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LOOKING UNDER THE SURFACE: A LONGITUDINAL ANALYSIS OF COMPETITIVENESS IN CANADIAN MANUFACTURING, 1984-1989

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ABSTRACT

This study uses longitudinal business microdata to examine certain aspects of the competitiveness of the Canadian manufacturing sector. It investigates the impact of investment intensity on various dimensions of business performance such as exports, employment (both levels and composition) and productivity by industry, region, and country of control. The study combines data at the individual firm level from the 1984 and 1989 Surveys of Manufactures with data from the six annual Surveys of Capital Expenditures between 1984 and 1989. The basic methodology involves linking together the six Investment Surveys at the establishment or plant level and then further matching these to a linked file of 1984 and 1989 Survey of Manufactures plant microdata. About 82% of the $131 billion estimated total manufacturing investment over this period was available in microdata form from sampled plants. Of this 82% representing investment microdata, almost 95% has been matched up successfully to Manufacturing Survey plants. As well, a country of control flag was added by matching to another file carrying this information.

The study divided firms evenly into two groups based on degree of investment intensity (high and low) and observed the resulting changes in employment, exports and productivity over this 1984-1989 period. The intention is to determine the pervasiveness of the results. Do all firms with higher investment activity have the same employment and trade effects or are there differing outcomes? The richness of this source of combined microdata yields new analytical insights, never before so comprehensively examined, on the adjustments taking place in Canadian manufacturing in the face of the then impending FTA between Canada and the U.S. and the then emerging new climate of global competition generally. These results will provide a base of comparison with which to evaluate post-FTA Canadian manufacturing adjustment experience in a later study. Many of the negative adjustment impacts of the FTA have received attention in the press, but the offsetting positive cases have not received similar publicity. A study such as this can treat this sensitive and highly important topic in a more balanced and even-handed manner by looking at both sides of the issue.

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INTRODUCTION

Modern manufacturing is undergoing fundamental changes as a result of the micro-electronic revolution and the increasing global orientation of markets. This micro-electronic revolution and the consequent changes it is spawning in manufacturing processes and practices is beginning to stand certain traditional economic principles such as economies of scale on their head. Most of these new manufacturing practices are well suited to the conditions of limited market size typical in many smaller economies. Many of these new organizational practices were developed by Japanese firms, but they have been shown to be neither cultural- nor sectoral-specific. Interestingly, most of these new approaches are not tied to scale or specific products.

> "The techniques that have been developed to ensure high standards of quality as well as to carry out preventive maintenance, lot reduction, production line reorganization, training of multi-skilled workers, use of low-capacity flexible machines, and waste reduction, can be introduced into any type of firm regardless of its product or output level. It is true that they have been introduced very successfully under conditions of assembly complexity and large scale output, but it is widely acknowledged that many of the practices are even better suited for batch production and light assembly - two types of production organization that dominate in developing (and smaller) countries".[1]

The quick and pervasive adoption of these new practices would seem to be an excellent opportunity for Canada to maintain, and perhaps even enhance, its competitiveness in the emerging new global market-place.[2]

The competitive process is the engine of capitalism. Traditionally, business competition in a country was viewed as the struggle between firms in an industry, the industry being a set of related products or activities within a specific geographic market. With the cumulation of technological advances, changing management practices and outlook leading to ever-growing international trade flows, competition now is increasingly seen to be global in nature in many industries, with the viability of whole domestic industries themselves at stake.

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1. Kurt Hoffman, New Approaches to Best-Practice Manufacturing: The Role of Transnational Corporations and Implication for Developing Countries, United Nations Centre on Transnational Corporations, ST/CTC/SER A/12 1990, Pages 50-51.

2. Statistics Canada carried out several recent surveys on the introduction of advanced technology into the manufacturing sector, but no comprehensive information is available as yet on the extent of the use of these new manufacturing practices. This would seem to be an example of an emerging statistical gap.

Awareness of this new environment has sparked a number of U.S. and Canadian government sponsored studies.[3]

Most analytical studies which rely on normally available published industry aggregates miss a great deal of what is really going on under the surface within the industry, since any divergent behaviour is netted out through aggregation. Many researchers have commented on this over the years. Griliches notes: "At the macro-level and even in the usual industry-level study, it is common to assume away the underlying heterogeneity of the individual actors and analyze the data within the framework of the "representative firm" ignoring the aggregation difficulties associated with such concepts".[4] John Baldwin makes the same point: "the mainstream of industrial organization has had trouble in coming to grips with the reality of heterogeneity of firms".[5] Finally, in a recent paper Robert McGuckin devotes a section to the lack of priority that has been given to microdata analysis.[6] He notes that as long ago as 1955, more than 35 years ago, Solomon Fabricant observed that the Census Bureau could produce a valuable body of source material merely by making available new arrangements of data already in its files through new breakdown and cross classifications, since the existing published aggregates are only the beginning of information. He further notes laments by F.M. Scherer in 1980 on the waste of unanalyzed Census Bureau files, on down to the present in 1992, where Jack Triplett recently argued that uses of data beyond primary sponsor specified and supported aggregations are not emphasized at statistical agencies. The object of the present research effort is to go some way towards rectifying this research resource misallocation.[7]

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3. Two recent Canadian examples are:
   a) Ontario: Report of the Premier's Council: Competing in the New Global Economy, 1990.
   b) Canada: Michael Porter, Canada at the Crossroads - The Reality of a New Competitive Environment, Business Council on National Issues, 1991.

