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Résumé de l'article

Cette étude examine les relations entre les centres urbains canadiens (régions métropolitaines de recensement) en ce qui a trait au phénomène de fusion d'entreprises pour les années 1971, 1976, 1981 et 1991. Une analyse loglinéaire décrivant les flux spatiaux pour ces années permet d'établir que les villes de Toronto, Montréal, Calgary et Vancouver connaissent le plus grand nombre de fusions du point de vue des entreprises achetées ou acheteuses.

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# A Spatio-Temporal Examination of Canada's Domestic Merger Activity, 1971-1991

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## **Abstract**

This study examines the relationship of Canada's urban centres (Census metropolitan areas), with respect to domestic merger activity for the years 1971, 1976, 1981, 1986 and 1991. Log-linear analysis is employed to provide a descriptive examination of the spatial merger flows for the years in question. It has been determined that from an acquiring and acquired firm perspective, Toronto, Montreal, Calgary and Vancouver, were the cities where the greatest number of merger activity was conducted.

**Key Words :** Canada, census metropolitan areas, mergers of enterprises, acquisitions, log-linear analysis.

## **Résumé**

### **Une étude spatiotemporelle des fusions d'entreprises au Canada**

Cette étude examine les relations entre les centres urbains canadiens (régions métropolitaines de recensement) en ce qui a trait au phénomène de fusion d'entreprises pour les années 1971, 1976, 1981 et 1991. Une analyse loglinéaire décrivant les flux spatiaux pour ces années permet d'établir que les villes de Toronto, Montréal, Calgary et Vancouver connaissent le plus grand nombre de fusions du point de vue des entreprises achetées ou acheteuses.

**Mots-clés :** Canada, régions métropolitaines de recensement, fusions d'entreprises, acquisitions, analyse loglinéaire.

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## INTRODUCTION

This paper addresses one form of corporate growth, expansion through mergers. Specifically, it examines Canada's domestic merger activity for the years 1971, 1976, 1981, 1986 and 1991. To accomplish the above, two objectives are met. First, a literature review is conducted to properly ascertain the numerous motivations and theories that underscore merger behaviour. Second, through the use of log-linear analysis, the spatial flows of Canada's domestic merger activity are determined. The outline for the remainder of this paper is as follows : 1) definitions of mergers and acquisitions; 2) merger motivations and theories; 3) the geography of mergers in Canada; 3) data, methodology, and analysis; 4) log-linear analysis; and 5) conclusions.

## DEFINING MERGERS AND ACQUISITIONS

Nelson (1959) states a merger results when two or more independent enterprises combine to form one economic enterprise. An acquisition (or takeover) occurs when an acquiring firm acquires over fifty per cent of the equity of a target firm (Green, 1990). From a business and economics standpoint it is clear that mergers and acquisitions are distinguishable. Spatially, however, mergers and acquisitions are indistinguishable as they both represent a process that transfers the corporate locus of control from the acquired firm to the acquiring firm (Dicken, 1976) and possibly from one urban centre (Census metropolitan area) to another (Semple and Green, 1983). Therefore, the authors use the term "merger" to represent mergers, acquisitions, and takeovers.

## THE GEOGRAPHY OF MERGERS IN CANADA

In Canada, numerous researchers have examined mergers (Lorch, 1981; Green, 1987; Jorgensen, 1987; Knubley, Krause, and Sadeque, 1991; Rugman and Waverman, 1991; Shapiro, 1993; McDougall, 1995; Aliberti, 1998). Lorch (1981) examined the transfer of corporate control in Canada's manufacturing sector during the period 1967-1976. He found Canada's corporate geographical space to be hierarchical in nature. Green (1987) determined that Canadian mergers had the propensity to concentrate around four metropolitan areas : Toronto, Montreal, Calgary and Vancouver. Jorgensen (1987) noted that in the 1980s nearly sixty per cent of Canadian acquisitions were by firms based out of the United States. Knubley, Krause and Sadeque (1991) examined various patterns and motivations for Canadian acquisitions abroad. Rugman and Waverman (1991) examined the level of foreign ownership and corporate strategy of Canadian mergers. Shapiro (1993) provided a conceptual approach to the collection of Canadian merger data : he stated that data should be gathered at the pre-acquisition, acquisition, and post acquisition periods in order to better measure, classify, and analyze merger activity in Canada. McDougall (1995) examined the economic impact of Canadian mergers on corporations and concluded : 1) firms that have been taken over by foreign firms initially increase their capital investment and their research and development expenditures; 2) profitability of firms increases when firms invest in production and use new technologies; and 3) as firms grow in size, the amount of research and development spending tends to decrease. Aliberti (1998) concluded that over time,

government imposed distortions, market disequilibrium imperfections, market structure imperfections, market failure imperfections, and spatial imperfections had a significant impact on Canada's domestic and international mergers and acquisitions activity.

