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THE DYNAMICS OF FIRM TURNOVER AND THE COMPETITIVE PROCESS

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Abstract: The dynamics of change within industries has rarely been studied by industrial economists because of the lack of panel data. A series of studies have recently been completed using a specially constructed panel of Canadian Census of Manufactures data. This paper summarizes the results. It looks at the importance of entry and exit, of acquisitions and of growth and decline in continuing firms. It describes the contribution that firm turnover makes to productivity growth, to efficiency, and to equilibration of differences in industry profitability.

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Key Words: Firm Dynamics, Competitive Process, Entry and Exit, Mobility, Firm Turnover, Mergers

INTRODUCTION

The research agenda in industrial economics has been determined, for the most part, by the type of information that has been available for researchers. Earlier generations of economists studying industrial organization had to rely on case studies. While they provided a wealth of detail, industry case studies generally preclude the type of generalizations that social science demands. With the addition of econometrics to the tool bag of the industrial economics profession, cross-sectional studies of industry characteristics at a point in time became popular. The focus on a single point in time was primarily the result of a lack of panel data. Statistical agencies have focused on producing a set of industry statistics at a point in time. Linking these over time has been of secondary importance. Linking the micro units at a lower level has received even less emphasis. Only recently has it become possible to use panel data to follow the micro-production units over time as computer technology and administrative practice have improved.

The lack of panel data on businesses has influenced the phenomena that can be studied and, in certain cases, the descriptions produced. In turn, the depiction of the industrial system that has been conveyed, both in textbooks and in more popular articles, has been influenced by these shortcomings. Several examples can be given:

1) Industrial economists have long been interested in summary measures of market structure. The most commonly used measure of structure--concentration--depicts the firm-size distribution at a point in time. Alternate measures that capture the dynamics of changes in firm size have long been suggested, but require the researcher to follow plants and firms over time. An inability to do so has restricted attention to concentration measures. Since these measures show substantial stability, the industrial system has come to be characterized in many circles as being relatively rigid, and adaptation as difficult and slow. With structure being defined in a narrow sense to refer to firm-size distribution, change could be described as occurring "at the pace of a glacial drift".[1] In reality, there is a great deal of change in the relative position of firms in most industries--a view of the world that is exactly the opposite of that engendered by undue reliance upon concentration statistics.

2) Merger studies have also suffered from the lack of comprehensive panel data on businesses. Yet there is considerable pressure for more information on the effects of mergers. Merger waves gain public attention and spectacular failures lead to legislation that affects the market for corporate control. As a result, industrial economists have attempted to study the effects of merger activity on the firms involved. The lack of comprehensive panel data on businesses has forced many researchers to rely on small samples that were constructed from diverse sources containing unknown sample selection biases. In addition, the sheer effort of data collection has meant that coverage for more than a relatively small number of years has rarely been possible. The result is that no clear picture of the effect of mergers has emerged in the literature.[2]

3) Entry of new firms has played a central role in many theories of industrial organization. Unfortunately, there are few quantitative studies of the phenomenon. The longitudinal panels

that are necessary for these studies have been difficult to create since it is not easy to identify the production units that are really new in administrative records. Because of the large number of changes in the corporate form of organization, production entities can appear to be new when all that has really transpired is a change in corporate control.

The administrative problems in measuring the various forms of entry are not the only difficulty. Generally, entrants are small and, therefore, the effect of entry in the short run is not large. Estimating the long-run effect of entry requires that entrants be tracked over time. The lack of panel data sets has generally precluded this from being done. As a result, studies that measure the importance of entry at time of birth have left the impression that entry is unimportant[3]--even though the reverse is true.[4]

The lack of panel data on businesses has left large gaps in our understanding of the importance of different processes to the operation of the market system. Equally important, misconceptions have developed in some quarters because of studies that have relied on somewhat imperfect ad hoc data bases or that have been based on a partial analysis of only one aspect of the adjustment process.

A good many of these problems can be found in entry and exit studies. Until the early 1980s, there were few quantitative studies of the process--thereby leaving the field to informed speculation about its importance. Since that time, there have been a number of studies of entry and exit using administrative data bases. Unfortunately, many of these data bases have severe limitations. The first problem with these studies lies with the quality of the data that have been used.[5] In some cases, this is because the data is strung together from disparate sources and the extent of coverage bias is unknown. In other cases, births and deaths may be entirely false, because identifiers change for random unknown reasons. In other cases, the updating of files may be so slow that it is difficult to date births and deaths precisely.

The lack of good panel data gives rise to a second problem. It has been difficult to measure the long-run impact of entry. This problem is not independent of the first. Over longer time periods, there is a greater likelihood that firms will disappear from the data base through the random chance that their identifier has been changed; thus, the measurement of the long-run effect has been subject to large error.

A third problem has been the failure to place entry and exit in context--to compare it to other changes taking place in an industry. Any one turnover process may appear unimportant when taken by itself. It is, however, incorrect to conclude from this that intra-industry dynamics are unimportant. The sum of all the individual processes that cause firm turnover may be quite large.

Entry and exit studies are not the only area in which the lack of panel data has led to the creation of false impressions. Merger strudies have had to rely upon incomplete ad hoc data bases. Mobility studies have been hampered by our inability to track many firms for long periods and the empirical studies based on them have suffered from truncation bias.

In order to address these deficiencies, a longitudinal panel data set for the Canadian manufacturing sector was constructed so as to examine issues in industrial economics and public policy. Questions that have elicited interest initially related to trade-adjustment issues.[6] In the second phase of the project, the data base was used to investigate various aspects of the dynamics of the competitive process. The results of the studies and their contribution to our understanding of the competitive process are summarized herein.