4. Zvi Griliches, Data Problems in Econometrics, Technical Working Paper #39, 1984, NBER, p.6

5. John Baldwin, Industry Efficiency and Plant Turnover in the Canadian Manufacturing Sector, Analytical Studies Branch Research Paper #37, Statistics Canada, 1991.

6. Robert McGuckin, Multiple Classification Systems for Economic Data: Can a Thousand Flowers Bloom? and Should They?, Centre for Economic Studies #91-8, 1991, US Bureau of the Census, p.8-9.

7. Indeed, it is precisely because the management of the Business and Trade Field recognized this need, that the Business and Trade/ Analysis and Integration Group was created to act as a catalyst to promote more of this type of micro-data research within the Field.

METHODOLOGY

This analysis uses longitudinal business microdata to examine certain aspects of the competitiveness of the Canadian manufacturing sector. The study combines data from the 1984 and 1989 Surveys of Manufactures with data from the six annual Surveys of Capital Expenditures between 1984 and 1989 at the individual firm level. It then examines the impact of investment intensity on various dimensions of business performance such as employment (levels, composition and compensation), exports and productivity. Investment intensity of firms is calculated as the ratio of a firm's average annual investment in plant and equipment between 1984 and 1989 divided by its 1989 sales. The basic methodology involves linking together the six Investment Surveys at the establishment or plant level and then further matching these to a linked file of 1984 and 1989 Survey of Manufactures plant microdata. About 82% of the $131 billion estimated total manufacturing investment over this period was available in microdata form from the sample of surveyed plants. Of this 82% representing investment microdata, almost 95% has been matched up successfully to Manufacturing Survey plants.

TABLE 1: SALES BY PLANT AND INVESTMENT MATCH STATUS, 1984 & 1989.

SALES		PLANT MATCH STATUS						TOTAL		
		CONTINUING			BIRTH/DEATH					
		INVESTMENT MATCH STATUS			INVESTMENT MATCH STATUS			INVESTMENT MATCH STATUS		
		MATCH	UNMAT	TOTAL	MATCH	UNMAT	TOTAL	MATCH	UNMAT	TOTAL
1984	($bil)	216	24	240	13	5	18	229	29	258
	% ->	90	10	100	72	28	100	89	11	100
	% ->	94	83	93	6	17	7	100	100	100
1989	($bil)	278	38	316	11	12	23	289	50	339
	% ->	88	12	100	48	52	100	85	15	100
	% ->	96	76	93	4	24	7	100	100	100

Explanation of Terms:
PLANT MATCH STATUS: refers to a comparison of plants between 1984 & 1989
INVESTMENT MATCH STATUS: MATCH are firms with matching investment information, UNMAT are firms with no matching investment data.
SALES: is the value of total activity shipments of all respondents which received long forms in 1989 or 1984. These account for 97% and 95% respectively of all 1984 and 1989 shipments.

Source: Business & Trade - Analysis & Integration Group / Statistics Canada

It can be seen from Table 1 that 93% of both 1984 and 1989 sales represent plants that continued in existence over this six year period, while the remaining 7% represent 1989 plants coming on-stream since 1984 and 1984 plants that ceased reporting by 1989. As a result of the longitudinal approach adopted, this study largely restricts its analysis to the subset of plants that both continued in existence over this period and that had matched investment data. This panel had sales of $215 and $278 billion in 1984 and 1989 respectively and constituted over 80% of the total sales in both years of all long-form respondents.[8] All subsequent analysis deals primarily with this panel of continuing plants with matched investment data.

Certain conventions were adopted to minimize complexities that always arise in any longitudinal type of research. Terminal year plant company affiliation organization, country of control, geographic location and industry classification were adopted.[9] Country of control was included because a number of studies have suggested that there could be different restructuring and performance among different country of control groups.[10] A recent study released by Investment Canada also reports on performance differences among foreign and Canadian controlled firms.[11] This country of control flag has been added by matching at the firm level to another file which carries this information.

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8. As noted in Table 1's footnote, respondents which were long-form in either or both years accounted for 97% and 95% respectively of total 1984 and 1989 revenues. Excluding the respondents which were short-form in both years thus had little impact on the analysis, but saved considerable computing resources.

9. For example, it was found that 3% of both 1984 and 1989 sales of continuing plants were reclassified industrially at the 4-digit SIC level over this period.

10. Don McFetridge provides a good rationale for looking at this variable: The Economics of Industrial Structure: An Overview, Canadian Industry in Transition, McDonald Royal Commission Background Study, U of T Press, 1986, p.21.

11. John Knubley, International Investment and Competitiveness, Working Paper #9, Investment Canada, 1991, (See pages 39-40 which discusses findings of D. Allen, Performance of Canadian and Foreign-Controlled Manufacturers in Canada 1983-87, 1990, in a study commissioned by Investment Canada).

In order to control for differences between industries, but at the same time not deal with too many different groups, two-digit Industry Groups were sorted by 1989 total activity shipments and the top seven which accounted for 3/4 of all output were singled out for separate analysis (see Table 2).[12] The residual industries termed Other- Manufacturing are seen to account for the remaining 1/4 of sales, but are relatively labour-intensive, accounting disproportionately for slightly more than 40% of all employment.

TABLE 2: INDUSTRY GROUPS RANKED BY SALES, 1989

INDUSTRY GROUP	TOTAL ACTIVITY SHIPMENTS $Bil	%	Cum %	EMPLOYMENT '000	%	Cum %
1. Transportation Equipment	73	22	22	231	14	14
2. Food, Beverage & Tobacco	52	15	37	219	13	27
3. Paper	27	8	45	114	7	34
4. Petroleum Rubber & Plastic	27	8	53	81	5	39
5. Chemicals	27	8	61	88	5	44
6. Primary Metals	23	7	68	101	6	50
7. Electrical	21	6	74	134	8	58
8. Other	88	26	100	703	42	100
TOTAL	339	100	100	1675	100	100

NOTE: Industry 2 includes SIC Groups 10, 11, & 12; Industry 4 includes Groups 15, 16, & 36; Industry 8 includes Groups 17, 18, 19, 24, 25, 26, 28, 30, 31, 35, & 39.