## MERGER MOTIVATIONS AND THEORIES

There are numerous motivations and theories that underscore merger activity (see Table 1).

**Table 1 Merger Motivations and Theories**

Merger as rational choice	Merger benefits bidder's shareholders	Net gains through synergies	Synergy/efficiency theory
		Wealth transfers from customers	Monopoly theory
		Wealth transfers from target's shareholders	Raider theory
		Net gains through private information	Valuation theory
	Merger benefits managers		Managerial/empire building theory
Merger as process outcome			Process theory
Merger as macroeconomic phenomenon			Disturbance theory
Merger as a resource dependency phenomenon			Organizational interdependence theory
Merger resulting from external factors (economies of scale, general business conditions, and tax incentives)			External merger theory
Merger as an outcome of more than one motive or theory			Multiple Cause Theory
Merger as a spatial phenomenon			Spatial Merger Theory

Source : Adapted from Trautwein, 1990.

From Table 1 mergers are considered a rational choice if they benefit the bidder's shareholders or the managers of the acquiring firm. If a merger benefits the bidder's shareholders net gains can be achieved through : synergies (Mathewson and Quigley, 1998); wealth transfers from customers; wealth transfers from target's shareholders; or private information. Respectively, these motivations for merger activity stem from four theories : synergy/efficiency theory; monopoly theory; raider theory; and valuation theory.

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A merger can also benefit managers. If this is the case, the managerial/empire building theory is the motive behind the merger. The process theory is used to explain a merger, if a merger is an outcome of informational, organizational or political processes. If a merger is seen as a macroeconomic phenomenon i.e., to take advantage of a nation's fluctuations in its capital market, then the economic disturbance theory is used to explain the merger.

The organizational interdependence theory is used to explain a merger if the merger is a response to an unstable economic environment or regional uncertainties. A merger resulting from antitrust activity, economies of scale, general business conditions, promotional gains and/or tax incentives, is explained through the external merger theory. Whereas, the multiple cause theory is used to explain a merger if no single motive or theory explains the merger. For example, one can use the process theory, disturbance theory and organizational theory, if a merger results from some or all of : information, organizational or political processes, fluctuations in a nation's capital market, or as a response to regional uncertainties.

Last, a merger can be seen as a spatial phenomenon, consequently, the spatial merger theory should be used to explain the merger. Similar to theories in industrial economics, corporate geographers try to predict the expansionary pattern of firms from a spatial perspective (Taylor and Thrift, 1982). Unlike industrial economic growth models that emphasize the restrictions of a firm's growth, corporate geographers emphasize the "internal structural metamorphosis associated with growth and its spatial manifestation" (Qu and Green, 1997). This spatial manifestation occurs in four developmental stages : market penetration, product development, market development, and diversification. From a spatial perspective, the resultant outcome of the developmental stages is that the corporation will be surrounded by a core region. Within the core region, the expansion of sales offices and production facilities occurs and eventually leads to interregional and, later, international expansion. The expansion of a firm is, in essence, a "spatial learning process involving nested action spaces, information spaces, and decision spaces" (Taylor and Thrift, 1982), in order to obtain greater accessibility to capital, information, and more sophisticated forms of technology.

The motivations and theories summarized in Table 1 are what have made corporations even larger and, it is these large corporations that are extremely important to the prosperity of national economies, particularly, in Western industrialized society (Watts, 1980). Since these corporations possess many assets and employ many workers, the decisions that these corporations make at the headquarters level (control point) affect the growth and development of a country's urban system (Pred, 1974; Stephens and Holly, 1980). The headquarters of these corporations have the capital resources, information and technology, to affect the development and implementation of these policies on a national-scale, sub-national scale and local-scale. Ultimately, these corporate policies affect the economic linkages that are currently in place in a country's urban hierarchy. Changes to these economic linkages may create disparities in regional development, especially, if an oligopolistic framework is in place within industries, as few firms will control economic activity and will accentuate the spatial concentration of control (Thorngren, 1970; Pred, 1973).

