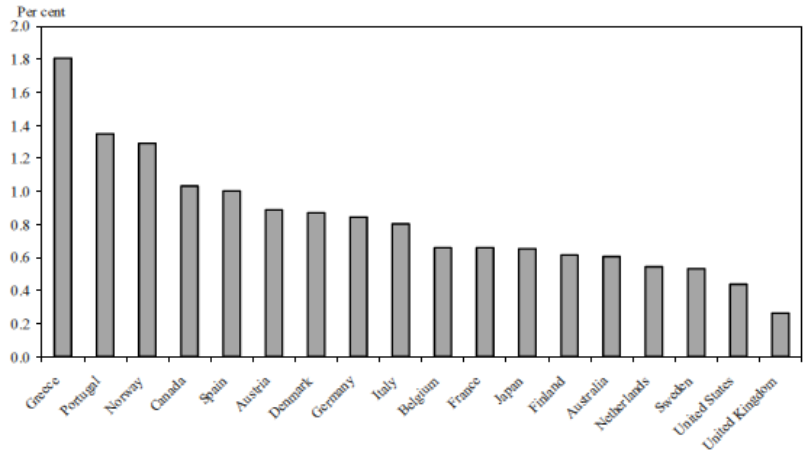
- These results offer an interpretation to the observed recent differences in growth patterns across OECD countries, in particular between large Continental European economies and the United States. Strict product market regulations— and lack of regulatory reforms—are likely to underlie the relatively poorer productivity performance of some European countries, especially in those industries where Europe has accumulated a technology gap (e.g. ICT-related industries).

Based on these same OECD indicators of product market regulation for 1998 and 2003, Conway, de Rosa, Nicoletti, and Steiner (2006) investigate the effect of product market regulation on the international diffusion of productivity shocks or technological improvements. They find that restrictive product market regulations slow the process of adjustment through which best practice production techniques diffuse across borders and new technologies are incorporated into production processes.

This finding has important policy implications. In particular, it implies that remaining differences in product market regulation may partially explain the recent observed divergence in productivity growth in OECD countries given the emergence of general purpose technologies over the 1990s. The authors find that, in times of rapid advances in the production/technology frontier, the positive effect of pro-competitive regulations on the speed of catch-up is amplified, increasing the dispersion of productivity levels across countries in which the stringency of product market regulations differs. The authors also find very large productivity gains from product market reform, especially for countries operating far from the world productivity frontier. They estimate that for the nine countries considered, the increase in annual productivity growth if these countries were to align regulation in non-manufacturing sectors on that of the least restrictive OECD country, would be more than 0.75 percentage points.[16]

[16] The aggregate indicator of regulatory conditions is for seven non-manufacturing sectors – transport (airlines, railways, road freight), energy (gas, electricity), and communications (post and telecoms). Manufacturing is excluded but this sector is typically lightly regulated and open to international competition. This indicator is highly correlated with the economy-wide product market regulations

**Figure 4: Increase in Average Annual Business Sector Productivity Growth 1995-2003 Given a Move to Sectoral Regulations that are Least Restrictive of Competition in 1995**




Note: Data are the average increase in annual business-sector productivity over the period 1995 to 2003 given an easing in regulation to the least restrictive of competition in non-manufacturing sectors in OECD countries in 1995. Productivity in the productivity leader in each sector is assumed to grow at 1.6% per year. The business-sector results are calculated as weighted averages of the sectoral productivity increases using value added weights.

Source: Conway, de Rosa, Nicoletti and Steiner (2006)

Figure 5 (below) shows Canada's performance according to OECD product market regulation indicators and as reported by Conway, Janod and Nicoletti (2005). Their analysis indicates that for Canada:

- in absolute terms, product market barriers are below 2 on a scale of 0 to 5 where 0 is the least restrictive and 5 the most restrictive;
- in all three policy domains, Canada moved slightly to a less restrictive product regulatory environment between 1998 and 2003;
- in 1998, Canada ranked as one of the OECD countries with the least restrictive product market regulations, ranking among the four least restrictive countries in two of the three policy domains. Canada ranked average ($13^{th}$ out of 28) in barriers to trade and investment; and
- despite the absolute trend toward deregulation in Canada between 1989 and 2003, other countries made even bigger moves and Canada's relative ranking deteriorated in all three policy domains and, in aggregate, from fourth to eighth.

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indicator constructed by Conway, Janod, and Nicoletti (2005). See Conway and Nicoletti (2006) for details on the indicator.

**Figure 5: Canada's Performance on OECD Product Market Regulation Indicators**

| | Canada's PMR Score (0 - 5 from least to most restrictive) | | Canada's Ranking out of 28 OECD Countries | |
|---|---|---|---|---|
| | 1998 | 2003 | 1998 | 2003 |
| State Control | 1.8 | 1.7 | 4 | 8 |
| Barriers to Entrepreneurship | 1.0 | 0.8 | 1 | 1 |
| Barriers to Trade and Investment | 1.3 | 1.1 | 13 | 22 |
| Overall Product Market Regulation | 1.4 | 1.2 | 4 | 8 |

Note: The state control domain includes sub-domains on public ownership and involvement in business operations; the barriers to entrepreneurship domain includes sub-domains on administrative barriers to start-ups, regulatory and administrative opacity, and barriers to competition; the barriers to trade and investment domain includes explicit barriers to trade and investment and other barriers.

Source: Conway, Janod and Nicoletti (2005), Tables 21-24.

The most problematic policy domain for Canada according to this analysis is with respect barriers to trade and investment, where Canada ranked 22nd out of 28 countries in 2003. However, it should be noted that this specific finding, and the methodology upon which is based, has been subject to challenge.[17] For example, the Conference Board of Canada (2008) argued that:

> According to the Organisation for Economic Co-operation and Development (OECD), Canada has among the world's most restrictive regulatory barriers to foreign investment. However, the OECD rankings are fairly (if not significantly) skewed. As *Foreign Investment Review Regimes: How Canada Stacks Up* reveals, the OECD's restrictiveness calculations are heavily weighted toward the existence of overt, explicit foreign investment screening requirements, while ignoring a host of opaque barriers such as political interference and state-owned enterprises.

[17] To the extent that the OECD product market indicators suggest Canada has a relatively high degree of competitive intensity, Chen (2006) has observed that they stand in contrast to a perception that competitive intensity in Canada is significantly lower than in the United States and many other developed countries. These perceptions are often based on opinion surveys of executives and the factors that influence these opinions may not bear much resemblance to the measures of competitive intensity used by economists. Moreover, concentration ratios, as measured, for example, by the Herfindahl-Hirschman index, also point to a less rosy competitive situation for Canada than painted by the OECD product market regulation measures, as has been pointed out by Crepeau and Duhamel (2006) and Thille (2006). On the other hand, many economists argue that for the traded good sectors concentration ratios based on the number of domestic competitors are not particularly meaningful in an open economy such as Canada where these industries are subject to intense competition from imports.

> When both implicit and explicit barriers to foreign direct investment (FDI) are considered, Canada is found to be no less restrictive than France, Germany, and Italy, which, in turn, are less open to FDI than their OECD rankings would suggest. (1)

Notwithstanding the methodological limitations of the OECD work on product market regulation,[18] it remains that the weight of the empirical evidence suggest that all countries, including Canada, stand to benefit from further product market regulatory reform. For example, the analysis by Conway *et al*. found Canada to have the fourth largest potential gains (after Greece, Portugal, and Norway) from regulatory reform. The OECD estimates that business sector productivity growth over the 1996-2003 period in Canada would have been 1 per cent per year higher if the country had moved in 1995 to the sectoral restrictions in OECD countries that were the least restrictive of competition that year. As this business sector labour productivity growth in Canada (output per hour) was only 1.9 per cent over the 1995-2003 period, this represents more than a 50 per cent improvement in productivity growth and massive increase in wealth creation (nearly $100 billion on a cumulative basis).

## B. The United Kingdom (UK)

This section highlights three UK government-authored reports that provided the analytical underpinnings for UK policy actions taken over the past eight years: the UK Treasury's 2000 report on *Productivity in the UK: The Evidence and the Government Approach;* a 2004 report *The Benefits from Competition* commissioned by the UK Department of Trade; and the UK Office of Fair Trading (OFT) 2007 report *Productivity and Competition*. Taken together, these reports also illustrate how many of the theoretical concepts discussed earlier in this paper find practical expression in government economic policy analysis and advice.

In 2000, the UK Treasury released a report entitled *Productivity in the UK: The Evidence and the Government Approach.* The report set out the Government's analysis of the productivity challenge for the UK and a strategy for raising productivity through the promotion of "economic stability" and microeconomic reform.