Source: Business & Trade - Analysis & Integration Group / Statistics Canada

This study divided firms into two even groups based on degree of investment intensity (high and low) within each of these eight broad industry groupings and observed the resulting changes over this 1984-1989 period in employment, exports, productivity, and various other performance characteristics to be discussed later. The intention is to determine the pervasiveness of the results. Do all firms and plants with higher investment activity have the same employment and trade effects or are there differing outcomes? The richness of this source of combined microdata yields new analytical insights, never before so comprehensively examined, on the adjustments taking place in Canadian manufacturing in the face of the then impending FTA between Canada and the U.S. and the then emerging new climate of global competition generally. These results will provide a comparison with which to evaluate post-FTA Canadian manufacturing adjustment experience in a later study. Many of the negative adjustment impacts of the FTA have received attention in the press, but the offsetting positive cases have not received similar publicity. A study such as this can treat this sensitive and highly important topic in a more balanced and even-handed manner by looking at both sides of the issue.

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12. Major Groups 10, 11 and 12, Food, Beverage and Tobacco respectively, were grouped as one, as were Groups 15, 16 and 36 Rubber, Plastics and Petroleum respectively. The remaining 11 Groups (17, 18, 19, 24, 25, 26, 28, 30, 31, 35 and 39) were grouped residually as Others- Manufacturing. This is admittedly somewhat arbitrary, but does allow controlling for major industry.

ANALYSIS

The following analysis examines the changes in employment over the 1984 - 1989 period for various categories of firm groupings. It also explores the impact of investment on employment and a number of additional characteristics.

Employment Change

Before zeroing in on the cohort of firms with continuing plants and matched investment data which were outlined in Table 1, this section will cover the whole population and illustrate the large submerged underlying employment dynamics that are unseen when our comparisons are restricted, as they normally are, to cross-sectional aggregates for two different years. From the right outer-most column of Table 3 it can be seen that our complete study population with employment of 1,581,000 in 1984 grew 94,000 by 1989, a growth rate of 6% or about 1% per year over this six-year period. This population can be split into two cohorts: the continuing plant component and the birth/death component. Table 3 decomposes the overall 94,000 net employment change into net employment gains of 128,000 by the continuing plant segment and net losses of 34,000 by the birth/death group.

TABLE 3: EMPLOYMENT CHANGES BY FIRM EMPLOYMENT CHANGE CATEGORIES AND INDUSTRY, 1984 - 1989.

EMPLOYMENT CHANGE CATEGORY		TRANSP EQUIPMT	FOOD, BEV, & TOBAC	PAPER	PETROL, RUBBER, & PLAST	CHEM-ICAL PRODS	PRIMARY METAL	ELECTR PRODS	OTHER MANUFAC INDS	TOTAL MANUFAC INDS
TOTAL	1984 000s	193	216	112	73	86	106	131	664	1,581
1. TOT INCREASES	1984 - 1989 000s	60	42	9	21	18	7	33	206	396
1.a INCREASES	CONTINUING PLANTS	35	27	6	16	13	6	22	142	267
1.b INCREASES	PLANT BIRTHS	25	15	3	5	5	1	11	64	129
2. TOT DECREASES	1984 - 1989 000s	-22	-39	-7	-13	-16	-12	-30	-163	-302
2.a DECREASES	CONTINUING PLANTS	-15	-17	-6	-5	-8	-9	-10	-69	-139
2.b DECREASES	PLANT DEATHS	-7	-22	-1	-8	-8	-3	-20	-94	-163
NET CHANGE	1984 - 1989 000s	38	3	2	8	2	-5	3	43	94
NET CHANGE	% OF TOTAL	20	1	2	11	2	-5	2	6	6
ABSOLUTE CHANGES	1984 - 1989 000s	82	81	16	34	34	19	63	369	698
ABSOLUTE CHANGES	% OF TOTAL	42	38	14	47	40	18	48	56	44

Explanation of Terms:
EMPLOYMENT CHANGE CATEGORY: firms are split between those with increasing and decreasing employment and their plants are split between continuing plants from 1984 to 1989, plant births since 1984, and plant deaths before 1989.
Source: Business & Trade - Analysis & Integration Group / Statistics Canada

However, this 128,000 continuing plant net gain is itself seen to be the result of 267,000 employment gains and 139,000 employment losses. Similarly, the birth/death cohort net loss of 34,000 is the result of 129,000 employment gain by births and losses of 163,000 by plant deaths. Thus the aggregate net change of 94,000 is seen to be result of 396,000 employment gains and 302,000 employment declines. These total changes of 698,000 represent almost half (44%) of the 1984 total base employment.[13] Looking at this index of employment volatility shown in the bottom row, the above-average sectors are Other Manufacturing (56%), Electrical Products (48%), and Petroleum, Rubber and Plastic (47%). Two sectors Paper (14%) and Primary Metal (19%) have much below-average employment turnover ratios.