CONCEPTUAL APPROACHES TO COMPETITION

Words in common usage tend to take on a variety of meanings. "Competition" is no exception. The nuances that are attached to the term differ from writer to writer. Nevertheless, most approaches fall into one of two camps. Competition is either described as a process or a state of affairs.

When competition is described as a process, it is the competitive struggle that receives attention. In some treatises, entrepreneurs are described as the key to success. Hayek and his stress on the individual epitomizes this tradition. In the works of Frank Night, the emphasis is on the notion of risk. Risk taking is the function of the entrepreneur and the successful are rewarded for their efforts. The accent throughout is on the notion that a competitive market system is one where entrepreneurs vie freely with one another for success. The struggle resembles a contest; markets in which the contest is intense can be said to be competitive.

A second strand of this literature can be found more frequently in business schools than economics departments. It discusses the strategies that businesses can be expected to follow during their quest for success. Porter (1980) concentrates on the varied strategies related to the choice of market niche, advertising strategy, or technological path that lie behind the growth of successful companies. Carrol and Vogel (1984, 1987) also contain such case studies, including some describing how new firms find ways to break into established markets.

Economists have not been content to provide only verbal descriptions of competition. They have also developed models of the processes. Simon and his colleagues stressed that the properties of stochastic process should be studied.[7] Steindl (1965) linked the underlying stochastic events to the observed firm growth and decline process. Nelson and Winter (1982) developed a simulation model that allows investment in research and development to affect firm success. Elliasson (1985) has built a simulation model for Sweden that allows the linkages between micro and macro economies to be more fully explored. While much of the empirical tradition involves simulation, some attempts to measure the dynamics of change can be found. Prais (1976) followed the largest firms in Britain over the period 1909-70. However, this example was aimed not so much at the issue of dynamism as at the extent to which these firms contributed to changes in concentration. This is ironic since concentration is a static concept associated with the other main definition of competition.

The alternate and more traditional way of describing competition is to view it as a state of affairs. The world of competition is described by taking a snapshot at a point in time. Those who ascribe to this position take the view that the dimensions of the competitive system can

be classified by a set of characteristics that involve not so much the processes that take place as certain structural attributes of the market. Adherents of this position place the emphasis on such characteristics as the number of firms, concentration, advertising ratios and other structural variables.

All of these variables capture characteristics that describe the position of an industry at a point in time and not how it reached that position. These measures are proxies for the intensity of the competitive process. Because they are proxies, substantial effort has been devoted to showing that these characteristics are related to cross-sectional differences in profitability. This is an indirect way of confirming that these measures are related to the intensity of the competitive process that has been postulated to affect cross-industry differentials in profitability.

At a conceptual level, the two protagonists may not disagree as to what constitutes highly competitive markets. It is at the practical level of measurement that they differ. Those who use measures of market structure are, *faute de mieux*, focusing on a state of affairs. In using these measures, they presume such measures represent the intensity of competition within the industry.

Differences in practice often unwittingly lead to subtle divergences in attitudes that then influence the research agenda. Reid (1987) has argued that during the evolution of the North American school of industrial organization, Marshal's concept of the representative firm was transformed into Vining's concept of the average firm. In the first case, the concept of the representative firm did not rule out intra-industry heterogeneity and an interest in the diversity of strategies that might be employed by the successful firm. In the latter case, the average-firm concept came to be associated with homogeneity and issues of heterogeneity were placed low on the research agenda.

This distinction, far from being a matter of semantics, influenced the issues that were considered worthy of investigation. When firm- and plant-cost data were first used to investigate the nature of cost curves, the exercise was greeted with criticism by Friedman (1955), who argued that inter-firm cost differences must be the result of measurement error. Later when Leibenstein (1966) argued that cost differences among firms within an industry warranted study, Stigler (1976) responded negatively.

The dynamics of intra-industry change were generally ignored in empirical work. The lack of empirical work in turn fed back into theoretical developments. For example, the earlier limit pricing and the more recent contestability models focused on potential entry. With litle empirical work being done on entry dynamics, entry appeared to be unimportant, and theorists turned to speculating on what would happen in a world where entry was possible but non-existent, because of optimal entry-deterring strategies being employed by incumbents.

Alternately, entry was viewed as a phenomenon that was unimportant except when it moved an industry from one equilibrium situation to another. This view stemmed from a second common practice--that of focusing on equilibrium and comparative statics exercises. As

useful as these proved to be, they also discouraged research into the dynamics of industry adjustment. If dynamics only influenced the pace of adjustment from one equilibrium to another, then it could only be of secondary interest unless disequilibrium lasted for a very long period. And to admit the latter possibility was to question the usefulness of the most powerful theoretical tool of the time--comparative economic statics.

The alternate possibility was that the dynamics of intra-industry change determined the equilibrium towards which the industry continually adjusts. Recognition of this possibility, of course, distinguished the field of industrial organization from micro-economics in general. Nonetheless, empirical work in this area did little to advance our understanding of the dynamics of industry behaviour.

To some extent, this was due to the narrow range of data available for empirical research in this area.[8] Industrial economists relied on industry profitability and measures of structure derived from the size distribution of firms. Thus, empirical work focused on explaining cross-industry profitability using market structure as a proxy for the state of competition. The most important measure of market structure--concentration--used data on firm-size distributions at a point in time.

These studies originated in the structure-conduct-performance (SCP) school. Structure, which was taken as exogenous, affected the ability of firms to coordinate behaviour and, thus, the extent to which industry performance was non-competitive. SCP studies presented a picture of industry performance and industry structure that perpetuated the view that the world was static and that dynamics were of only secondary interest.[9]

Stability was implicit in the logic of the model--a model that was offered as a guide for anti-trust action. Market structure had to be stable and exogenously determined. Otherwise, the implications of this approach for policy analysis were adverse. If structure changed quickly, then so too would behaviour, and there would be little room for policy intervention. Only if structure was reasonably stable did it make sense to try to engineer changes in structure with anti-trust policy.