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## DATA, METHODOLOGY AND ANALYSIS

The domestic merger data were compiled on a yearly basis in an aggregate form from the Investment Review Divisions of Industry Canada, for the years 1971, 1976, 1981, 1986, and 1991. These data were comprised of the location, city and province, of the acquiring and acquired firms, and the year of the merger transaction. Through initial tests, it was determined that there were only low levels of variation from year to year in merger characteristics. It was more parsimonious to choose representative years that matched census years.

To determine the spatial distribution of corporate control for the aforementioned years, a domestic spatial interaction model was developed from the log-linear analysis. Log-linear spatial interaction modeling is an excellent explanatory and exploratory tool for empirically finding and describing the spatial structure (flows) of the Canadian merger data. A number of log-linear models are developed, and the model that has the best goodness of fit (model has to meet the 5% significance level) to the data, is chosen.

Through log-linear analysis one can create a geographic contingency table which one can use to measure the relationships that exist among variables that are measured at discrete levels. In other words, log-linear modeling enables one to postulate multiplicative relationships that exist between the frequency cell counts in a contingency table and the parameters (multiplicative form of log-linear parameter estimates are denoted as beta parameters) of the model. The estimates are integrated in relation to the overall geometric mean of one. Values of beta estimates above one indicate increased likelihood of merger occurrence while values less than one indicate decreased likelihood of merger occurrence. The parameter estimates are a measure of the effect or importance of a category in a variable while all other effects are held constant. The parameters of the log-linear model can be statistically interpreted to represent specific interaction effects of the merger data. The contingency table produced from the log-linear analysis provides spatial flows from the data. These flows can be represented in a merger matrix. The matrix comprises the locational attributes of the acquiring and acquired firm, and the year of acquisition of the acquired and acquiring firm. This matrix will allow one to essentially define the spatial flows of merger activity within Canada (the cities/metropolitan areas that have had the greatest attraction to merger behaviour).

## LOG-LINEAR ANALYSIS

Log-linear analysis is employed to examine Canada's domestic merger data. Due to data constraints, only a three way contingency table was employed with the following variables: (A) location of the acquiring firm; (B) location of the acquired firm; and (C) year of acquisition. This last variable enables for the examination of the interrelationships between the location of the acquiring and acquired firm, over time. In essence, the log-linear procedure tests the relationship of the location of the acquiring firm or the location of the acquired firm or the interaction between the two, and the effects of time on merger frequency counts (Green, 1987). In addition, log-linear modeling enables for the disaggregation of the distance parameter (effect), unlike the gravity model. Log-linear modeling

produces parameter values for each interaction pair that allows for the effect of distance to be disaggregated. In log-linear analysis, the main effects or parameter estimates account for the propensity a city has to conduct merger activity, based on the size of the city. Since this is the case, the interaction term could be logically assumed to be a distance dimension (Green, 1987).

Once log-linear analysis was employed on Canada's domestic merger data, the following log-linear spatial interaction model was chosen.

**Table 2 Log-Linear Spatial Interaction Model**

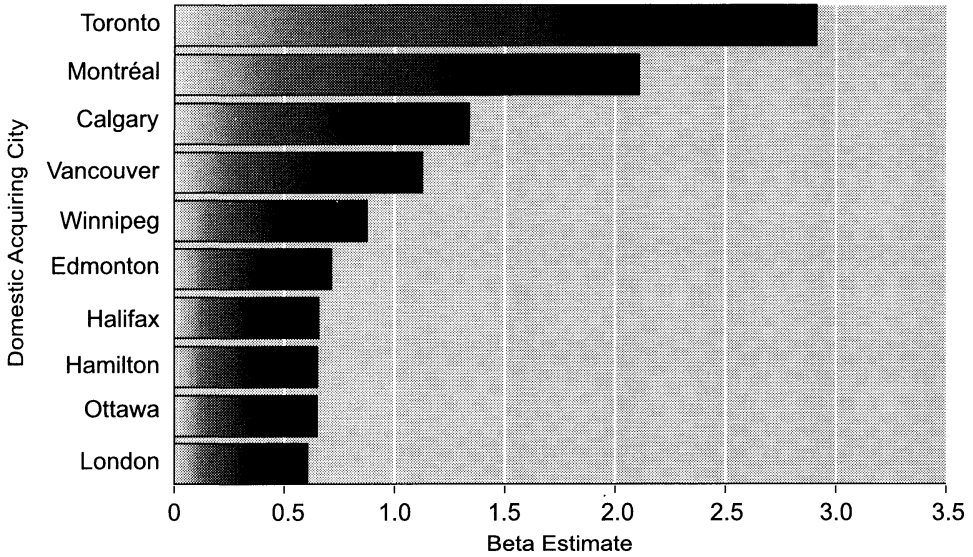
		Likelihood-Ratio		Pearson	
Model	D.F.	Chisq.	Prob.	Chisq.	Prob.
AB, AC, BC	324	124.85	1	126.7	1

A = Acquiring City; B = Acquired City; C = Year of Merger Activity.