The inner body of Table 3 reveals several interesting results. Food shows a 22,000 employment drop and Electrical a 20,000 drop due to plant deaths. Further analysis would be needed to determine if these represent actual cessation of operations or a reclassification to wholesale trade. Both of these outcomes represent a declining manufacturing presence in these two industries, though an industrial reclassification could represent less of a loss than an outright cessation. On the positive side, Transportation Equipment registered both strong total and net employment increases over this period. The gains of 60,000 were split between increases in continuing plants (35,000) and plant births (25,000) and were offset by only 22,000 total employment declines for a net gain of 38,000 or a net employment gain of 20% over this interval.

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13. These gross turnover numbers, while much larger than the net overall period change, are still not the complete employment change picture, since each firm's own net employment change is itself composed of gross employment in- and out-flows which if tabulated would be higher yet again.

The Impact of Investment on Employment

The basic objective of this study is to investigate the impact of firms' cumulative 1984 to 1989 investment on various dimensions of their performance. This section looks at employment effects and later sections cover a number of additional aspects such as exports, value-added per worker, price-cost margins etc. As was stated in the Methodology Section, since this is a micro-level firm analysis of the impact of investment on performance, this study focuses on the cohort of continuing plants with matched investment data. The research is designed to assess whether there are discernable differences among firms with differing investment intensities. Within each of the eight broad industry groupings, firms were split into two equal groups (low and high investment intensity) based on their investment/sales ratios.[14] Finally, firms were further split by country of control and geographic region to test for further differences based on these factors.

Theory indicates that investment can have several potential effects on employment depending on the reason(s) for the investment. Investment of a 'capital-widening' nature, can be undertaken to equip additional workers with the same level of capital as existing workers. Investment of a 'capital-deepening' nature can be undertaken to equip each worker with more capital, which by increasing productivity can lead to the need for less labour input to achieve the same previous level of output. However, such investment can either maintain a firm's competitiveness vis-a-vis its competitors, or perhaps improve its position, leading to increased output and employment possibilities should the firm desire. Because of these somewhat ambiguous and dichotomous possibilities, the study splits firms between those experiencing increasing and decreasing employment, so that offsetting behaviour by different firms pursuing different adjustment strategies will not be netted out.

Various anecdotal evidence can be noted daily in the media, such as firms cutting back their presence in Canada and moving to Mexico, the Southern U.S., or offshore. Mitel recently announced it was bucking these trends and was repatriating its telephone manufacturing operations to Canada from the Far East because the process was sufficiently capital intensive that the fairly small labour cost component, though more expensive, was sufficiently out-weighed by other offsetting factors. This study allows not only the summarization of the net results of all these shifting and conflicting motives, but also the opportunity to view the various separate restructuring currents underway within the Canadian manufacturing sector.

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14. Investment in this study is the sum of both new and repair expenditures on construction, machinery and equipment. New survey results beginning in 1986 on type of machinery and equipment investment could be used to further refine this analysis in future work. For an excellent justification of combining repair and new investment see: K. Matziorinis and R. Rowley, Repair Expenditures: New Evidence on Replacement Investment, McGill Univ. working paper, 1992.

TABLE 4: CROSS-CLASSIFICATION OF INVESTMENT INTENSITY AND EMPLOYMENT CHANGE BY COUNTRY OF CONTROL, 1984 - 1989.

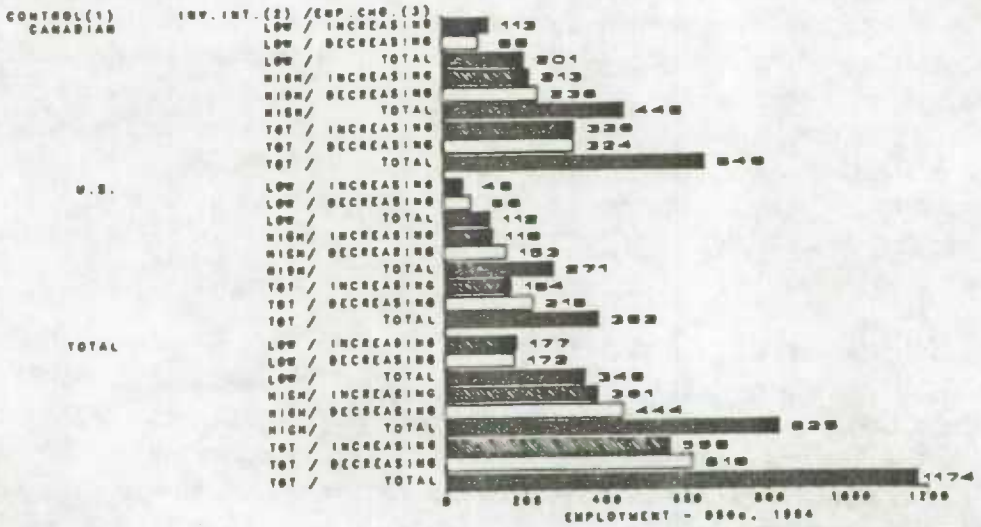
COUNTRY OF CONTROL			INVESTMENT INTENSITY								
			LOW			HIGH			TOTAL		
			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY		
			INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL
CANADIAN	FIRMS	#	1,026	624	1,650	932	556	1,488	1,958	1,180	3,138
	SALES 1984	$mil	18,152	11,457	29,608	27,457	38,634	66,091	45,609	50,090	95,699
	SALES 1989	$mil	27,387	12,848	40,235	40,005	42,040	82,045	67,391	54,888	122,279
	EMPL 1984	000s	113	88	201	213	236	448	326	324	649
	EMPL 1984	AVGE SIZE	110	141	122	228	424	301	166	274	207
	EMPL CHG	000s	47	-21	27	51	-41	10	98	-62	36
	EMPL CHG	% of 1984	42	-23	13	24	-18	2	30	-19	6
U.S.	FIRMS	#	224	123	347	268	175	443	492	298	790
	SALES 1984	$mil	12,662	27,652	40,314	16,917	36,807	53,725	29,579	64,459	94,038
	SALES 1989	$mil	16,035	35,510	51,545	26,197	43,940	70,137	42,232	79,449	121,682
	EMPL 1984	000s	46	66	112	118	153	271	164	219	382
	EMPL 1984	AVGE SIZE	206	533	322	440	874	612	333	733	484
	EMPL CHG	000s	16	-10	7	25	-23	2	41	-33	9
	EMPL CHG	% of 1984	35	-15	6	21	-15	1	25	-15	2
OTH.FOR.	FIRMS	#	96	62	158	136	94	230	232	156	388
	SALES 1984	$mil	2,789	3,362	6,151	11,306	8,293	19,599	14,095	11,655	25,750
	SALES 1989	$mil	4,932	4,745	9,677	14,039	9,852	23,891	18,971	14,597	33,568
	EMPL 1984	000s	17	19	36	51	56	106	68	74	143
	EMPL 1984	AVGE SIZE	182	301	229	374	592	463	294	477	368
	EMPL CHG	000s	5	-3	2	12	-9	2	17	-12	5
	EMPL CHG	% of 1984	30	-16	6	23	-17	2	25	-17	3
TOTAL	FIRMS	#	1,346	809	2,155	1,336	825	2,161	2,682	1,634	4,316
	SALES 1984	$mil	33,603	42,470	76,073	55,680	83,734	139,414	89,283	126,205	215,487
	SALES 1989	$mil	48,354	53,103	101,457	80,241	95,831	176,072	128,595	148,934	277,529
	EMPL 1984	000s	177	172	349	381	444	825	558	616	1,174
	EMPL 1984	AVGE SIZE	131	213	162	285	538	382	208	377	272
	EMPL CHG	000s	69	-33	35	88	-74	14	157	-107	49
	EMPL CHG	% of 1984	39	-19	10	23	-17	2	28	-17	4