The empirical evidence that relied on snapshots of the state of affairs in an industry, such as measures of the firm-size distribution, reinforced the importance attributed to stability. The concentration statistics, used to measure structure, change very slowly over time. As a result, economists characterized market structure as "stable", thereby leaving the impression that it was also rigid.[10] Since these results not only accorded with the *a priori* view that markets were relatively stable but also supported the approach being taken by the SCP school, they were accepted as the conventional wisdom.

MEASURING THE INTENSITY OF COMPETITION

At the heart of our research project is the notion that speculation about the intensity and effects of the competitive process is no substitute for data that describe the outcome of the process. Various aspects of the turnover of firms within industries are subject to measurement. Statistics that summarize this are referred to as mobility measures.

Our research strategy was based on the presumption that much of what happens during the competitive process will be manifested by changes in relative firm position. Mobility measures provide a more direct measure of the intensity of competition. As a result of the competitive struggle, firms will grow and decline, enter and exit from different markets. The intensity of the competitive process will separate the successful from the unsuccessful. Measuring the extent to which this is the case sheds considerable light on the nature of the competitive process.

It is possible that some aspects of the competitive struggle will not be translated into a shift in relative market share. In some instances, an intensely bitter struggle may leave all parties in the same relative position as at the outset. However, it seems unlikely that there are a large number of intense struggles occurring in which no winner emerges. Focusing on the extent to which relative position is changed is better than just concentrating on the shape of the firm-size distribution.

Not all research in industrial organization has been aimed at measuring the static concept of the state of competition. Some studies have examined the extent of intra-industry dynamics. These studies suffer from two major deficiencies. First, they generally deal only with a small number of industries.[11] Second, they examine only part of the turnover process. They investigate entry and exit, or turnover in incumbents, or the merger process.[12]

In order to overcome these deficiencies and to further our understanding of the dynamics of the competitive process, information was generated on all of these causes of firm turnover for a cross-section of Canadian manufacturing industries. The aspects of turnover that were examined were greenfield entry and closedown exit,[13] turnover due to mergers,[14] and change in the relative position of incumbent producers. The period chosen for study was the decade of the 1970s. Rates of turnover were calculated for both the short and long run--that is, for periods of one year and for periods up to a decade in length.

The Canadian manufacturing sector was chosen since it is possible to build a longitudinal panel from the Canadian Census of Manufactures that is able to distinguish different events.[15] Many data bases are unable to define the nature of births precisely. Sometimes this is because identifier numbers that are attached to businesses change for random reasons. There are cases where a tax-related data base changes identifiers if a firm changes chartered accountants. In other cases, identifiers can change if a merger or control change occurs. In these cases, merger entry and exit cannot be distinguished from greenfield entry and exit. Since the two have different characteristics, failure to distinguish between them can produce misleading results. In the Canadian data, either these problems are missing or they can be overcome.[16]

Our research project had three objectives. The first was to provide basic statistics on the average amount of turnover. The second was to depict cross-industry patterns in turnover. The third was to model the process and to ask whether the importance of turnover could be evaluated. A brief synopsis of the results follows.

A) Greenfield Entry and Closedown Exit

The importance of entrants depends upon the probability of entry, on the size of entrants at birth, on the death rate of the new-born, and on the growth rate of survivors after birth. Each of these is investigated.[17]

If year-to-year data on entry and exit are examined, the process appears to be insignificant. Greenfield entrants, at birth, rarely account for more than one per cent of employment. Moreover, these entrants are initially small on average and present little threat at this early stage to large firms.

Entry turns potential into actual competition. Entrants are not instantly successful. The maturation process is often slow and painful. The infant-mortality rate is high. Upwards of 50 per cent of births die by their tenth birthday. Nevertheless, those infants who survive grow sufficiently to offset the deaths of their siblings. As a result, the share of each cohort increases slowly over time and, as more and more cohorts of entrants are born annually, the importance of new firms accumulates.

The data on firm turnover indicate that it is not a phenomenon confined to a group of firms that constantly churn at the margin of an industry. Greenfield firms that entered between 1970 and 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.[18]

B) Acquisition Entry and Divestiture Exit

Greenfield entry and closedown exit is the process that turns the firm population over in the most direct sense. Resources are also transferred as a result of changes in control. When firms acquire control of plants in a new industry, entry occurs.[19] It is not entry that, initially at least, creates new capacity. It is entry that leads to a change in the identity of a firm's controlling interests.[20]

There are a number of important similarities between the two types of entry and exit. Like greenfield entry and exit, acquisition entry and exit is relatively small when measured on an annual basis--averaging about one per cent per year when measured in terms of the proportion of employment affected. Acquisition entrants follow a similar life cycle to greenfield entrants. Almost the same percentage of births in each category results in subsequent exits. Greenfield entrants that fail generally result in closedown exits; firms that enter by acquisition subsequently exit by divestiture. Finally, the effect of successive cohorts of acquisition entrants also cumulates over time until it reaches economically significant levels after a decade. Establishments that were acquired by entrants to a 4-digit industry between 1970 and 1979 accounted for 11.8 per cent of shipments in 1979 on average; establishments that were divested over the same period by exiting firms accounted for some 11.8 per cent of 1970 shipments on average.

Although there are similarities between the two entry and exit processes, there are also important differences. The acquisition and divestiture process is more volatile than greenfield entry and exit. Whereas a cohort of greenfield entrants steadily gains market share over the decade considered, a cohort of acquisition entrants only gains market share in the short run and then begins to decline. Greenfield entry and exit affect the small end of the firm-size distribution; acquisition entry and exit affect larger firms. Greenfield entry and exit occur less in concentrated industries; acquisition entry and exit occur more in concentrated industries.