The report's starting point is that the UK faced a major labour productivity gap with its main competitors: with the United States (a 45 per cent gap in 1999); with France (an 18 per cent gap); and with Germany (an 11 per cent gap). According to the report, if the UK were to match the productivity performance of the United States for example,

[18] The OECD research work suggests that the impact of government policies in any given case may be ambiguous, have consequences for other economic sectors outside of the target sector that may be difficult to anticipate and measure, and almost certainly will be dependent on the specific market conditions (including degree of market concentration, industry characteristics, etc.) at hand. It should also be noted that the OECD product market regulation measures attempt to capture the impact of public policy on the competitive environment. Concentration ratios, on the other hand, attempt to gauge the structure of markets, as represented by the degree of dominance of the largest firms. These are different phenomena. It is very possible that a country could have at the same time low levels of product market regulation and high concentration ratios, or vice versa.

output per head would be over £6,000 higher. According to the report, "The challenge for the Government is to achieve its long-term economic ambition to have a faster rise in productivity than its main competitors as it closes that gap."

The report's detailed commentary on the reasons for the emergence of the productivity gap (and potential measures to close it) covers much ground but continually returns to focus on the central role of competitive markets and competitive intensity:

> Competition plays a central role in driving productivity growth. It encourages firms to innovate by reducing slack, putting downward pressure on costs and providing incentives for the efficient organization of production. It also reorganizes market structures, by reallocating resources away from inefficient firms to more productive competitors and new entrants.

Notably, the report reflects many of the ideas and economic policy themes on the relationship between competitive intensity, innovation and productivity previously described in this paper. For example:

- the report cities the studies by Blundell, Griffith and Van Reenan (1995) and Nickell (1996) that found that various measures of competitive pressure in a sector have a positive impact on firm efficiency and productivity growth rates. Increases in the size of market shares and the size of supernormal profits earned by firms, both of which are positively associated with market power, have a negative impact on future productivity growth. Similarly, the wide distribution of productivity outcomes is itself consistent with a lack of competitive pressure and is found to be negatively correlated with productivity growth at the sector and firm level;

- the report takes notes of the importance of firm dynamics, with entrepreneurial ability in creating new businesses being an important source of competitive pressure. The report states that: "New entrants and the threat of entry are also a critical component of effective competition, and a source of innovation. The powerful impact of competition on productivity growth through new entrants is highlighted by recent plant-level studies. In general, plants that exit from the market are less productive than the average plant. New entrants also start off less productive than incumbents, but thereafter rapidly improve their performance so that in aggregate, exit and entry provides an important mechanism by which resources are reallocated from less to more productive firms. Attempts to quantify this effect in the US and the UK have led to broadly similar results attributing 30-50 per cent of productivity growth in manufacturing to exit and entry effects;"

- the report highlights the evidence from firm and plant-level analysis and suggests that the key to increasing UK productivity growth lies in improving firms' access to the inputs and resources they require to raise their productivity and creating a competitive environment in which they are encouraged to do so. One area of particular importance is competition. It reduces slack and makes a continuous

stream of innovations a critical ingredient to business success. It provides strong incentives for firms to adopt best-practice techniques and engage in innovative activity, and hence increases the rate of labour productivity growth. Competitive pressure arises when entrepreneurs start up new firms and introduce innovative managerial practices and new technology to challenge incumbents; and

- the report notes the role of poor regulation in impeding the functioning of markets: "Although government regulation has a clear and vital role to play in ensuring that markets operate efficiently, excessive or unnecessary government regulation can obstruct efficient market functioning."

The 2000 report put forward a two pillar framework for government policy to strengthen the UK's productivity performance based on the dual national/firm analysis**:**

- first, providing macroeconomic stability to allow firms and individuals to invest for the future; and

- second, undertaking microeconomic reforms to ensure that markets function efficiently and tackling barriers to productivity growth.[19]

The UK Treasury's 2000 report set the stage for a series of further studies issued by other UK Government departments and agencies over the following years.

In 2004, the UK Department of Trade and Industry published an important study on the benefits of competition by the Centre for Competition Policy at the University of East Anglia (Davies, Coles, Olczak, Pike and Wilson, 2004). The study examined six market case studies (retail opticians, international telephone calls, net book agreement, passenger flights in Europe, new cars, and replica football kits) and provided a powerful demonstration of the real world impact of increased competition. Interestingly, in this study the authors caution that there can be "harmful side-effects" of the elimination of market imperfections because imperfections were sometimes put in place in the first place to help protect some other desirable objective. (Examples in this sample include: protection of professional service standards amongst opticians, the stocking of minority taste books by booksellers, safety in the skies by regulating air travel.) Nevertheless, in the six market studies little conclusive evidence was found that any such harmful side effects actually materialized**.** Consequently, the authors conclude that the six case studies

[19] Recognizing the strong link between competition and productivity, the UK government sought to strengthen competition policy by introducing the new *Competition Act* which came into force in March 2000. The *Act* enhanced the powers available to the Office of Fair Trading (OFT) to tackle anti-competitive practices and abuses of a dominant position. It also introduced strong penalties for transgressors – up to 10 per cent of UK turnover for each year of the infringement up to a maximum of three years – and ensures that the OFT is able to identify and pursue cases of anti-competitive behaviour entirely independently of Ministers. In addition, the UK government provided new market study responsibilities to the country's competition authority and pioneered the incorporation of competition assessment into the development of legislation and government policy. Since 2002, departments and agencies proposing legislation have been required to examine it from a competition perspective as part of the country's regulatory impact assessment process

were success stories given the often large price reductions, innovation and product improvement, typically achieved with little evidence of harmful side effects.

In 2007, the UK's Office of Fair Trading (OFT) published *Productivity and Competition*. In contrast to the UK Treasury and DTI studies, the objectives of this report were oriented to the actual and potential role of competition authorities. The study's specific objectives were to build an understanding of the link between competition and productivity by exploring the relevant literature and subsequently demonstrating the OFT role in promoting productivity; and to determine how productivity analysis might "help inform the OFT's prioritization in terms of identifying areas of potential concern (horizon scanning)." Nonetheless, a number of the same themes touched on the in the UK Treasury's report were re-visited. For example, the study identified the following three mechanisms by which competition drives productivity:

- **Within firm effects through incentives**. Competition places pressure on the managers of firms to increase internal efficiency by reducing waste and slack (X-inefficiency);

- **Between firm effects through selection**. Competition ensures that higher productivity firms increase their market share at the expense of the less productive. These low productivity firms exit the market, and are replaced by higher productivity firms, increasing productivity through a composition or "market sorting" effect; and

- **Innovation.** Innovation increases dynamic efficiency through technological improvements of production processes (both embodied in investment goods and disembodied as in, for example, organizational change), and the creation of new products.

With respect to the last of these channels, the OFT study recognizes that the relationship between competition and innovation is complex and conclusions depend on whether one is focusing on competition in the market or for the market. The OFT perceptively points out that the challenge for a competition authority is to ensure that there is sufficient incentive to innovate in a situation of competition for the market when there is the risk that maintaining this incentive depresses competition in the market. It notes that this can be difficult, particularly in industries characterized by network effects. In these industries, high concentration ratios may suggest low levels of competition, but in fact different systems may be in rigorous competition to become the standard.

The OFT's 2007 study recognizes that it is not possible to isolate and quantify what part competition has played in the narrowing of the productivity gap between the UK and its main competitors. But it points out that improvements in productivity growth rates have coincided with major reforms to regulation and anti-trust policy.

## C. Australia

As reported by Gretton (2008) the emergence of national economic reform was a gradual process in Australia: "High trade barriers, and various regulatory and institutional impediments culminated during the 1970s and 1980s in poor economic performance relative to Australia's international peers (Banks, 2005). In recognition of these inhibitors of growth, Australian governments embarked on reforms to liberalise Australian capital markets, abolish imports quotas and reduce tariff and other assistance to industry. These measures increased competitive pressures in the economy which led to greater flexibility in Australia's previously rigid and highly centralized labour market arrangements and institutional and regulatory reforms to promote more efficient delivery of infrastructure services (for example, electricity and communications)." As reported in this section (and drawing in part from the results of the Australian Productivity Commission's 2005 *Review of National Competition Policy Reforms*) this policy shift has resulted in Australia now having the lowest level of product market regulation (tied with the UK) among OECD members. The Australian experience holds many lessons for other counties and especially for a country like Canada which in many ways is Australia's economic twin.

### i. National Competition Policy

The Australian, State and Territory Governments in 1995 agreed to a program of competition policy reform called the National Competition Policy (NCP). This set of reforms provided a timely, coordinated and comprehensive approach to reform across all levels of government. The NCP sought to establish the conditions necessary for effective competition in markets by taking action in four areas:[20]

- **structural reforms,** including the separation of regulatory and commercial functions, reviewing the merits of separating natural monopoly from potentially contestable service elements and of separating contestable elements into smaller independent businesses;

[20] In addition to NCP and related infrastructure reforms in electricity, gas, water and road transport, Australia's program of economic reform over the last two decades has also included extensive policy changes in the following areas:

- *Capital markets:* floating of the Australian dollar, removal of foreign exchange controls and capital rationing, and entry of foreign banks;
- *Trade reforms*: reductions in tariffs and abolition of quantitative import controls;
- *Infrastructure services (pre NCP):* partial deregulation and restructuring of airlines, coastal shipping, telecommunications and the waterfront;
- *Government services:* competitive tendering and contracting out, performance-based funding and user charges;
- *Labour market policies:* shift from centralized wage fixing to enterprise bargaining;
- *Macroeconomic policy:* inflation targeting; and
- *Taxation reform:* lower corporate and personal tax rate, introduction of a broad-based consumption tax

- **competitive neutrality,** involving the adoption of a corporatized governance model for significant businesses which remained publicly owned, imposing on them similar commercial and regulatory obligations (such as liability for taxes or tax equivalent payments, dividends and rate of return requirements) to those faced by private sector businesses, and establishing independent mechanisms for dealing with complaints that these requirements have been breached;

- **prices oversight,** establishing independent authorities in each jurisdiction to set, administer or oversee prices for enterprises which remained monopoly service providers; and

- **third party access arrangements**, providing legal avenues for firms to use nationally significant infrastructure services (such as rail networks) owned and operated by others (on 'reasonable' terms and conditions and at 'fair' prices) if commercial negotiations for access to those services are unsuccessful.