Explanation of Terms
INVESTMENT INTENSITY: firms are split into 2 groups based on 1984-89 avg annual invest / 1989 sales
EMPLOYMENT CHANGE CATEGORY: firms are split between those with increasing and decreasing employment
SALES: is the value of total activity shipments.
EMPL: is total employment of all production and salaried workers.
EMPL 1984 AVGE SIZE: is average employees per firm.
EMPL CHG: is employment change between 1984 and 1989.

Source: Business & Trade - Analysis & Integration Group / Statistics Canada

Table 4 shows that, overall, the employment of the 4,316 firms in this cohort grew 4% between 1984 and 1989. However, those with higher investment grew only 2%, while the lower investment group grew 10%. These overall rates for the two groups nevertheless mask sharply divergent behaviour within both of these groups themselves. Among the 2,155 firms in the low investment group, 1,346 had increasing employment and

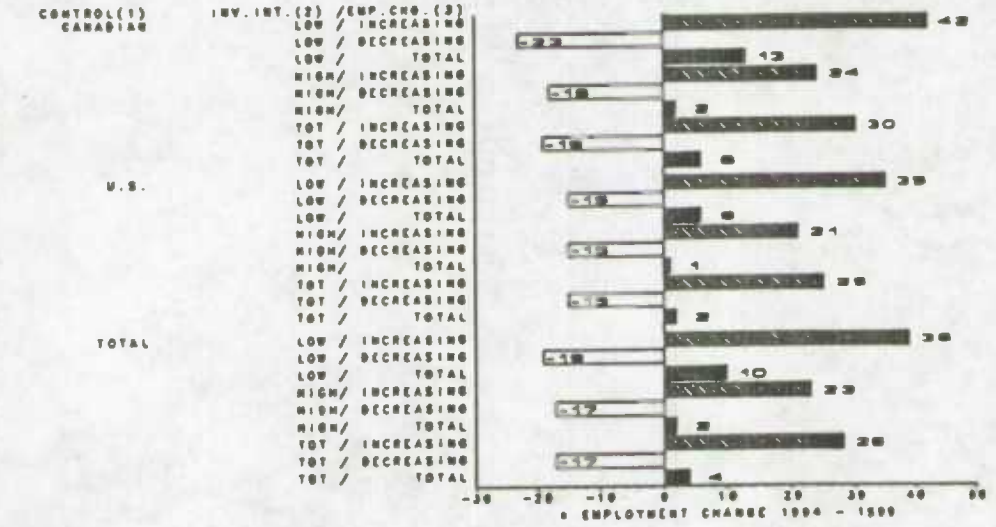
GRAPH 1: EMPLOYMENT LEVELS
BY COUNTRY OF CONTROL, INVESTMENT INTENSITY,
& EMPLOYMENT CHANGE CATEGORIES, 1984.



(1): CONTROL is country of control.
(2): INV.INT. is average investment intensity which is average 1984-88 investment / 1988 sales.
(3): EMP.CHG. corporate firms with increasing or decreasing employment between 1984 & 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

GRAPH 2: PERCENTAGE EMPLOYMENT CHANGE BETWEEN 1984 & 1988
BY COUNTRY OF CONTROL, INVESTMENT INTENSITY,
& EMPLOYMENT CHANGE CATEGORIES.