The two forms of entry and exit may be about equal, on average, in terms of employment affected; but they are not good substitutes. The market for corporate control in concentrated industries leads to takeovers for large firms that are not living up to their potential. It is here that acquisition and divestiture are the primary form through which renewal occurs. In less concentrated industries, new ideas and production processes are more likely to be introduced via greenfield entrants. In small firms, decline is more likely to lead to exit than to takeover.

C) Change in the Incumbent Firm Population

In contrast to entry and exit, turnover in the continuing or incumbent sector appears large when measured on an annual basis.[21] Rates of employment change in the incumbent plant population averaged some 7 per cent annually between 1970 and 1982--for both firms that grew and declined. This is considerably more than either of the entry rates. But much of the annual change in the incumbent population is ephemeral, the result of short-run transitory effects. The annualized long-run rates of change of those firms that grew between 1970 and 1979 averaged less than 2 per cent; for those that declined, 1 per cent.

Despite this difference between the volatility of incumbent firms in the short and long run, cumulative long-run change in the incumbent population is significant. Over 35 per cent of all firms existing in 1970 declined in absolute terms between 1970 and 1979. In 1970, these firms were on average some 50 per cent larger than those about to grow over the same period. The amount of growth and decline in each sector was large enough to change the relative size of the average firm in the two groups by 1981.

Substantial evidence shows that large firms generally declined and small firms grew over the period.[22] A comparison of the market share of a firm in 1979 to its share in 1970 revealed a regression-to-the-mean phenomenon. The three largest firms in an industry, on average, tended to lose almost one-quarter of their market share in the 1970s. Turnover is not confined to the smallest firms in an industry, nor are the largest firms immune to change.

This has important implications for competition policy. It has long been argued that one of the characteristics of a market most relevant to an evaluation of the state of competition is the success of dominant firms in protecting their position (Gort, 1963). On average, there is no such tendency in the Canadian manufacturing sector.

D) Total Turnover

Total change can be measured by the extent to which market share is transferred from exiting and declining plant to growing and entering plant. Greenfield entry and closedown exit led

to some 20 per cent of market share being transferred from losers to gainers. About the same market share--some 17 percentage points--was transferred as continuing firms changed relative position. The total share being shifted was some 36 percentage points. If entry and exit due to acquisition entry and exit by divestiture are added, almost 44 per cent of market share is shifted to the successful from the unsuccessful. The size of the three turnover processes taken together is large, even though none of the processes by itself suggests overwhelming change.

IMPLICATIONS FOR MARKET PERFORMANCE

Traditional approaches in industrial organization have relied upon profitability to measure performance and have estimated the extent to which market structure was related to profitability. These studies have been criticized for several reasons. First, market structure is an imperfect proxy for the intensity of competition. Second, by relying on industry level rather than micro data, existing studies have not been able to rule out the possibility that the relationship between profitability and concentration is the result of the superior efficiency of the largest firms.

The study sets out to overcome these deficiencies by using micro data to evaluate the performance of the plants that fall into different turnover categories and by focusing on more than just on profitability. An alternative measure that has long been emphasized as coming from the Schumpeterian tradition is technical progress. To this end, the study first examines the effect of turnover on productivity.[23] The study then examines the extent to which turnover increases technical efficiency in an industry. The amount of technical efficiency depends on the dispersion of firm performance within an industry. It is a natural metric for the evaluation of turnover--a phenomenon deeply rooted in the notion of firm heterogeneity. Finally, the study examines the relationship between industry profitability and firm turnover.

A) Contribution to Productivity

Intra-industry dynamics makes an important contribution to economic progress.[24] Births are considerably more productive than deaths. Incumbent plants that gain market share become much more productive than those losing market share. Because of this, a large proportion of productivity growth in the 1970s was due to plant turnover. Greenfield entry contributed about 20 per cent of the total; continuing firm plant births, about 7 per cent; and the replacement process within continuing plants, some 21 per cent. The world is not one where most firms make equal gains at the margin. Technical progress is not a disembodied phenomenon that can be studied as a simple matter of capital accumulation. Gains in productivity are associated with substantial shifts in market share.

This has implications for the policy process in several areas--one of which involves labour adjustment. Adjustment does not occur in this world because a small number of workers are being made redundant at the margin in a large number of firms, as most firms adopt new techniques. Adjustment is required because substantial numbers of jobs are being lost in firms that are either declining or exiting, while others are being gained in more successful firms. Adjustment problems arise because of the great heterogeneity in the response of different firms to exogenous events.

B) Relationship to Technical Efficiency

One of the few strands of empirical industrial economics to interest itself in firm heterogeneity is the X-efficiency literature. Originating with economists like Liebenstein (1966), it argued that the divergence in productivity or efficiency across firms was worthy of study. Recent work by Caves and Barton (1990) has produced estimates of efficiency--the ratio of actual to potential output-- and industry characteristics that are related to efficiency for a broad cross-section of U.S. industries.

This literature suffers from the problem that it has not been able to show that these industry characteristics are also related to the process that generates inefficiency. Our research, therefore, focused on the extent to which turnover increases efficiency, and whether the determinants of turnover were related to the same characteristics that were found to influence inter-industry differences in efficiency.[25]

We found that each of greenfield entry and closedown exit, plant birth and death of continuing firms, and the displacement of declining with growing continuing plants contributed significantly to increasing industry efficiency. Of the gains that could be attributed to turnover, the proportion contributed by each of these sources was 34, 15, and 51 per cent, respectively. More importantly, turnover was affected by the type of industry characteristics that were correlated with efficiency. Factors like advertising and import intensity, which had a negative effect on the level of industry efficiency, also had a negative effect on turnover. The intensity of competition, therefore, not only has a beneficial effect on average productivity, it also helps to bring more firms closer to the production frontier.