The aforementioned model implies that in order to fully comprehend the spatial effects of Canada's domestic merger behaviour, one must ensure that the following are controlled for : 1) the location of the acquiring firm; 2) the location of the acquired firm; 3) the year of merger activity; 4) the spatial interaction effects of the acquiring and acquired cities; 5) the spatial interaction effects of the acquiring cities and the time variable; and 6) the spatial interaction effects of the acquired cities and the time variable. Following, is a descriptive examination of Canada's domestic merger activity.

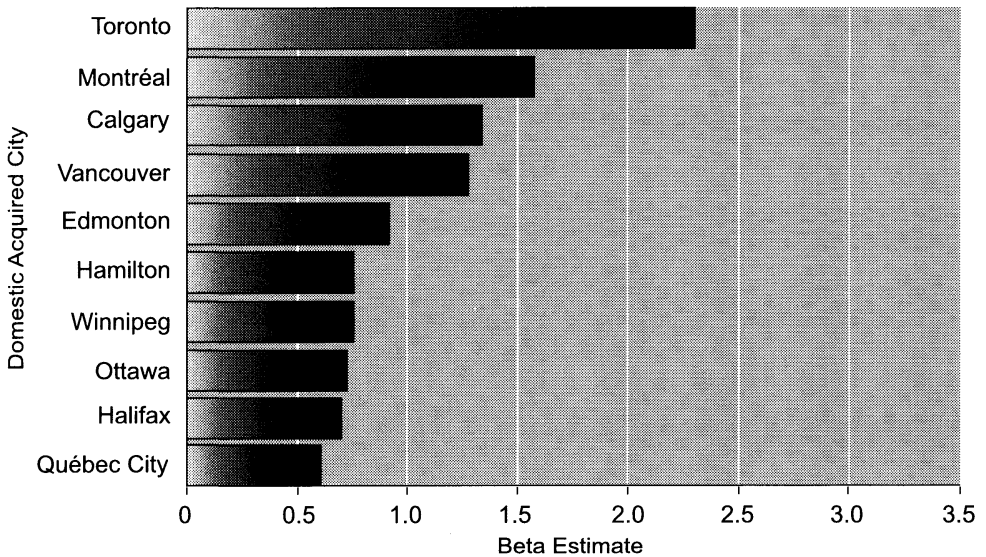
From a domestic acquiring city merger standpoint, it is apparent that Toronto's (2.91), Montreal's (2.11), Calgary's (1.34) and Vancouver's (1.13) beta estimates, are a level above other major Canadian cities (see Figure 1). The beta estimates for each city implies that firms in these four centres have a greater propensity to acquire firm's in other Canadian cities, than do firm's in other Canadian cities. In essence, firms based out of Toronto are 2.91 more likely to acquire firms in other Canadian cities, than are firms in other cities. Firms based out of Montreal are 2.11 times more likely to acquire firms in other Canadian cities, than are other cities. While firms based out of Calgary and Vancouver are 1.34 and 1.13 times more likely to acquire firms in other Canadian cities, than are other Canadian cities. Canada's other major cities all have a beta value less than one, indicating that although firms in these centres do acquire firms in other Canadian cities, the propensity to conduct merger activity is less likely to occur from these centres, with respect to Toronto, Montreal, Calgary and Vancouver.

**Figure 1 Domestic Acquiring Cities Beta Estimates**



In the case of Canadian cities that have the propensity to attract merger activity, Canada's four most dominant centres come to the forefront again. Toronto (2.3), Montreal (1.57), Calgary (1.34), and Vancouver (1.28) are more likely to have firms acquired from them, than any other major Canadian cities (see Figure 2). Following

**Figure 2 Domestic Acquired Cities Beta Estimates**





these four centres are Edmonton (0.92), Hamilton (0.76), Winnipeg (0.76), Ottawa (0.73), Halifax (0.7) and Quebec City (0.61). Although these centres have a beta value that is less than one, they still have firms from other Canadian cities acquiring firms in these centres, but to a less extent than do Toronto, Montreal, Calgary and Vancouver.