(1): CONTROL is country of control.
(2): INV.INT. is average investment intensity which is average 1984-88 investment / 1988 sales.
(3): EMP.CHG. corporate firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

grew 39%, while 809 had declining employment of 19%. Of the 2,161 with high investment[15] 1,336 (roughly the same proportion as in the low investment group) had increasing employment and grew 23%, while the employment of the remaining 825 fell by 17%. The high investment group as a whole were more than two times the average employment size of their low investment counterparts (382 versus 162), and within both investment groups, firms with declining employment were almost twice the average size of those with increasing employment. The main difference between the two investment groups was in the increasing employment firm components (39% versus 23%); the declines were almost the same in the two groups (19% versus 17%). These higher increases led to the overall higher employment growth of the low investment group relative to the high investment group, despite the highly divergent results found within each of these groups themselves.

Shifting next to the country of control dimension of Table 4, this same result noted above holds for both Canadian and U.S. controlled firms. Graph 1 shows the 1984 employment distribution, while Graph 2 shows the percentage employment growth for each control group and their various components. From Graph 2 it can be seen that the largest differences in each control group (as was found at the all-firm level) are between the increasing employment growth rates: Canadian 42% versus 24% (an 18 percentage point differential), and U.S. 35% versus 21% (a 14 point difference). Again, the declining rates are all very similar in each control group, as was found at the all-firm level. Graphs 3 and 4 look at the industrial and geographic dimensions respectively, and both continue to illustrate this same pattern of higher growth differentials than among employment rates of decline between the two investment groups; again the low investment group always has both the higher growing group and higher overall net employment growth rates.

In every country of control, industry and regional grouping the low investment group has the higher employment growth rates, both in the increasing employment sub-groups and within the group as a whole. Evidence has been presented that on average larger firms have higher investment intensities and are also on balance more prone to employment declines.

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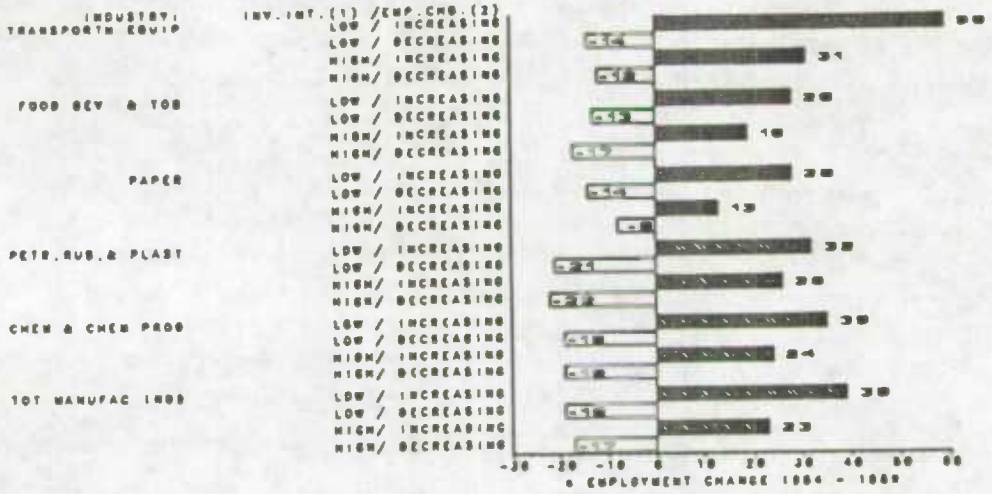
15. The two investment groups are not exactly even in number, since in some of the 8 industries there were odd numbers of firms and the statistical ranking procedure consistently assigned the extra firm to the high investment group.

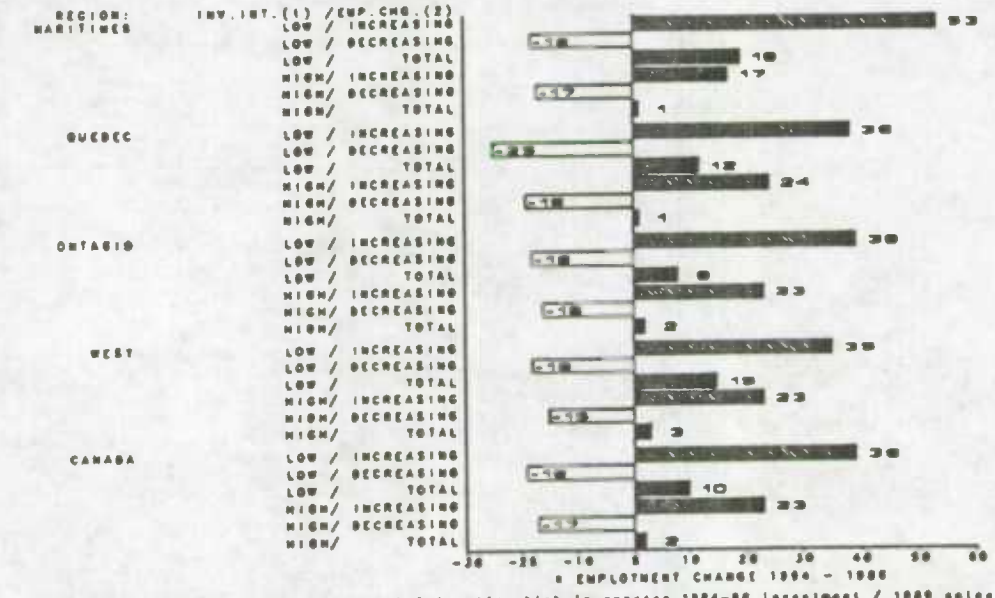
GRAPH 3: PERCENTAGE EMPLOYMENT CHANGE BETWEEN 1984 & 1988
BY INDUSTRY, INVESTMENT INTENSITY,
& EMPLOYMENT CHANGE CATEGORIES.