C) Relationship to Inter-Industry Patterns in Profitability

Since so much of the traditional literature uses profitability as a measure of performance and relates it to concentration, a related exercise was employed using various dimensions of mobility.[26] Traditionally, cross-industry differences in profitability have provided the focus of these studies. This approach relates the state of performance at a point in time to the state of competition as measured by the firm-size distribution at the same point in time. Because industry dynamics rather that statics was the focus of our research, a different strategy was employed. The extent to which profits regressed toward the mean between 1970 and 1979 became the focus of the study, and the relative strength of the various components of the many dimensions of mobility were used as explanatory variables.

The study found differences in profitability across industries that did not disappear over time. In addition, long-run profitability was lower where entry exceeded exit thereby confirming the importance of net entry. On the other hand, profitability was higher in industries where the sum of greenfield entry and closedown exit was higher. Other measures of total turnover were also positively related to turnover. The difference in these findings once more emphasizes the need to distinguish between different measures of intra-industry change.

THE RELATIONSHIP BETWEEN CONCENTRATION AND TURNOVER

Measures of turnover provide a rich description of the intensity of the competitive process. This is sufficient reason for preferring these measures in addition to or in place of concentration measures. Nevertheless, it is important to investigate the relationship between concentration and the intensity of competition as manifested in turnover measures. Concentration measures are still all that is available to some researchers and continue to be used as guides for anti-trust work.

The evaluation of this relationship took two forms. On the one hand, it asked whether concentration statistics can be used in a simple fashion to convey the impression of the intensity of competition.[27] On the other hand, asked whether concentration statistics, along with mobility statistics, can be used to improve our knowledge of industry dynamics.[28]

When the first approach was taken, the concentration statistic was found to be wanting. There are several reasons for this result.

- First, the impressions of the amount of change provided by the four-firm concentration statistic do not provide an adequate picture of intra-industry change. Concentration measures do not change much over time thereby suggesting stability; in reality, there is considerable underlying turmoil in an industry as firms shift relative position.
- Second, the concentration measure fails to be strongly correlated with a number of important dimensions of mobility. Concentration, therefore, does a poor job of ranking industries on the basis of the amount of change going on within industries. There are a number of different dimensions of intra-industry change. *Inter alia*, these dimensions include the extent to which firms change ranks, larger firms regress towards the mean, entry and exit is important, and whether much market share is redistributed among continuing firms. Of all the mobility measures, turnover from entry and exit is most closely related to concentration. The concentration measure might suffice if concentration was the only industry characteristic that affected performance. This is not the case.
- Third, use of the concentration measure to choose a top quartile of industries most deserving of anti-trust attention does not yield the same list as would many of the mobility measures.

Our study also examined the relationship between concentration and mobility using an entirely different perspective.[28] Instead of using concentration to predict mobility, it reversed the question and asked whether concentration could be better understood once mobility was known. It has been argued that the distribution of firm size is determined by the type of stochastic process governing the growth and decline of firms (Ijiri and Simon, 1977). As such, concentration should be partially explained by mobility. This was the case. Along with measures of plant and firm scale, mobility was found to affect concentration. If the nature of intra-industry competition affects the size distribution, it is all that more

important to have measures of the former. It also means that the effect of behaviour on structure is not a second-order effect.

THE MERGER PROCESS

The role fulfilled by mergers is a controversial topic in industrial organization. Many studies have been performed using financial or stock market data. As both Caves (1987) and Scherer (1987) noted, the two sources differ in their evaluation of the success of U.S. mergers. This is also the case for Canada. Studies by the Royal Commission on Corporate Concentration (1978) found that diversified mergers were not very successful. On the other hand, stock market event studies done by Eckbo (1986) found the opposite result.

In order to resolve this conundrum, information is needed on the actual performance of the plants that are merged. Canadian Census of Manufactures data were used for this purpose--to examine the industry share of these plants, their wage rates, their labour productivity and their price-cost margins before and after the merger so as to evaluate the real effects of mergers. Both short-run and long-run effects were examined so as to distinguish between impacts that are immediate as opposed to those that are longer lasting.

The evidence for Canada suggests that, on average, mergers are not failures.[29] While Mueller (1985) found that merged firms lost considerable market share, there was no evidence of this in Canada. When the natural regression-to-the-mean process is taken into account, market share is generally not lost in plants that undergo mergers. In the short run, plants that are taken over by entrants to the market experience an increase in market share. In the long run, there are few market-share effects. The evidence shows that this result does differ across different merger types. Horizontal mergers, where the divesting party leaves the industry, are characterized by post-merger increases in market share.

Productivity effects also differ in the short and the long run. The productivity of plants acquired by entrants is slightly below the mean at the time of acquisition; it experiences a short-run increase in the period after merger. In the long run, there is some evidence of a sustained increase for some merger categories. Productivity levels, which were not above the mean at the beginning of the period, have become significantly higher by the end of the period where at least one party to the merger is an incumbent. But there is no productivity gain for the largest category--where the divesting firm exits the industry and the acquiring firm is an entrant.

The clearest effect of mergers is on price-cost margins. In all situations where a plant is divested by an exiting firm, the plant's price-cost margin is not significantly different from the average price-cost margin of other plants prior to the merger: it is afterwards. Together, the results suggest that, although divestitures by exiting firms have little effect on productivity, they increase profitability on average.

When the cross-industry pattern of these merger results was investigated further, a considerable difference in the effects was discovered.[30] Productivity increases were concentrated mainly in high-tech and product differentiated industries. These are also the industries where foreign ownership was highest. However, the productivity-enhancing effect in these indus-

tries was the same for both domestic and foreign acquiring firms. This indicates that the industry environment rather than the nationality of the acquirer is the primary determinant of a merger's effect.

Together, the results on productivity and profitability indicate that, far from simply involving a meaningless churning of ownership, mergers contribute to real performance improvements--either in terms of plant productivity or profitability.