The NCP was based on an explicit recognition that competitive markets will generally serve the interests of consumers and the wider community, by providing strong incentives for suppliers to operate efficiently and be price competitive and innovative. The guiding principle under the NCP was that competition will generally enhance community welfare by encouraging greater efficiency. However, the NCP recognized the limitations of competition and the importance of distributional issues.[21] Indeed, a key principle of NCP was that arrangements that detract from competition should be retained if, and only if, they can be shown to be in the public interest.[22] Thus NCP approached competition as a means to a higher end, societal welfare, and recognized that that it is neither practical nor desirable to promote competition in every activity and circumstance.

[21] This community-wide framework implicitly recognizes that policy change typically involves both winners and losers, benefits and costs. While the costs imposed on particular groups need to be taken into account, they do not provide a justification for forgoing reforms where those costs are substantially outweighed by benefits to the wider community. However, they do point to the need for effective implementation mechanisms to ease the burden of adjustment and any significant adverse distributional impacts associated with policy change.

[22] Governments were given the flexibility, however, to deal with circumstances where competition was considered to be inconsistent with social, environmental, equity and regional objectives. Public interest factors were to be taken into account in situations where the benefits of a particular policy or action needed to be balanced against its costs. These public interest factors included laws and policies relating to ecologically sustainable development; social welfare and equity considerations, including community service obligations; laws and policies relating to matters such as occupational health and safety, industrial relations, access and equity; economic and regional development, including employment and investment growth; the interests of consumers generally or a class of consumers; the competitiveness of Australian business; and the efficient allocation of resources. Indeed, it was recognized that the reform framework provided no guidance on the circumstances in which mechanisms to facilitate adjustment, or to address adverse distributional consequences ensuing from the reform process, may be warranted.

### ii. Results of the NCP

The Australian Productivity Commission's 2005 *Review of National Competition Policy Reforms* report found that the National Competition Policy (NCP) delivered substantial benefits to the Australian community which, overall, have greatly outweighed the costs. According to the Commission, the NCP had:

- contributed to the productivity surge that has underpinned 13 years of continuous economic growth, and associated strong growth in household incomes;
- directly reduced the prices of goods and services such as electricity and milk;
- stimulated business innovation, customer responsiveness and choice;
- helped meet some environmental goals, including the more efficient use of water.

The review also found that the benefits from NCP have flowed to both low and high income earners, and to country as well as urban-dwelling Australians — though some households have been adversely affected by higher prices for particular services and some smaller regional communities have experienced employment reductions. With respect to productivity growth, the review states that:

> While many factors can influence productivity growth, a number of analytical studies indicate that microeconomic reforms — including NCP — were a major contributor to Australia's productivity surge in the 1990s, and to the economy's increased resilience in the face of economic disturbances. The reforms achieved this by increasing the pressures on both private and government businesses to be more productive, through increased competition, while simultaneously enhancing their capacity to respond through more flexible work arrangements, and the removal of unnecessary red tape. (xvii)

In addition to the impact on productivity, the review found that structural and behavioural changes in the economy resulting from the NCP boosted other aspects of economic performance:

- Australia's trade intensity (the ratio of exports plus imports to GDP) rose from 27 per cent in the mid 1980s to 44 per cent in 2003;
- inward foreign direct investment (FDI) increased from 17 per cent of GDP in the early 1980s to 30 per cent in 2003, while outward FDI rose from 4 per cent of GDP to 20 per cent over the same period;
- business expenditure on R&D as a proportion of GDP has doubled since the mid 1980s; and
- investment in information and communication technologies during the 1990s

grew at 15 per cent a year — higher than most other OECD economies.

The report notes that the fact that NCP and other microeconomic reforms yielded a significant payoff in productivity and income growth is not surprising. Previous model-based projections by the Australian Industry Commission suggested that the major elements of NCP could potentially generate a net benefit equivalent to 5.5 per cent of GDP. More selective analysis done for the report found that the observed productivity and price changes in key infrastructure sectors in the 1990s — to which NCP and related reforms have directly contributed — have increased Australia's GDP by 2.5 per cent, or $20 billion. This modeling likely underestimates the total benefits as it does not pick up the 'dynamic' efficiency gains from more competitive markets.

There is wide international recognition that the improvement in Australia's economic performance is directly linked to economic reform. According to the OECD

> …enhancing product market competition has been central to microeconomic reform in Australia and has been a crucial element in improving general economic performance. Following the trade liberalisation of the 1970s and 1980s, competition in product markets has intensified since 1995, as a result of the National Competition Policy (NCP), the most extensive economic reform programme in Australia's history. (OECD 2004b: 120)

At the sectoral level, strong productivity performance has been directly related to the introduction of industry specific reforms. In this context, several specific reviews of performance trends in key infrastructure sectors confirm the general improvement in productivity growth since NCP (and other) reforms were implemented (although the shift to contracting out, or outsourcing, means that some of these estimates may overstate the actual improvement). For example, in:

- telecommunications — where entry restrictions have been removed and an industry specific access regime and anti-competitive conduct code introduced — MFP increased by around 7 per cent per year between 1996-97 and 1999-2000;

- rail freight and passenger services — where structural separation of public monopolies and third party access arrangements have been introduced — total factor productivity rose by an average of 8 per cent per year between 1989-90 and 1997-98;

- postal services — where contestability has been introduced to non standard letter delivery — MFP increased by an average of 3.5 per cent a year between 1992 and 2002;

- stevedoring — which has been subject to changes in work arrangements following industrial relations reform and a relaxation of entry restrictions — labour productivity increased by more than 70 per cent between 1995 and 2003; and

- key infrastructure sectors which were explicitly the subject of NCP initiatives labour productivity has increased sharply. For example, in electricity generation, labour productivity more than doubled on average across Australia between 1993 and 2002 and more than trebled between 1991 and 1999 in Victoria — where reforms were introduced earliest. In gas distribution, labour productivity rose more than six fold between 1991 and 2000.

As the lags between reform implementation and observed improvements in productivity can be quite long, the eventual productivity and growth dividend to Australia from NCP (and other) reforms may be considerably higher than observed to date.

## D. The United States

The US has been a world leader in recognizing the importance of competitive forces for raising production efficiencies and consumer welfare and ranks third lowest in the OECD in terms of product market regulation. It was a first mover among OECD countries in seeking to deregulate economic activity when, in the late 1970s, it deregulated the airline industries. There is a large academic and business literature on the US regulatory experience in relation to competitive intensity, innovation and productivity. Among the more notable contributions, as summarized in this sub-section, is that made by Clifford Winston of the Bookings Institution.

Winston's 1993 comprehensive survey of the US deregulation experience, in which he quantifies the welfare effects, remains relevant today even as the US enters what some may regard as a new regulatory "cycle" (i.e., new financial regulatory regimes following the sub-prime mortgage turmoil; new energy efficiency regulatory regimes in the face of historically high energy prices).

Winston (1993) defines economic deregulation as the state's withdrawal of its legal powers to direct the economic conduct (pricing, entry, and exit) of nongovernmental bodies. He writes that:

> Economic deregulation of American industry is one of the most important economic experiments in economic policy in our time. In 1977, 17 per cent of the U.S. GNP was produced by fully regulated industries. By 1988, following ten years of partial and complete economic deregulation of large parts of the transportation, communications, energy, and financial industries that total had been cut significantly – to 6.6 per cent of GDP. (1263)
>
> Winston ends his survey on the impact of deregulation by concluding:
>
> Society has gained at least $36-$46 billion (1990 dollars) annually from deregulation primarily in the transportation industries… This amounts to a 7-9 per cent improvement in the part of GNP affected by regulatory reform. The bulk of the benefits have gone to consumers but in contrast to theoretical expectations not

> at the expense of labor or producers; the latter have actually benefited, on net, from reform…Producers in some industries avoided losses by reducing costs from labor and other input suppliers with whom they were sharing rents, by enhancing efficiency through technological and operational innovations, and by tailoring prices and services to customers. (1284-5)

In terms of the lessons of the US experience with deregulation in the 1980s, Winston observes:

> Economists were generally successful in predicting the direction and size of the effects of regulatory reform on prices and profits. They were less successful where deregulation led to substantial changes in firms' operations and technology. And their predictions did not adequately incorporate the effects of regulatory reform on services or foresee the extent of price discrimination in certain industries. In addition, they did not always anticipate the importance of supplementary government policies in ensuring deregulation's success, and were unable to foresee major changes in external economic factors that dramatically affected some industries' performance and clouded assessments. (1286)

Winston provides an interesting perspective on the issue of whether all industries should be deregulated. He notes that the answer would be easy, and positive, if perfect competition or optimal "regulation" were accurate characterizations of actual markets or regulatory processes. This is of course not the case. In the real world, the choice is therefore between imperfect competition and imperfect regulation. He believes that the accumulated evidence of the US experience with deregulation suggests that the burden of proof should be on those who argue that price and entry competition is not workable. Only in these industries would there be a need for economic regulation.