(1): INV.INT.: Is average investment intensity which is average 1984-88 investment / 1988 sales.
(2): EMP.CHG.: Separates firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

GRAPH 4: PERCENTAGE EMPLOYMENT CHANGE BETWEEN 1984 & 1988
BY REGION, INVESTMENT INTENSITY,
& EMPLOYMENT CHANGE CATEGORIES.



(1): INV.INT.: Is average investment intensity which is average 1984-88 investment / 1988 sales.
(2): EMP.CHG.: Separates firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

Other Dimensions of Firm Performance

This section continues to focus on this same cohort of firms comprised of continuing plants with matched investment data. It builds on the previous section by maintaining the two by two investment/employment change taxonomy used there, and goes on to examine seven additional dimensions of business performance.

1. Exports

Exports intensity is measured as exports to sales in 1984, 1989 and the simple difference between these two ratios is used to assess change. Overall it can be seen from Table 5 that firms with declining employment had higher initial export reliance levels and became less so than firms with increasing employment. This was so for both investment groups as well. Further testing of this finding would require splitting firms by whether or not their export reliance increased or decreased and looking at their net employment changes.

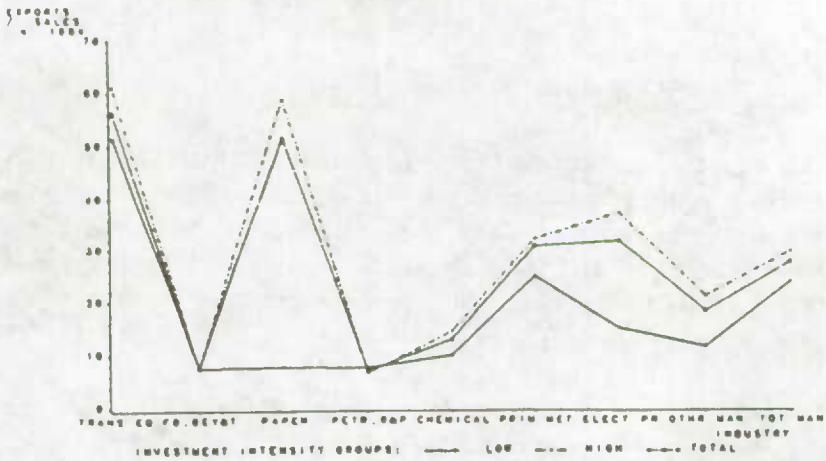
TABLE 5: EXPORT ORIENTATION AND INVESTMENT, BY INVESTMENT INTENSITY, EMPLOYMENT CHANGE, AND COUNTRY OF CONTROL, 1984 - 1989.

COUNTRY OF CONTROL			INVESTMENT INTENSITY								
			LOW			HIGH			TOTAL		
			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY		
			INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL
CANADIAN	INV INT	%	1	1	1	7	10	9	5	8	6
	EXT/SALES	1984 %	16	13	15	24	21	22	21	19	20
	EXT/SALES	1989 %	19	16	18	23	21	22	21	20	21
	EXT/SALES	89 - 84 %	3	4	3	-1	-0	-0	1	1	1
U.S.	INV INT	%	2	1	1	7	7	7	5	4	4
	EXT/SALES	1984 %	13	41	32	28	46	40	22	44	37
	EXT/SALES	1989 %	18	32	28	30	38	35	26	35	32
	EXT/SALES	89 - 84 %	5	-9	-5	3	-9	-6	4	-9	-5
TOTAL	INV INT	%	1	1	1	7	8	8	5	6	5
	EXT/SALES	1984 %	14	31	24	25	33	30	21	32	27
	EXT/SALES	1989 %	18	26	22	26	30	28	23	28	26
	EXT/SALES	89 - 84 %	4	-5	-1	1	-3	-2	2	-4	-2

Explanation of Terms
INVESTMENT INTENSITY: firms are split into 2 groups based on 1984-89 avg annual invest / sales 1989
EMPLOYMENT CHANGE CATEGORY: firms are split between those with increasing and decreasing employment
INV INT: average annual investment to 1989 shipments;
EXT/SALES:are ratios of exports to 1989 shipments;

Source: Business & Trade - Analysis & Integration Group / Statistics Canada

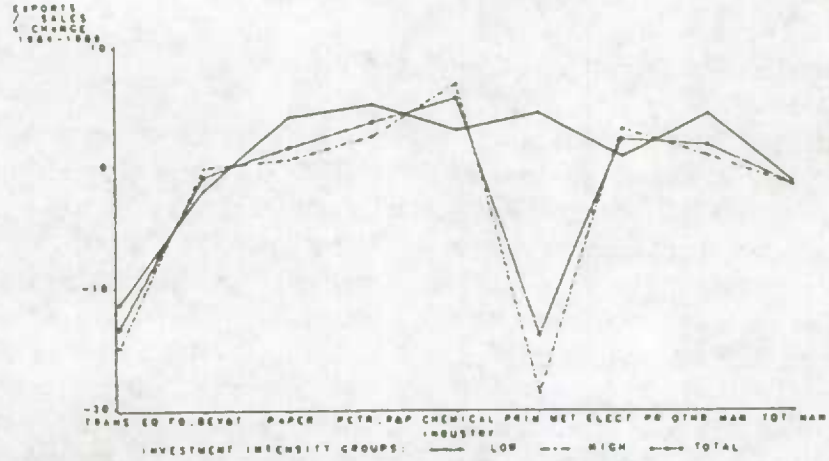
GRAPH 5 : EXPORT ORIENTATION
BY INVESTMENT INTENSITY GROUPS & INDUSTRY, 1984



Investment intensity is average 1984 - 1989 investment / 1989 sales.
Firms in each industry are split into two equal groups based on this inv tot measure.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