CONCLUSION

Relying on comprehensive firm and plant data from the Census of Manufactures at Statistics Canada and a reliable set of plant and firm identifiers that allowed for the creation of longitudinal panels, the combined studies of the dynamics of competition in the Canadian manufacturing sector overcome many of the problems that have plagued empirical studies of turnover. In doing so, they also provide new insights into the dynamics of the market system.

The conclusions that can be drawn are:

1) Greenfield entry and closedown exit have a significant cumulative impact when measured over a decade. While the immediate impact is primarily on smaller firms, the process is not unimportant in a quantitative sense. This is not a phenomenon that warrants the description of churning at the margin. Firms may start small and many may die during the maturation process, but the effect of successive cohorts cumulates to meaningful levels. Entry cannot be dismissed as being quantitatively unimportant, as some previous studies have done.

2) In evaluating the extent to which firms turn over due to entry, the effect of entry via acquisition must not be ignored. Over the decade of the 1970s, its cumulative effect was just about the same as for greenfield entry. What is equally important, acquisition entry brings new participants into parts of the firm-size distribution and into industries where greenfield entry is less extensive. It is the joint effect of the two processes that has to be considered in evaluating the intensity of entry. The quantitative importance of acquisition entry emphasizes the importance of the market for corporate control and the problems that will arise if these markets are unduly hindered.

3) Turnover also takes place within the continuing firm population. There is a continuous growth and decline process taking place that results in small firms displacing large firms. Large firms are not immune to change.

This has important implications for a competition policy that is aimed at restraining the largest firms. The largest firms in an industry are, on average, already in decline because of the inexorable process that replaces the old with the new. The rapidity of that process differs industry by industry. These differences should form the basis for summary statistics that encapsulate rigidities. Moreover the direction of the process militates against a policy that unduly treats concentration ratios as indicative of the degree to which market power is long lasting.

4) While each of the turnover processes examined--greenfield entry and closedown exit, acquisition entry and divestiture exit, and continuing plant turnover--is respectable by itself, it is the joint effect of the three that is striking. Almost 44 per cent of all market share that could be shifted was transferred. By itself, this testifies to the intensity of competition.

5) The importance of turnover does not have to be evaluated on the basis of size alone. Gains in productivity are associated with substantial shifts in market share. Greenfield entrants are more productive than the exiting plant that they replace. Continuing plants that gain market share become substantially more productive than continuing plants in decline. Turnover makes a substantial contribution to productivity. This reinforces the admonitions of those who have argued that a dynamic population of firms is the key to industrial success and that performance should be measured in terms of progress--not the static concept of inter-industry profitability differentials. The evidence developed in the Canadian studies clearly demonstrates the linkage between turnover and progress.

6) The evidence on the link between various aspects of turnover shows that they perform different functions. They improve productivity; they increase industry efficiency; and they serve an equilibrating function for inter-industry profit differentials. As unsurprising as the result might be to many economists, it is important because it demonstrates this result in a comprehensive way for the first time. There are some who have used other less perfect data sets, or who have examined only part of the process, who have claimed to find different results.

7) The effects of the various turnover components on the different aspects of performance are not the same.

- Greenfield entry has a particularly strong effect on progress. However, the effects of entry emerge only in the long-run and studies that focus on the short-run will underestimate the impact of entry. The new-born require time to reach adolescence and only begin to make a substantial contribution when they become young adults.
- Merger entry has greater short-run effects because it is used essentially to rescue a mature firm that has temporarily gone astray. The long-run effects are less because there is less room for improvement for an adult that has already proved its mettle. Improvement comes here from returning slightly subnormal performance to the mean. Nevertheless, it has a substantial overall effect because the affected businesses are large.
- It is turnover in the continuing population that has strong effects everywhere. It makes substantial contributions to productivity growth, to efficiency, and to the profit equilibration process.

8) The use of concentration as a summary statistic to represent the intensity of competition should be reevaluated. It is not strongly correlated with many of the mobility measures except for greenfield entry and exit. Indeed, it is as much determined by mobility as it is a determining factor of the amount of mobility. This confirms the importance of treating structure as endogenous.

9) The finding that there is a "real" effect of mergers shows that mergers, like entrants, do not involve a meaningless churning of resources. Greenfield entrants bring new resources into an industry. Mergers bring in new actors. Both renew the industry--but in different ways.

REFERENCES:

Baldwin, J.R. 1991a. "The Success of Mergers in the Canadian Manufacturing Sector," unpublished paper given to a conference entitled "Mergers, Oligopoly and Trade" Universite d'Aix-Marseille.

Baldwin, J.R. 1991b. "Industry Efficiency and Plant Turnover in the Canadian Manufacturing Sector," Research Paper #37. Analytical Studies Branch. Statistics Canada--in R.E. Caves (ed.) Industrial Efficiency in Six Nations M.I.T. Press, 1992.

Baldwin, J.R. 1992a. "The Persistence of Profits and Firm Turnover" unpublished paper presented to the annual meetings of the Canadian Economics Association. June 1992.

Baldwin, J.R. 1992b. "Patterns of Large and Small Firm Mobility," Research Paper #23f. Analytical Studies Branch. Statistics Canada.

Baldwin, J.R. and R.E. Caves. 1991. "Foreign Multinational Enterprises and Merger Activity" Research Paper #42. Analytical Studies Branch. Statistics Canada.--in L. Waverman (ed.) Corporate Globalization through Mergers and Acquisitions. Ottawa: Investment Canada and University of Calgary. 1991.

Baldwin, J.R. and P.K. Gorecki. 1986a. " The Relationship Between Trade and Tariff Patterns and the Efficiency of the Canadian Manufacturing Sector in the 1970s. A Summary," in G. Whalley. research coordinator. Canada-United States Free Trade, Volume 11 of the research series of the Royal Commission on the Economic Union and Development Prospects for Canada. Toronto: University of Toronto Press.