## E. The European Union (EU)

In addition to the pursuit of market-oriented policies by national governments in Europe, the EU also has taken steps to foster competition across the EU. The best known, and most successful, initiative has been the open skies policy in air passenger travel, which has given Europe the cheapest air fares in the world. Appendix 2 proves details on this initiative.

Product market reform has been an important issue for action at the EU level. Key instruments for delivering product market reform in the EU are competition, the single market, and research policy. As part of the Lisbon strategy developed in 2000, Heads of State agreed to full liberalization of the telecommunications market by 2001 and to speed up liberalization of energy, postal and transports markets. Indeed, more competition in services markets has been an important objective of the Lisbon strategy and the call for a fully operational internal market for services in the EU is at the top of the European policy agenda (Task Force of the Monetary Policy Committee of the European System of Central Banks, 2006). Europeans recognize that limited competition in the service sector

is one of the factors hindering productivity growth in that sector and contributing to higher inflation. Indeed, as the Task Force notes:

> Overall, a higher level of competition in the services sector would tend to support more efficient and flexible market services, facilitate adjustment processes and increase the resilience of the euro area to economic shocks. (5)

## F. Other Countries

This sub-section, which draws on Sharpe (2006), briefly reviews competition-related policies that have fostered productivity growth in three successful European countries: Ireland, Sweden, and Finland.

### i. Ireland

Ireland has enjoyed very strong economic and productivity growth since 1990, the payoff of the priority given education, the creation of a favourable environment for business and entrepreneurship, and the promotion of free trade, foreign investment and monetary union. Commercial, industrial, tax and education policies have all been supportive of a rapid pace of productivity growth. Ireland has been identified as a market friendly place to invest by multinational firms, a factor that has contributed significantly to prosperity. In a review of competition in the Irish economy for the OECD, Rae, Vogt and Wise (2006) point out that a pro-competition culture has taken hold in Ireland among policymakers and the general public, partly in response to some highly visible successes from certain early deregulations.

However, Rae, Vogt and Wise note that the general openness and outward orientation of the Irish economy masks a significant lack of competition in many sectors. They point out that Irish success owes more to liberalized labour markets than product markets; that the strong economy has hidden the welfare and efficiency losses created by insufficient competition in certain sectors; that lack of competition in the utilities sectors is only now starting to become a constraint as bottleneck begin to appear; and finally that given the very high prices in certain sectors, a striking feature of Irish success has been that too many benefits of the boom have been captured by producers rather than consumers. They conclude that despite the positive aspects of Irish regulatory regime, competition policy enforcement has been weak, reflecting the legacy of policy that has favoured the interests of producers over consumers.

### ii. Finland

Finland's economic success in recent years is closely linked to the fortunes of its dominant private sector company, Nokia, which has enjoyed world-wide success and rapid productivity growth. In contrast, the overall productivity performance of the rest of the Finnish economy has not been brilliant as the productivity gains in the high-tech sector have not diffused to other industries.

Finland performed somewhat better than average (10th out of 30 OECD countries) on the OECD product market regulation index in 2003, scoring 1.3 out of 6 in 2003, just above Canada (1.2). This score represents a considerable improvement from 1998 when it scored 2.1, reflecting a trend toward product market deregulation over the period. While certainly not as market-oriented as the United Kingdom, Australia, or the United States, Finland has nevertheless profited from a number of competition-related initiatives, including: the early liberalization of the telcom sector; an historical lack of monopolization of the Finnish telephone network by the State, ensuring that competitive pressures to invest in R&D existed even before deregulation; and the liberalization of the financial sector, leading to better access to capital for IT start-ups.

### iii. Sweden

Like Finland, Sweden has also exhibited an asymmetrical productivity performance, with a highly productive manufacturing sector and a lagging service sector. Competition has been identified as the key factor explaining the difference in performance. Manufacturing firms must compete in international markets and therefore produce products that are innovative, of high quality, and competitively priced. Service industries are to a large degree sheltered from such market forces. For example, the retail sector is hampered by protective zoning legislation while union rules hinder productivity in construction. At a societal level, strict employment protection legislation, a virtually flat before and after tax earnings structure that is a remnant of the centralized collective bargaining of the past and that is also driven by the extensive income redistribution system, and non-uniform corporate tax rules all impede workers and capital from moving to firms and positions in which they could be more productive.

Sweden performed somewhat better than average (8th out of 30 OECD countries) on the OECD product market regulation index in 2003, scoring 1.2 out of 6 in 2003, the same as Canada. This score represents an improvement from 1998 when it scored 1.8, reflecting a trend toward product market deregulation over the period that was common to all OECD countries.

## G. Michael Porter and Associates

The importance of competition for innovation and productivity growth has been an important theme in the work of Michel Porter, starting with his seminal *The Competitive Advantage of Nations* published in 1990. In that book, Porter developed the "diamond model" to shed light on how the competitive advantage of nations develops and evolves over time. Based on research in ten leading trading nations, Porter showed how traditional comparative advantages such as natural resources and pools of labour have been superseded as sources of prosperity, and how broad macroeconomic accounts of competitiveness are insufficient.

Porter developed the concept of "clusters," or groups of interconnected firms, suppliers, related industries, and institutions that arise in particular locations. Sound macroeconomic policies and stable political and legal institutions are necessary but not

sufficient conditions to ensure a prosperous economy. Competitiveness is rooted in a nation's microeconomic fundamentals—the sophistication of company operations and strategies and the quality of the microeconomic business environment in which companies compete. An understanding of the microeconomic foundations of competitiveness is fundamental to national economic policy. A key component in a country's microeconomic foundations is the state of competition as it is direct competition that impels firms to work for increases in productivity and innovation.

Porter and Associates find that vigorous domestic rivalry promotes success in international markets. Porter and Sakakibara (2001) explored the influence of domestic competition on international trade performance, using data from a broad sample of Japanese industries. Domestic rivalry is measured directly using market share instability rather than employing structural variables such as seller concentration. They found robust evidence that domestic rivalry has a positive and significant relationship with trade performance measured by world export share, particularly when R&D intensity reveals opportunities for dynamic improvement and innovation. Conversely, trade protection reduces export performance. These findings support the view that local competition - not monopoly, collusion, or a sheltered home market - pressures dynamic improvement that leads to international competitiveness.

## H. McKinsey Global Institute Productivity Studies

The McKinsey Global Institute (MGI) is a think tank based in Washington, D.C., founded in 1990 by McKinsey & Company with the objective of analyzing international productivity levels from both economic and management perspectives. Over the last fifteen years, MGI has studied most of the world's major economies. In each case, MGI uses microeconomic analysis on a sector-by-sector level to study the effects that industry decisions ultimately have on national productivity. This sub-section, which draws on Sharpe (2006), seeks to synthesize some of the findings of these studies.

Time and again, the MGI's studies have returned to the same story in trying to explain productivity gaps between countries: a lack of competitive intensity. To the extent that certain European and Japanese sectors seem to consistently trail the United States in productivity, these sectors are nearly always characterized by a small number of domestic firms who engage in little price or service competition because of regulatory protection in the form of product market restrictions and trade barriers. MGI finds that such restrictions lead to managerial complacency, a consequent lack of innovation in production processes, and ultimately to a productivity performance below that of the technological leader. Potential factors related to competition that have been identified by MGI as directly affecting productivity are the following:

- **Concentration.** A high market share held by a small number of firms is not necessarily inconsistent with intense competition. Concentration can improve productivity through achieving economies of scale, and it can also boost productivity if it allows a small number of large firms to compete intensely with

each other. Examples of highly concentrated yet highly competitive industries include the Dutch banking industry and the Swedish automobile industry;

- **Trade Protection.** Tariffs and quotas reduce productivity through shielding industries from international competition and so making the adoption of global best practices unnecessary. The automobile industry in Germany, France and the United Kingdom, the food processing industry in Japan, and many Swedish service industries are all examples highlighted by MGI of industries whose productivity performance has been hindered by trade protection; and

- **Deregulation.** MGI highlights the airline, telecommunications and banking industries as cases in which deregulation has boosted productivity, and in which countries that have chosen to delay or forgo deregulation have consequently suffered lower productivity levels than the early deregulators.