In the case of the years of merger activity, 1981 with a beta parameter value of 1.13 was the year where the greatest amount of domestic merger activity occurred. Following 1981 were 1986 (1.04), 1971 (1.01), 1991 (0.96) and 1976 (0.88).

If one looks at the beta parameters for all five years, it almost resembles a uniform distribution, indicating that although merger activity fluctuates over time, the fluctuations are not that great, at least for the five illustrative years of study. However, it is interesting to note that the beta parameters for the years 1971, 1981, and 1986 are all greater than one, indicating that merger activity was more likely to be conducted with greater frequency during those years than in 1976 and 1991. The reason why the beta parameters were greater than one for 1971, 1981, and 1986 was because these three years reflect high points of the merger cycles that were going on at the time (*Mergers, Corporate Concentration and Power in Canada, 1988*).

Above, the main effects or parameter estimates for Canada's cities housing acquiring firms, cities housing acquired firms, and the year of merger activity in Canada were given. Following, in Table 3, a spatial interaction table between Canada's acquiring firms and acquired firms cities is presented.

**Table 3 Acquiring Cities and Acquired Cities Parameter Estimates for the Years 1971, 1976, 1981, 1986 and 1991**

Acquired Cities	ACQUIRING CITIES									
	Calgary	Edmonton	Halifax	Hamilton	London	Montreal	Ottawa	Toronto	Vancouver	Winnipeg
Calgary	9.07	1.13	0.55	0.80	0.84	0.45	0.55	0.85	1.35	0.94
Edmonton	1.86	2.47	0.79	0.84	0.87	0.55	0.78	0.63	1.25	1.12
Halifax	0.53	0.96	3.93	1.09	1.64	0.69	1.09	0.82	0.57	0.81
Hamilton	0.48	0.88	0.98	3.01	1.50	0.49	0.99	1.10	1.00	0.99
Montreal	0.45	0.61	1.01	0.81	0.705	7.19	1.19	1.30	0.91	0.63
Ottawa	0.47	0.93	1.44	1.06	1.08	0.70	4.12	0.81	0.56	1.07
Quebec City	0.65	1.02	1.17	1.20	1.14	2.29	0.99	0.59	0.61	1.16
Toronto	1.06	0.64	0.69	0.58	0.94	1.80	0.74	6.52	1.02	0.44
Vancouver	1.55	1.34	0.56	0.81	0.66	0.65	0.61	0.92	4.67	0.95
Winnipeg	1.06	0.86	0.91	0.95	1.03	0.88	0.97	0.57	0.70	3.65

It is important to note that Table 3 can be considered an origin-destination matrix. By fitting the log-linear model to the origin-destination contingency matrix, this is equal to a constrained gravity model (Willikens, 1983). The interaction effects, produced in Table 3, can then be related to physical distance (Green, 1987).

Based on the beta parameters on Table 3, one can ascertain that firms in Canadian cities are parochial in their merger preferences. Toronto (6.52), Montreal (7.19), Calgary (9.07), and Vancouver (4.67), are more likely to conduct merger activity within themselves than with any other Canadian city. The same can be said for the other Canadian cities in Table 3.

Beyond this primary trend, however, there are firms within Canadian cities that demonstrate preference to conducting merger activity with firms in certain cities. Toronto firms prefer to conduct merger activity with Montreal, Calgary and Vancouver firms. The mere size factor of the cities of Montreal, Calgary and Vancouver is an explanation for why Toronto targeted those particular cities for merger activity. Montreal firms prefer to conduct merger activity with Toronto (size factor), Ottawa and Halifax firms (proximity factor). Calgary firms prefer to conduct merger activity with Edmonton and Vancouver firms (proximity factor). Vancouver firms prefer to conduct merger activity with Calgary and Edmonton firms (proximity factor). Furthermore, Table 3 illustrates that firms in other Canadian cities also show preference to firms in specific cities, with respect to merger activity.

Furthermore, Tables 4 and 5 illustrate that, over time, the effect of city specific conditions for both, the acquiring and acquired cities, foster or discourage the occurrence of merger activity. In the case of Canadian acquiring cities, firms in each city shows preferential treatment to a specific year, when conducting merger activity. Table 4 illustrates this point.