Baldwin, J.R. and P.K. Gorecki. 1986b. " Canada/U.S. Productivity Differences in the Manufacturing Sector: 1970-79," chapter 5 in D.G. McFetridge. research coordinator. Canadian Industry in Transition, Volume 2 of the research series of the Royal Commission on the Economic Union and Development Prospects for Canada. Toronto: University of Toronto Press.

Baldwin, J.R. and P.K. Gorecki. 1986c. The Role of Scale in Canada/U.S. Productivity Differences in the Canadian Manufacturing Sector in the 1970s. Volume 6 of the research series of the Royal Commission on the Economic Union and Development Prospects for Canada. Toronto: University of Toronto Press.

Baldwin, J.R. and P.K. Gorecki. 1987. "Plant Creation Versus Plant Acquisition," International Journal of Industrial Organization 5: 25-41.

Baldwin, J.R. and P.K. Gorecki. 1989. "Measuring the Dynamics of Market Structure," Annales d'Economie et de Statistique 15/16 (July/December): 316-32.

Baldwin, J.R. and P.K. Gorecki. 1990a. "Firm Entry and Exit in the Canadian Manufacturing Sector," Research Paper #23a. Analytical Studies Branch. Statistics Canada. This is partially reprinted in Canadian Journal of Economics (May 1991): pp 300-23..

Baldwin, J.R. and P.K. Gorecki. 1990b. "Intra-Industry Mobility in the Canadian Manufacturing Sector," Research Paper #23b. Analytical Studies Branch. Statistics Canada.

Baldwin, J.R. and P.K. Gorecki. 1990c. "Measuring Entry and Exit to the Canadian Manufacturing Sector Using Longitudinal Data: Methodology," Research Paper #23c. Analytical Studies Branch. Statistics Canada--partially reprinted in A.C, Singh (ed.) Analysis of Data in Time. Proceedings of a Conference sponsored by Statistics Canada, Carleton and Ottawa University, 1990 .

Baldwin, J.R. and P.K. Gorecki. 1990d. " The Contribution of the Competitive Process to Productivity Growth: the role of firm and plant turnover," Research Paper #23d. Analytical Studies Branch. Statistics Canada--partially reproduced as "Entry, Exit and Productivity Growth," in P. Geroski and J. Schwalbach (eds.) Entry and Market Contestability: An International Comparison. Oxford: Basil Blackwell, 1991.

Baldwin, J.R. and P.K. Gorecki. 1990e. "Mergers and the Competitive Process," Research Paper #23e. Analytical Studies Branch. Statistics Canada--partially reproduced as "Mergers Placed in the Context of Firm Turnover," in Proceedings of the Census Bureau Fifth Annual Research Conference. Washington, D.C.: Bureau of the Census. 1990.

Baldwin, J.R. and P.K. Gorecki. 1990f. "Concentration Statistics as Predictors of the Intensity of Competition," Research Paper #23g. Analytical Studies Branch. Statistics Canada.

Baldwin, J.R. and P.K. Gorecki. 1990g. "Firm Turnover and Market Structure: The Use of Concentration Ratios as a Misleading Practice," in R.S. Khemani and W.S. Stanbury (eds.) Competition Policy at the Centenary. Halifax, N.S.: Institute for Research in Public Policy. 1991.

Baldwin, J.R. and P.K. Gorecki. 1990h. "The Relationship Between Mobility and Concentration for the Canadian Manufacturing Sector," Research Paper #23h. Analytical Studies Branch. Statistics Canada.

Baldwin, J.R. and P.K. Gorecki. 1990i. Structural Change and the Adjustment Process: Perspectives on Firm Growth and Worker Turnover. Economic Council of Canada. Ottawa: Minister of Supply and Services.

Baldwin, J.R. and P.K. Gorecki. 1991. "Distinguishing Characteristics of Foreign High Technology Acquisitions in Canada's Manufacturing Sector" Research Paper #37. Analytical Studies Branch. Statistics Canada--in D. McFetridge (ed.) Foreign Investment, Technology, and Growth. Ottawa: Investment Canada and University of Calgary. 1991.

Canada. Royal Commission on Corporate Concentration. 1978. Report. Ottawa: Minister of Supply and Services.

Carrol, G. and D. Vogel (eds.) 1984. Strategy and Organization. Boston: Pitman.

Carrol, G. and D. Vogel (eds.) 1987. Organizational Approaches to Strategy. Cambridge, Mass: Ballinger.

Caves, R. E. 1987. "Effects of Mergers and Acquisitions on the Economy: An Industrial Organization Perspective," in Lynne Browne and Eric Rosengren (eds.) The Merger Boom. Boston: Federal Reserve Bank of Boston.

Caves R. E. and D. Barton. 1990. Technical Efficiency in the US Manufacturing Industries. Cambridge, Mass.: MIT Press.

Caves R. E. and R. Porter. 1978. "Market Structure, Oligopoly, and Stability of Market Shares," Journal of Industrial Economics 26: 289-313.

Eckbo. B.E. 1986. "Mergers and the Market for Corporate Control: The Canadian Evidence," Canadian Journal of Economics 19: 236-60.

Elliasson, Gunnar. 1985. The Firm and Financial Markets in the Swedish Micro-to-Macro Model: theory, model, verification. Stockholm: The Industrial Institute for Economic and Social Research.

Friedman, M. 1955. "Comment," in Business Concentration and Price Policy. Princeton: Princeton University Press. pp. 213-18.

Gort, M. 1963. "Analysis of Stability and Change in Market Shares," Journal of Political Economy 62: 51-61.

Hall, B. 1987. "The Relationship between Firm Size and Firm Growth in the U.S. Manufacturing Sector," Journal of Industrial Economics 35: 583-606.