Other competition-related factors can affect productivity in a more indirect fashion. These include:

- **Minimum Wages.** Higher wages typically have the effect of reducing the number of low-skill jobs, as the benefit of these low-skill services is outweighed by the higher cost of providing them. While this has the effect of raising conventionally-measured average labour productivity, MGI argues that overall "service productivity" is negatively affected because the range of services that is offered shrinks;

- **Work Rules.** MGI recognizes that some labour market inflexibilities can be beneficial. However, collective agreement terms that are not adjustable to market realities can negatively affect productivity by preventing productivity-enhancing reorganizations of work; and

- **Zoning Laws.** Some European countries have zoning regulations that have a negative impact on productivity by making it difficult for firms to purchase parcels of land of a required size, and through creating an artificial scarcity of land and thereby making land overly expensive. This affects productivity because high rents hinder the ability of smaller firms to innovate, and because larger firms have difficulties achieving optimal scale.

Perhaps even more important than the market conditions under which a firm operates is the way its managers choose to react to those conditions. Competition is the main driver of managerial innovation, but that managerial innovation (or lack thereof) is what affects productivity, first at the firm level, then the industry level, and ultimately at the national level. MGI makes the following observations related to managerial innovation:

- **Best Practice.** Managers need to be aware of best practices in a given industry, and be prepared to implement them. MGI states that sufficient exposure to competition will ensure that this is the case;

- **Human Capital.** MGI finds little evidence that labour skills at the production level differ greatly across countries. However, the qualifications of managers can have a significant impact on productivity, through entrepreneurship and the training of production workers;

- **Marketing.** MGI finds that the U.S. telecommunications sector's productivity performance has been positively affected through marketing, since the resulting greater demand for telecommunication services means that there is greater output for a given investment in fixed capital;

- **Information Technology.** Although few would dispute that investment in information technology can have a significant impact on productivity growth, MGI concludes that realizing its full benefit requires an appropriate application. In addition to the effect of IT use on productivity growth, the presence and strong productivity performance of industries producing IT goods also positively affect overall manufacturing productivity growth; and

- **Capital Intensity.** MGI finds that improvements in capital intensity are a necessary but not sufficient condition for improvements in productivity. This is because increasing the amount of capital per worker does not necessarily mean that the capital is being used efficiently. Improvements in capital productivity are often dependent on other managerial and competitive factors.

Diana Farrell (2003), a McKinsey executive, in an influential paper published in the *Harvard Business Review* has made the case that rather than springing from the internet, the real new economy of the 1990s emerged from intensifying business competition and a resulting surge in managerial innovation. She argues that information technology is of great, but not primary importance, to the fate of industries and individual companies. This view is based on the finding that three quarters of productivity gains in the United States in the late 1990s were concentrated in six sectors (retailing, securities brokerages, wholesaling, semiconductors, computer assembly, and telecommunications) representing only one third of GDP and that in these industries there was little correlation between productivity and IT investment. Farrell argues that intensifying competition lead to productivity-boosting innovations in the six key sectors. She states:

> In sectors where competition was promoted – through the dismantling of regulatory constraints, primarily – innovation flourished and productivity soared. But wherever regulation or other forces warped the competitive environment, competitive pressures eased, innovations failed to develop or to spread rapidly, and productivity growth slackened.

The key objective of the section has been to show that the international experience provides strong support for the position that from the point of view of innovation and productivity performance, the regulatory and governance frameworks affecting public policy that are least restrictive in their impact on the competitive environment or competitive intensity produce superior economic results. The experience of the UK, Australia, the United States, and OECD countries in general certainly show that a move to a more competitive economic environment improves economic performance. While there can be negative implications for certain groups from such policy changes, the evidence shows that such effects are often smaller than anticipated and that the productivity gains arising from the change can be used to fund compensation from the winners (often all members of society through lower prices) to the losers.

## I. Case Industry Studies

The appendices to this report contain two case studies of the relationship between competitive intensity and innovation and productivity, one from Canada and one from Europe. The first study is on European air passenger transport industry, the second on the Canadian wine industry. These case studies of product market regulation provide support for the proposition that there should be a policy presumption in favour of competitive markets to the extent that such markets can enable innovation and productivity growth. The key findings from the studies are summarized below.

The deregulation of air passenger transport in Europe in the 1990s has effectively turned the high cost-low productivity European air passenger industry into a globally competitive industry. The lessons from this experience are threefold. First, providing consumers with substantially lower prices can stimulate demands and create new markets for the industry when the price elasticity of demand for the industry is high. Second, deregulation can produce major gains to consumers without damaging the long-term profitability of firms if they can adjust their business strategies properly. Third, open and free competition is of crucial importance for productivity growth in an industry since it encourages entrepreneurial activity and industry innovation.

The Canadian wine industry was very weak before the Canada-U.S. FTA in terms of product quality and capability to adapt and innovate. The implementation of the FTA has dramatically reshaped the industry, instigating a major program to uproot native grape varieties and replant them with high quality European grapes. This diversification, as well as the creation of VQA standards, development of winery tourism, and promotion of unique products, has given Canadian wineries world-class reputations. The successful transformation of the Canadian wine industry has shed light on how increased foreign competition can drive innovation and enhance the competitiveness of an inward-looking industry. First, government protective measures for an industry, or a defensive strategy of avoiding competition, while potentially generating short-run market advantages, cannot ensure the long-run survival of an industry. Second, government programs, such as the subsidies provided grape growers to switch from Labrusca to Vinifera grapes, can foster the innovations needed to adapt to new competitive conditions. Third, industry competitiveness can be enhanced by the establishment of rigid product quality standards.

As a whole, surviving competition enhances an industry's capability to innovate and hence improves its performance.

# V Conclusion

The objective of this report has been to survey and assess the literature on the relationship between competitive intensity and productivity and innovation. The evidence in favour of more open and competitive markets as drivers of innovation and productivity is overwhelming. In the academic literature there is a debate about the existence of an inverted U-shaped relationship between innovation and competition related to Schumpeter's famous theory that monopoly can foster innovation. Innovation is said to rise with increases in competition up to a point and then fall. But this relationship is fragile, and more important, has little, if any, policy relevance. As Peter Howitt (2007), a leading growth economist in principle favourable to the Schumpeterian perspective has recently written, competition policy should not be relaxed in hopes of boosting innovation because more competition actually strengthens the incentive to innovate.

The work that has been done on firm dynamics and international experience provides strong support for the position that from the point of view of innovation and productivity performance, the regulatory and governance frameworks affecting public policy that are least restrictive in their impact on the competitive environment or competitive intensity produce superior economic results.

While there can be negative implications for certain groups from such policy changes, the evidence shows that such effects are often smaller than anticipated. Nevertheless, in cases where there are losers, while economists may talk about compensating them, in practice, there is often little follow-up. The reality is that a movement toward more competitive marketplaces affects both income distribution and poverty. It is likely that the net effect of this movement reduces absolute poverty by decreasing prices for the products purchased by the poor. Advocates of more competitive markets would be wise to make this point better known in order to broaden support for such policies.

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## Appendix 1: The European Air Passenger Transport Industry: An Example of the Dramatic Effect of Deregulation

In postwar Europe, aviation markets were regulated by bilateral agreements that confined the market to one airline per country. Based on this regulatory environment, air travel in Europe was dominated by national flag carriers such as British Airways, Air France, Alitalia, Lufthansa and Belgium's Sabena. These airlines had a virtual monopoly in their host countries over prime flight times and airport slots and did not compete on price, services or capacities. The economic rent from protectionism in the sector was absorbed by a combination of high wage costs and low productivity. As a result, European air fares were the highest in the world and Europe's share of world aviation was falling steadily compared to its counterparts (Barrett, 1996).

However, the deregulation of the industry both at the multilateral level through the institutions of the European Community and at a bilateral level through negotiations between individual countries has reshaped the markets, "making cheap flights a habit for millions of people, giving birth to a host of low-budget rivals while driving state-subsidized air carriers into bankruptcy" (Frankel, 2004). The increased competition within the industry allowed airlines to lower operation costs and enhanced the number of air routes served. The deregulation has led to substantial benefits for consumers as average passenger fares has fallen dramatically. Around 90 per cent of passengers on intra-European routes have enjoyed reduced fares since 1995 (Button, 2004). A study conducted by the European Commission (2001) estimates that the price of promotional fares fell by 41 per cent between 1992 and 2000. European air passenger transport is now characterized by the lowest prices in the world.

This case study briefly summarizes Europe's liberalization experience in the air travel industry. It focuses in particular on the emergence of European low-cost airlines (LCA), which since deregulation have introduced many innovative services and reshaped the competitive environment within the market. It first briefly describes the industry characteristics in terms technical efficiency and productivity growth prior to the deregulation. Then it reviews the framework for the European aviation liberalization and investigates the most striking changes have occurred in the industry due to the liberalization, emphasizing the important operating innovations of the LCAs. Finally it concludes on the lessons from the positive experience of European liberalization.

### The European Air Passenger Transport Industry Prior to Deregulation

Prior to deregulation, the European air passenger transport industry was largely based on a restrictive regime of bilateral agreements, which only allowed one airline from each country to operate services on a limited number of specified routes. In most cases, the capacity on international routes was divided at a rigid 50:50 between countries. Any change to fares required approval by both governments concerned.