**Table 4 Domestic Acquiring Cities by Year of Merger Activity**

Year	ACQUIRING CITIES									
	Calgary	Vancouver	Toronto	Montreal	Edmonton	Halifax	Hamilton	London	Ottawa	Winnipeg
1971	0.67	1.44	0.98	1.05	1.31	1.27	0.87	0.91	0.95	0.82
1976	1.07	0.45	0.80	0.89	1.05	0.92	1.14	1.45	1.21	1.52
1981	1.66	1.33	0.83	0.62	0.98	0.83	0.77	1.13	1.46	0.86
1986	0.78	0.85	1.30	1.89	1.16	0.98	0.89	0.71	0.75	1.14
1991	1.08	1.38	1.19	0.92	0.64	1.06	1.47	0.95	0.80	0.82

According to Table 4, Edmonton, Halifax and Vancouver firms targeted the year 1971, London and Winnipeg targeted the year 1976, Ottawa firms targeted the year 1981, Montreal and Toronto firms targeted the year 1986, and Calgary and Hamilton firms targeted the year 1991, over other years, to acquire more firms through more merger activity.

Furthermore, Table 4 illustrates that Calgary firms did not prefer the year 1971, Toronto, and Vancouver firms did not prefer the year 1976, Halifax, Hamilton, and Montreal firms did not prefer the year 1981, London and Ottawa firms did not prefer the year 1986, and Edmonton and Winnipeg firms did not prefer the year 1991, over other years, to acquire more firms through merger activity.

In the case of acquired domestic firms' cities, firms in some Canadian cities show preferential treatment to a specific year, when conducting merger activity. Table 5 illustrates this point.

**Table 5 Domestic Acquired Cities by Year of Merger Activity**

Year	ACQUIRED CITY									
	Calgary	Montreal	Toronto	Vancouver	Edmonton	Halifax	Hamilton	Ottawa	Quebec City	Winnipeg
1971	1.06	0.62	1.07	1.05	1.20	1.29	0.90	0.94	0.64	1.62
1976	0.96	0.78	0.90	0.81	0.86	0.99	1.18	1.18	1.36	1.15
1981	1.10	1.19	0.73	0.75	1.21	0.81	0.84	1.22	1.97	0.70
1986	0.85	1.20	1.31	1.48	0.85	0.97	1.31	0.85	0.86	0.66
1991	1.07	1.47	1.10	1.06	0.95	0.99	0.85	0.87	0.68	1.17

According to Table 5, Halifax and Winnipeg firms targeted the year 1971, Edmonton, Ottawa and Quebec City firms targeted the year 1981, Hamilton, Montreal, Toronto and Vancouver firms targeted the year 1986, and Calgary firms targeted the year 1991, to have more firms acquired from it through merger activity, than any other year.

Furthermore, Table 5 illustrates that Montreal and Quebec City did not prefer the year 1971, Halifax, Hamilton, Toronto and Vancouver did not prefer the year 1981, Edmonton, Calgary, Ottawa and Winnipeg did not prefer the year 1986, to have less firms acquired from it through merger activity, than any other year. While not one city chose 1976 or 1991 as the years to have less firms acquired from it. For the most part, from an acquiring and acquired firms city standpoint, merger activity occurred with less frequency in the years 1976 and 1991 because these years were low points on the merger cycles, and with greater frequency in the years 1971, 1981, and 1986 because these were high points on the merger cycle (Mergers, Corporate Concentration and Power in Canada, 1988).

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## CONCLUSION

This article has examined Canada's domestic merger arena for specific years, 1971, 1976, 1981, 1986 and 1991. To examine the aforementioned, a literature review on mergers was conducted and log-linear analysis was employed on the merger data.

A literature review was conducted to properly ascertain the numerous motivations and theories that underscore merger activity. There is no single theory that explains why a merger occurs. Every merger is different. Furthermore, depending on the merger certain motivations and theories are more applicable than others.

Log-linear analysis was employed to provide a descriptive examination of the spatial merger flows for the years in question. From an acquiring and acquired firm perspective, Toronto, Montreal, Calgary and Vancouver, were the cities where the greatest number of merger activity was conducted.

Over time, domestic merger activity in Canada has created regional implications as some centres have become more pronounced and conducive to such activity over others notably, Toronto, Montreal, Calgary and Vancouver. If this trend continues, a disproportionate economic shift will be transferred to the aforementioned four centres. This economic shift will be accompanied by agglomeration economies and further produce regional inequalities between centres.

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