Havrilesky, T. and R. Barth. 1969. "Tests of Market Share Stability in the Cigarette Industry 1950-66," Journal of Industrial Economics 17: 145-150.

Hayek, F.A. 1967. Studies in Philosophy, Politics and Economics. Routledge and Kegan Paul.

Hymer, S. and P. Pashigian. 1962. "Turnover of Firms as a Measure of Market Behavior," Review of Economics and Statistics 44: 82-87

Ijiri, Y. and H. Simon. 1977. Skew Distributions and the Sizes of Business Firms. Amsterdam: North-Holland.

Jacoby, N.M. 1984. "The Relative Stability of Market Shares. A Theory and Evidence from Several Industries," Journal of Industrial Economics 12: 83-107.

Johnson S. and D. Storey. 1985. "Job Generation; An International Survey of U.S. and Canadian Job Generation Studies Using Dun and Bradstreet Data: Some Methodological Issues," Research paper #1, University of NewCastle-Upon-Tyne, Newcastle (U.K.).

Joskow, J. 1960. "Structural Indicia: Rank-Shift Analyses as a Supplement to Concentration Ratios," Review of Economics and Statistics 42: 113-116.

Kirzner,I.M. 1973. Competition and Entrepreneurship. Chicago: The University of Chicago Press.

Leibenstein, H. 1966. "Allocative Efficiency vs. 'X-Inefficiency'," American Economic Review 56: 392-415.

Nelson, R.N. and S.G. Winter. 1982. An Evolutionary Theory of Economic Change. Cambridge, Mass: Harvard University Press.

Porter, M.E. 1980. Competitive Strategy: Techniques for Analyzing Industries and Competitors. New York: The Free Press.

Prais, S.J. 1955. "Measuring Social Mobility," Journal of the Royal Statistical Society Series A. 118: 56-66.

Prais, S.J. 1976. The Evolution of Giant Firms in Britain. Cambridge: Cambridge University Press.

Reid, G. 1987. Theories of Industrial Organization. Oxford: Basil Blackwell.

Scherer, F. M. 1988. "Corporate Takeovers: The Efficiency Arguments," Journal of Economic Perspectives 2: 69-82.

Schmalensee, R. 1988. "Industrial Economics: An Overview," Economic Journal 98: 643-81.

Singh, A. and G. Whittington. 1975. "The Size and Growth of Firms," Review of Economic Studies 42: 15-26.

Statistics Canada. 1979. Concepts and Definitions of the Census of Manufactures. Cat. No. 31-528.

Statistics Canada. 1983. Industrial Organization and Concentration in the Manufacturing, Mining, and Logging Industries, 1980. Cat. No. 31-402. Ottawa: Supply and Services Canada.

Steindl, J. 1965. Random Processes and the Growth of Firms: a study of the pareto law . London: Griffin.

Stigler, G. J. 1976. "The Xistence of X-Inefficiency," American Economic Review 66: 213-16.

Storey, D.J.(ed.) 1985. Small Firms in Regional Economic Development: Britain, Ireland, and the United States. Cambridge: Cambridge University Press.

NOTES:

1. Scherer (1970, p. 70).

2. See Caves (1987).

3. See OECD(1987).

4. See Baldwin and Gorecki (1990a).

5. For an evaluation of some of the data bases that have been used, see Baldwin and Gorecki (1990i); Johnson and Storey (1985).

6. The results of many of the trade-related studies are summarized in Baldwin and Gorecki (1986a, 1986b). The studies are contained in Baldwin and Gorecki (1986c).

7. See Ijiri and Simon (1977) for a compendium of these works.

8. This is a charitable interpretation since major exercises were launched in other areas to obtain data such as capital stock or financial assets when it was lacking.

9. Exceptions may be found in the early work on intra-industry change by Caves and Porter (1978).

10. See Schmalensee (1988).

11. See Havrilesky and Barth (1969) and Jacoby (1984).

12. For instance, Baldwin and Gorecki (1987, 1990a) look at the extent of entry and exit, Hymer and Pashigian (1962) examine share change in the incumbent population, Joskow (1960) investigates the extent of rank change, Gort (1963), Singh and Whittington (1975), Hall (1987) and Prais (1976) examine the degree to which market shares regress toward the mean, and Prais (1955) looks at the extent to which there is mobility across size classes.

13. Greenfield entry involves the entry of a firm by plant creation--as opposed to entry via merger. Closedown exit involves the exit of a firm by plant closedown--as opposed to exit via plant divestiture.

14. The primary focus is on acquisition entry and divestiture exit--that is, the entry of a firm via acquisition of a plant or the exit of a firm via divestiture of a plant.

15. See Baldwin and Gorecki (1990i, chs 4 and 5) for a discussion of the problems with other data bases that have been used to measure entry and exit.

16. See Baldwin and Gorecki (1990c) for a discussion of the data base and the methodology used.

17. See Baldwin and Gorecki (1987) and (1990a).

18. These and other industry data reported herein are averages calculated at the 4-digit SIC industry level.

19. See Baldwin and Gorecki (1990c).

20. The study did not capture changes in controlling interests when that interest was widely held. It captured changes in control for situations where a single controlling interest could be identified. See Baldwin and Gorecki (1990c) for a discussion of the meaning of acquisitions and divestitures in the data base.

21. See Baldwin and Gorecki (1990b).

22. See Baldwin (1992b).

23. Labour productivity is used.

24. See Baldwin and Gorecki (1990d).

25. See Baldwin (1991b).

26. See Baldwin (1992a).

27. See Baldwin and Gorecki (1990f).

28. See Baldwin and Gorecki (1990h).

29. See Baldwin (1991a).

30. See Baldwin and Gorecki (1991) and Baldwin and Caves (1991).

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