Under this regulation framework, the European air passenger transport industry

was dominated by state-owned operators, the so-called "flag carriers." True competition was absent. These flag carriers often regarded the attainment of certain public policy objectives (such as providing employment or maintaining uneconomic services to remote locations) as their primary function. Consequently, efficiency in the provision of services was of secondary importance and often not even an area of managerial concern (Kangis and O'Reilly, 2003). As a result, the European air passenger transport industry was characterized by high costs and low productivity.

MacGowan *et al.* (1989) provide striking evidence on this issue. Their calculations show that in 1987, six out of seven European national carriers paid their staff more than double, with three paying more than triple, US rates. These differentials did not reflect labour productivity differences since average US labour productivity was more than double that in Europe!

Good *et al*.(1993) compared technical efficiency among four European flag carriers (Air France, Alitalia, British Air, and Lufthansa ) and eight of their American counterparts from 1976 through 1986. They found that US carriers were nearly 15 per cent more efficient throughout the study period than European airlines. The result also shows that "bringing all European airlines up to the US performance average in 1986 would have saved the entire European airline industry approximately $4 billion (in 1986 prices) annually which is about 16 per cent of total operating costs."

**The Deregulation Process**

At the beginning of the 1980s, forces questioning the traditional European air passenger regulation regime began to appear, mainly from the European Commission itself.[23] The successful deregulation of civil aviation in the United States in the late 1970s also played an important role in triggering bilateral liberalization reform in Europe. However, the initiatives moving toward liberalization at the two different levels, bilateral and continent-wide, took more than a decade to complete.

In early 1980s, certain European countries such as the United Kingdom, the Netherlands, Belgium, Ireland and Germany signed liberal bilateral agreements with the United States on their North-Atlantic routes, allowing free entry, and price and capacity competition. These countries then introduced liberal bilateral agreements among themselves between 1984 and 1986. Because of these agreements flag carriers from these countries began to face strong competition both on the North-Atlantic routes and on intra-European routes. They were forced to adopt new business strategies to meet the challenges.

During the same period, the EC released several reports recommending the gradual deregulation of the air passenger industry. It approved the first deregulation

[23] For example, Encaoua (1991) notes that European non-scheduled charter companies, which were exempted from the bilateral agreements, wanted a more liberal framework. He also mentions that some European countries such as the United Kingdom and Netherlands were in favour of transport airline liberalization.

package in 1987. This package, although allowing limited competition in prices and capacities and restricted entry, was far from a complete deregulation of air passenger travel industry in Europe. It was only in 1997 that the formal deregulation of the industry was finally completed. Since then, any technically qualified European airline has been able to operate on any route in the region, including domestic routes, without any restraints on price or capacity.

**The Impact of Deregulation**

Since deregulation, fundamental changes have taken place in the European air passenger transport industry. Competition has increased dramatically. Services offered by the airlines have improved, giving consumers greater choice. Air fares have fallen precipitously, triggering demand for greater air passenger services.

Increased Competition

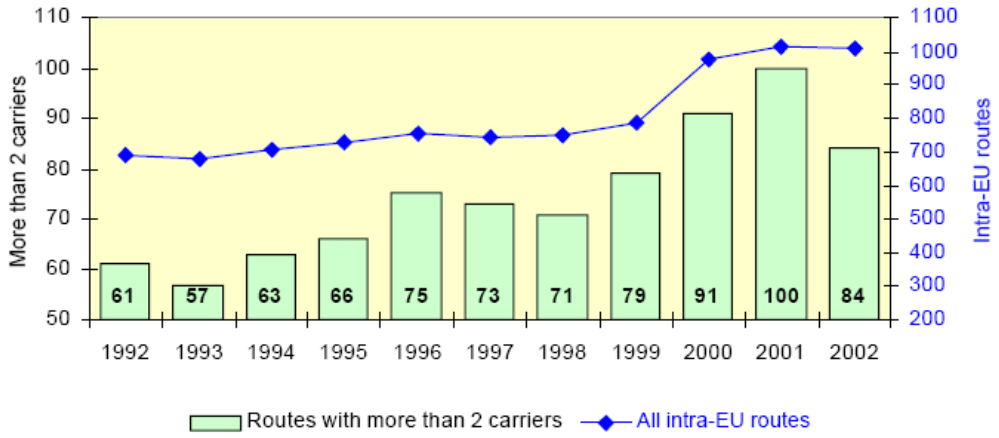
Liberalization gave all European-owned and controlled airlines equal rights of access to all markets in the Community. This broke the national flag carriers' monopoly in the skies. An important effect of the deregulation policy has been the development of low-cost airlines (LCA) such as Ryanair, Easyjet, Virgin Express and Debonair. These airlines based their business strategy on a simple no-frill product. They introduced many innovations to lower operating costs, which allowed them to offer consumers very low prices. With this strategy, LCAs expanded rapidly and by the end of 2000 had taken about 10 per cent of domestic and intra-European market (European Commission, 2003). In the United Kingdom where the liberalization process started relatively early, the share of passengers carried by LCAs had grown to 20 per cent by 2000. The emergence of LCAs imposed direct competition to existing airlines and forced the traditional flag carriers to innovate to maintain their market shares.

According to the European Commission (2003), although the total number of European-owned airlines that offer scheduled services did not increase much between 1992 and 2000 (from 124 to 131), the number of airlines exiting and entering the market were considerable. Only half of the airlines present at the start of 1993 still operated scheduled routes under their own code by 2000. In the same time, the lowering of barriers to entry allowed many new airlines to establish within the liberalized area: an average of more than 20 new carriers per year have been set up since 1993 (European Commission 1999). This market churning illustrates how the growth in competition changed the structure of the industry.

Improved Services

Increased competition has expanded the range of choice available to consumers by increasing the number of routes covered and the flexibility of flights offered. The total number of routes operated by the European-owned airlines increased 46 per cent from 1992 to 2000. The number of routes where more than two carriers competed rose 49 per cent over the same period (Chart 1). LCAs introduced most of the new routes.

Chart 1: Changes in Intra-EU Air Routes and Competition in the European Air Travel Industry




Source: European Commission (2001).

In order to attract passengers, many European airlines introduced innovations to decrease their operating cost while at the same time still offering high standard of services. For example, most LCAs use the websites to sell tickets, which gives consumers greater convenience since the online sale is open 7 days a week 24 hours a day.

Fall in Air Fares

The emergence of LCAs increased competition on the basis of price, making air travel affordable for a much broader segment of the population. For example, on routes with two competitive airlines in 2001, business and economy fares were 17 per cent and 24 per cent lower, respectively, than in 1992 (European Commission, 2001). Fares on routes between Ireland and the UK had even fallen by as much as 70 per cent during the 1990s (Barrett, 2000). Moreover, the number of promotional fares available in each flight has also increased and the prices of promotional fares generally decreased 41 per cent from 1992 to 2000. Some airlines even provide free tickets, with certain conditions.

Since the price elasticity of demand is relatively high in the air passenger travel industry, lower airfares have greatly increased demand for air travel. As a result, the number of air travel passengers in Europe increased three-fold between 1980 and 2000 (Collaborative Forum of Air Transport Stakeholders, 2003).

**The Innovations of LCAs: A Case Study**

As noted above, a very important effect of air passenger transport deregulation in Europe has been the emergence of low cost airlines (LCAs), which have completely reshaped the industry. Through innovations, these new entrants have not only successfully competed with existing air carriers, but they have also created new markets by taking business from other modes of passenger transport such as railways. Compared

to traditional scheduled airlines, the main operating features of LCAs are:[24]

- absence of expensive ticket sale offices in the cities they serve and reliance of cost-effective web-based or telephone reservation systems;

- elimination of non-essential in-flight services such as beverage and meal services, reducing input and labour costs;

- unrestricted seating arrangement to reduce boarding time;

- use of secondary airports to reduce airport charges and increase turn-around times; and

- leasing rather than purchasing aircrafts, allowing rapid changes in schedules in response to market demand.

By applying these strategies, many LCAs in Europe have challenged the existing airlines and driven the whole industry to reduce costs and increase productivity. The most successful story is Ryanair, Europe's first and largest LCA. Adopting a low cost strategy similar to the one pioneered by Southwest Airlines in the United States, Ryanair entered the European air market in 1985. It reduced travel agent commission from 9 per cent to 7.5 per cent; developed its own telemarketing system; established services to lesser-used airports; and achieved a 25 minute turnaround time compared to 45-60 minutes for rival airlines (Barrett, 1999).

These innovations helped Ryanair achieve remarkable labour and aircraft productivity. This situation leads to low prices which in turn attract increasing numbers of passengers. This success represented a major threat to Ryanair's main rival – the national flag carrier, Aer Lingus. In this competitive environment, both airlines reduced unit costs. Chart 2a and b show the annual passenger traffic carried by Ryanair and Aer Lingus between 1997 and 2003 and their respective falling unit cost levels over this period.

Based on these strategic innovations, Ryanair has become the most profitable airline company in the world. In 2006, Ryanair became the world's first airline to carry more than 4 million international passengers in one month. By the end of this decade, Ryanair hopes to carry 50 million passengers annually, which would make it Europe's largest. [25]

[24] See Pender and Baum (2000) for detailed discussion of operating features of LCAs.

[25] Ryanair (2007): About us, available online at http://www.ryanair.com/site/EN/about.php?page=About.

Chart 2a: Annual Passengers Carried by Ryanair and Aer Lingus, 1997-2003

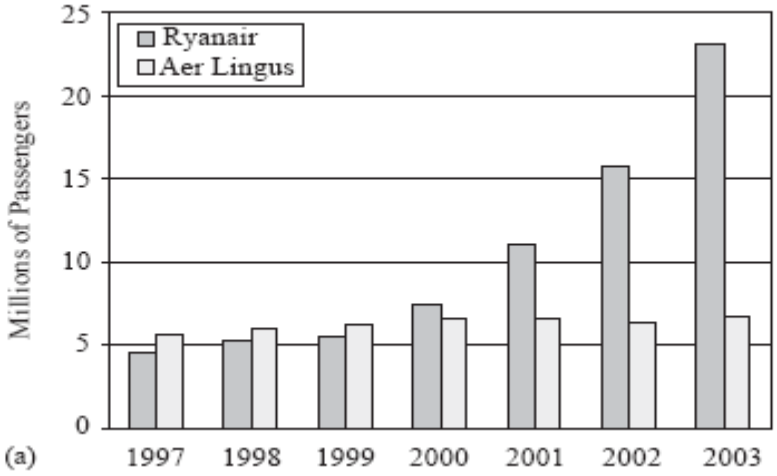
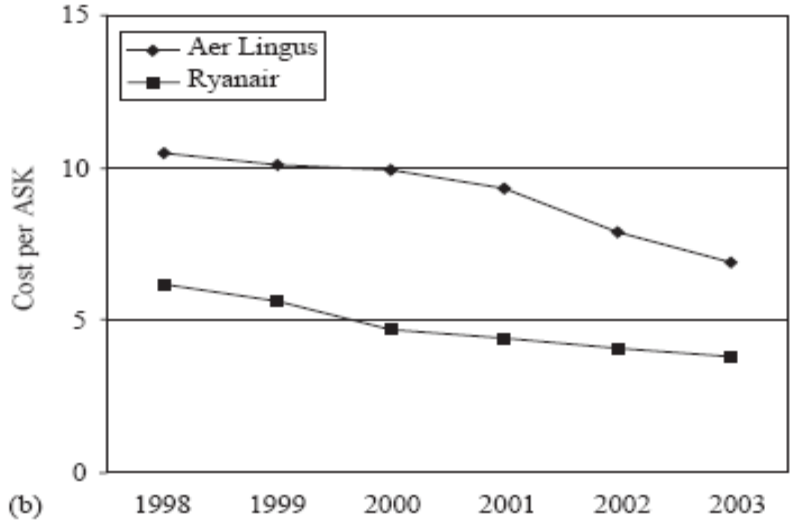



Chart 2b: Annual Unite Cost of Ryanair and Aer Lingus, 1997-2003




Source: O'Connell and Williams (2005: Figure 1a and Figure 1b)

## Conclusion

The successive packages of liberalizing measures have effectively turned the high cost-low productivity European air passenger industry into a globally competitive industry with a high productivity performance. The lessons from deregulation of the European air travel industry are threefold. First, providing consumers with substantially lower prices can stimulate demands and create new markets for the industry when the price elasticity of demand for the industry is high. Second, deregulation can produce

major gains to consumers without damaging the long-term profitability of firms if they can adjust their business strategies properly. Third, open and free competition is of crucial importance for productivity growth in an industry since it encourages entrepreneurial activity and industry innovation.

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## Appendix 2: The Transformation of the Canadian Wine Industry: Innovation from International Competition

The transformation of the Canadian wine industry "from a weak, inward-looking industry to a prize-winning international competitor" is an excellent illustration of the role of open and competitive markets driving innovation and productivity growth (Hart, 2005:6). Two decades ago, Canadian wineries used native-based grape species such as Vitis Labrusca to make wines.[26] These wines had a peculiar "foxy" taste and were of little interest to sophisticated consumers. Canadian wine was considered much inferior to that of Europe, the United States, and other wine-producing regions. However, because of trade barriers, as well as differential mark-ups and discriminatory listing practices by monopoly retail outlets, the Canadian wine industry was well sheltered from global competition and was able to survive at a low level. Wineries has little incentive to innovate even though Canadian consumers were leaning increasingly toward drier table wines made from quality wine grapes (Vitis Vinifera).[27]

During the 1980s, the signing of the Canada-U.S. Free Trade Agreement (FTA), along with a ruling under General Agreement on Tariffs and Trade (GATT) forced Canada to open domestic wine markets to higher-quality, lower-priced international rivals. In facing up to the increased competition, the industry had to introduce a series of innovations to improve the quality of its product. Today, the Canadian wine industry, although relatively small, is internationally recognized: wineries are producing quality wines, particularly ice wines, many of which have garnered awards and praise from international wine connoisseurs.

As the industry was enhancing its reputation, it experienced growth at a remarkable pace. From 1993 to 2005, real output increased at an average annual rate of 7.1 per cent, more than double that of the overall economy (Hope-Rose, 2006:6). This growth rate was the eleventh highest rate among the 215 industry groups.

This case study examines the main innovations in the Canadian wine industry driven by the intensive competition arising from the implementation of the FTA. It begins with a brief introduction of the industry and the FTA. The changes of policy, production and consumption affecting the industry are then reviewed. It concludes with some important lessons from the industry transformation after being exposed to foreign competition through FTAs.

### Industry Structure

In Canada, grape farmers have an important stake in the wine industry. About 80 per cent of the grapes grown in Canada are used for wine production (Bradshaw, 2004). Grape production is concentrated in four provinces: Ontario, British Columbia, Quebec

[26] Vitis Labrusca is a species of table grapes native to North America. Today they are grown mainly for juices, jams and the fresh fruit market.

[27] Vitis Vinifera is a vine species of European origin, known for its ability to produce the finest grapes for wine.

and Nova Scotia. In 2001, southern Ontario accounted for 70 per cent of total grape acreage, British Columbia was the second with 27 per cent, and the remainder was mostly divided between Quebec and Nova Scotia. The two leading wine grape regions in Canada are the Niagara Peninsula in Ontario and the Okanagan Valley in British Columbia.

The wine industry in Ontario and British Columbia is closely linked to the grape-growing sector and, as such, is directly affected by provincial agricultural policies. In Ontario, the vintners negotiate annually with the grape growers represented by the Ontario Grape Growers (OGG) to set grape prices. In British Columbia, the grape market is not regulated and growers and wineries contract privately with each other.

On the output side, policies affecting the sale and distribution of wine are regulated through provincial liquor control board outlets. The Liquor Control Board of Ontario (LCBO) is the main organization that shapes the production and distribution of wine in Ontario. In British Columbia, there are two branches of government that are responsible for regulating and monitoring the liquor industry: the Liquor Control and Licensing Branch (LCLB) and the Liquor Distribution Branch (LDB).

**Industry Protection Prior to the FTA**

Twenty years ago, the Canadian wine industry was well protected through trade barriers based on the following regulations and practices.

- Restrictive listing requirements for foreign wines. The provincial liquor boards determined which wines are allowed to be sold through their listing practice. Restrictive listing practices toward foreign wines made it difficult for foreign wine producers to be listed in Canada. According to Heien and Sims (2000), there were no California wines on the LCBO list in 1970s and by 1987 only 3 per cent of the wines listed in Canada were from the United States.

- Differential mark-ups for domestic wines and imported wines. The makeup was a fixed percentage of retail prices, determined by the provincial government and paid by the Canadian wine consumers. The disparity between domestic and import mark-ups was substantial. For example, the LCBO marked up foreign wines by 60 per cent as compared to a mark-up of 1 per cent for Ontario wines (Mytelka and Goertzen, 2004).

- Other nontariff barriers such as blending requirements, additional cost of services and floor prices. In British Columbia, the B.C. Grape Grower Association (BCGGA) enforced a 80/20 regulation affecting the domestic content of wines labelled as a product of British Columbia. Domestic wines had to have an 80 per cent B.C. grape content. Ontario, New Brunswick and British Columbia also had implemented "steep" cost of services differentials on foreign wines. These provinces also set a floor price or a reference price for U.S. wines (Heien and Sims, 2000).

As a result of these restrictive practices, imported wine listed in Canada was limited, and also was more expensive than domestic wine. Thus these government protective measures favoured inefficient domestic wine producers in Canada. Although there were dramatic changes in wine consumption patterns toward drier wines made from European Vinifera varieties (initially whites, such as Chardonnay, Riesling and Sauvignon Blanc, more recently reds, Cabernet Sauvignon, Merlot and Syrah), the Canadian wine industry in the mid 1980s was still largely based on hardy native species grapes (Labrusca) and had little incentive or interest in introducing innovations. Not surprisingly, Canadian consumers preferred beer or hard liquor which, which while also over-priced, was at least drinkable.

**Industry Innovation in Response to Foreign Competition**

The signing of the Canada-U.S. Free Trade Agreement (FTA) in the late 1980s shook the Canadian wine industry dramatically and forced Canadian grape farmers and wineries to confront competitive pressures from the United States. An important component of the agreement was the lessening of the restrictions on the importation and marketing of wine produced in the United States as well as the removal of tariffs on U.S. wines in Canada. More specifically, the agreement required elimination of two wine-related discriminatory practices (listing practices and differential mark-ups) and required Canada to treat U.S. wines as if they were domestic wines. In 1987, a GATT ruling accepted by Parliament that condemned Canadian restrictions on imported beer and wine also drove Canada to abandon the protective measures offered to the domestic wine industry. Under the terms of these agreements, foreign wines would be treated no less favourably than Canadian wines.

To compete, Canadian winemakers needed to produce high quality wines comparable to the foreign wines sought by Canadian consumers. With the support of provincial and federal governments, the Canadian wineries undertook a series of industry innovations to remain competitive by improving quality. The innovations included: a switch to higher quality grapes; the establishment of VQA standards; development of wine tourism; and promotion of ice wine. All four innovations are discussed below.

<u>Switch to Higher Quality Grapes</u>

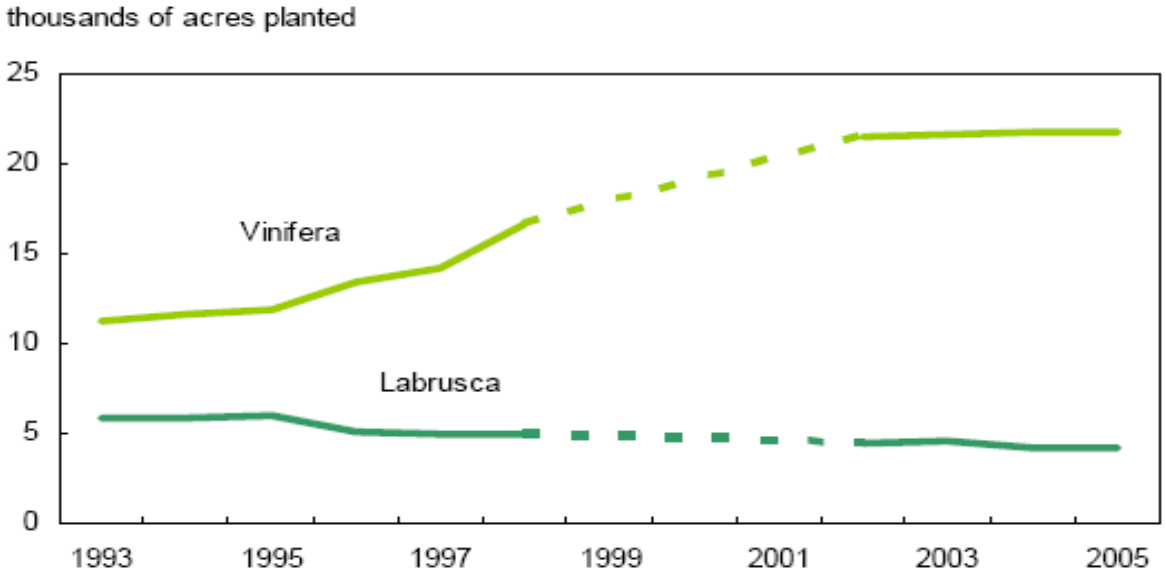
Wine making in Canada has a history of more than two centuries. But the modern era in Canadian winemaking only began in 1990s in response to the FTA and GATT. As noted, prior to the FTA, the Canadian wine industry was mainly based on hardy grapes such as French hybrids and Vitis Labrusca that could be grown successfully in native vineyards. The government protective measures toward these inferior wines discouraged the planting of the riskier but higher quality European wine grapes known as Vitis Vinifera. The implementation of the FTA and GATT has changed the story. In response to the demand for the higher quality wine grapes, grape growers moved away from native Labrusca in favor of new Vinifera that produce higher quality wines.

Since it takes three or four years for a grapevine to produce a crop and five years

for a grapevine to become fully productive, the movements from Labrusca to Vinifera posed a great risk on grape growers. Government assistance reduced risk and thus was a powerful force to encourage the transformation of the grape-growing industry. The Ontario Wine Assistance Programme (OWAP) of 1988, for example, provided funds to pull up Labrusca and Hybrid vines in the period from 1988 to the early 1990s, and provided "sugar bonuses" to encourage the planting of Vinifera grapes and the use of newer viticulture techniques that produce grapes of high quality for the wine sector from 1988 to 2000 (Mytelka and Goertzen, 2004:8). In British Columbia, a jointly funded federal/provincial program, the Grape and Wine Adjustment Assistance Program (GWAAP) was also introduced in the late 1980s to assist the industry's movement toward quality grapes and grape growers received about $28 million to aid to remove the unwanted grape varieties and to subsidize purchasing and growing quality grapes (Carew, 1998:249).

These government-supported programs greatly stimulated the switch from Labrusca to Vinifera. By 2005, the acreage of Vinifera varieties planted in Canada had virtually doubled from 11,276 acres in 1993 to 21,825 acres. On the other hand, farmers had only 4,280 acres of the old Labrusca varieties, down from 5,854 (Chart 1). And the trend towards planting Vinifera grapes for premium wines is expected to continue.

Chart 1: Grape Growers Switched from Labrusca to Vinifera, 1993-2005




Note: Data for 1999-2001 are confidential.
Source: Hope-Rose, Penny (2006) "From the Vine to the Glass: Canada's Grape and Wine Industry," Statistics Canada, Catalogue No. 11-621-MIE-No. 049.

Establishment of VQA Standards

The introduction of the Vintners Quality Alliance (VQA) standard further boosted the demand for Vinifera grapes for wine production. A VQA symbol on a wine label guarantees that the wine has satisfied a rigorous testing and audit process. In order to receive a VQA symbol on a wine bottle, the independent inspection process begins in the vineyard, continues throughout wine production and finishes with independent wine-tasting panels, which conduct a blind tasting of bottled samples of the wine before giving approval (Bradshaw, 2004). This premium product guarantee has given the Canadian wine industry a solid foundation from which to promote the wine industry in Canada as well as around the world.

The Ontario wine industry developed voluntary VQA standard in 1988. British Columbia followed two years later. The VQA Ontario was then designated as Ontario's wine authority in 1998 under the VQA Act, 1999. It is responsible for administering the VQA Act and its regulations under a detailed agreement with the Minister of Government Services. The VQA Act establishes an "Appellation of Origin" system by which consumers can identify quality wines made in Ontario based on the origin of grapes used, production methods and other standards. In 2006, VQA Ontario sales represented 18.8 per cent of all Ontario wine sales (Wine Council of Ontario, 2006).

Development of the Wine Tourism

In response to competition, the Canadian wine industry has developed a value-added innovation: winery tourism to support the marketing for quality wines. Wine companies use their wineries and vineyards as tourist attractions. Visitors are charged a fee for a winery tour, and to take part in activities such as grape harvesting and wine tasting. Winery tourism in Canada has become a unique competitive advantage over other wine regions. According to the Wine Council of Ontario(WCO), the industry attracted 750,000 winery visitors in 2006. These visits are the primary sales channel for many WCO member wineries.

Promotion of Ice Wine

The promotion of unique or signature products such as ice wines is another means by which the Canadian wine industry has adapted to trade liberalization. The commercial production of Canadian ice wine started as early as 1970s. However, it was not until the commencement of the FTA, that the production of ice wines increased dramatically. Canadian ice wine has earned the highest awards at many of the world's most prestigious wine fairs, including Vinexpo and VinItaly. Today Canada is the largest producer of this rare, rich and sweet wine, with the largest share coming from Ontario's Niagara Peninsula, followed by British Columbia.

## Conclusion

The Canadian wine industry was very weak before the Canada-U.S. FTA in terms of product quality and capability to adapt and innovate. The implementation of the FTA has dramatically reshaped the industry, instigating a major program to uproot native grape varieties and replant them with high quality European grapes. This diversification, as well as the creation of VQA standards, development of winery tourism, and promotion of unique products, has given Canadian wineries world-class reputations.

The successful transformation of the Canadian wine industry has shed light on how increased foreign competition can drive innovation and enhance the competitiveness of an inward-looking industry. First, government protective measures for an industry, or a defensive strategy of avoiding competition, while potentially generating short-run market advantages, cannot ensure the long-run survival of an industry. Second, government programs, such as the subsidies provided grape growers to switch from Labrusca to Vinifera grapes, can foster the innovations needed to adopt to a new competitive conditions. Third, industry competitiveness can be enhanced by the establishment of rigid product quality standards. As a whole, surviving competition enhances an industry's capability to innovate and hence improves its performance. The more rapidly industries accumulate competitive experience, the faster they learn and the more successful they become (Baum, 2002).

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