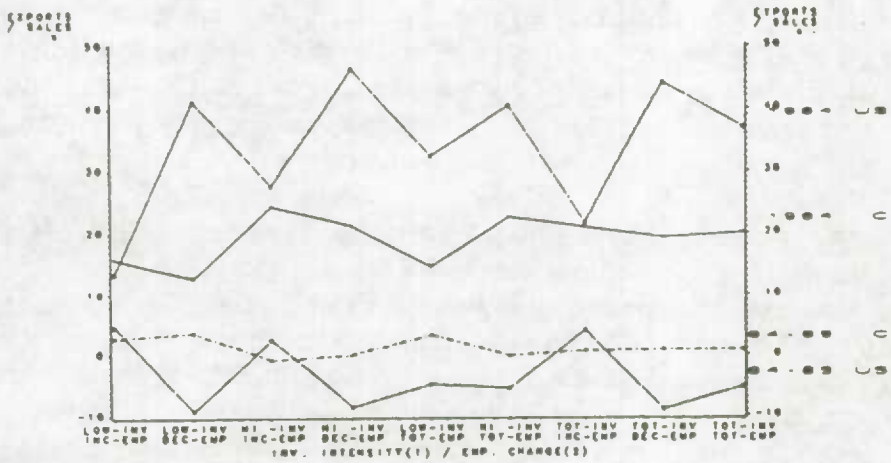
GRAPH 6 : PERCENTAGE CHANGE IN EXPORT ORIENTATION BETWEEN 1984 & 1989
BY INVESTMENT INTENSITY GROUPS & INDUSTRY.



Investment intensity is average 1984 - 1989 investment / 1989 sales.
Firms in each industry are split into two equal groups based on this inv tot measure.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

GRAPH 7 : EXPORT ORIENTATION BY COUNTRY OF CONTROL,
INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS.



(1): INV.INT: is average investment intensity which is average 1984-89 investment / 1989 sales.
(2): EMP.CHG: Categories firms with increasing & decreasing employment from 1984 to 1989.

Source: Business & Trade / Analysis & Integration, Statistics Canada

From an industrial perspective Graph 5 shows that both Transportation Equipment and Paper have high export intensity levels. Within all these industries the high investment group have higher export intensities, most markedly so in Paper. Graph 6 shows that both Transportation Equipment and Primary Metals suffered relatively large declines in export intensity over this 1984-1989 period. In 5 of the 8 groups the low investment group outperformed their higher investment counterparts.

From a country of control perspective, Graph 7 shows Canadian controlled firms with a 20% export propensity and U.S. with 37% in 1984. Canadian controlled firms show little variability in both 1984 levels and changes across the various groups under study, whereas the U.S. firms with declining employment have both higher initial levels and falling export reliance compared with those with increasing employment. More work is needed to better understand this initial result.

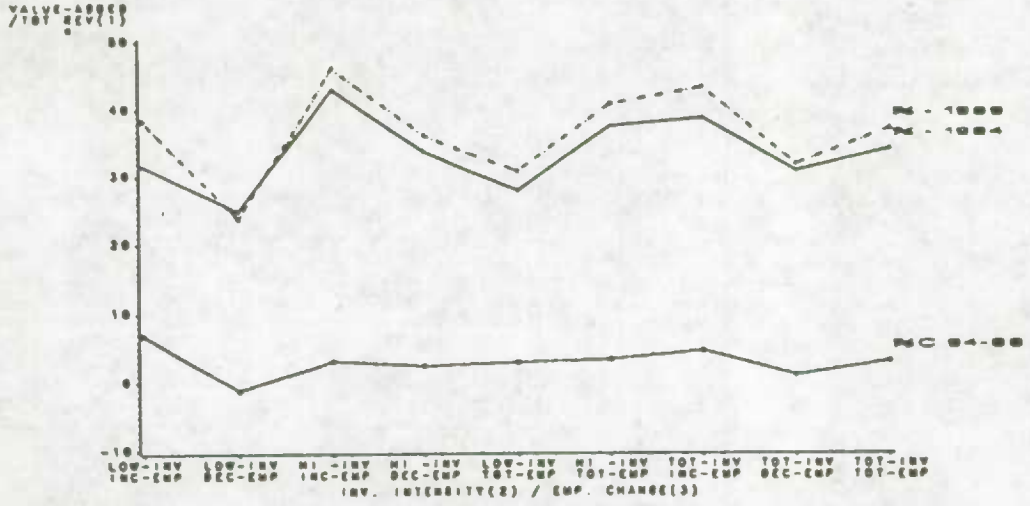
2. The Deindustrialization/Warehouse Economy Phenomenon

Researchers have postulated and searched for evidence that domestic manufacturing activity is of declining importance within the economy. The term the "hollow" corporation was corned a few years ago by Business Week magazine to describe firms that became more brokers and merchandisers than actual manufacturers. Two proxies to get at certain dimension of this idea at the firm level are employed here. The first is the ratio of a firm's value-added to its sales and the second is the ratio of a firm's non-manufacturing revenue to its total revenue. Among manufacturers, non-manufacturing revenue is largely derived from the sale of goods purchased for resale i.e. from wholesaling. Firms may flesh-out their product lines with goods manufactured elsewhere. To the extent foreign firms import their parents' products, some researchers have dubbed this the 'warehouse' economy phenomenon. Table 6 shows these resulting ratios for the various employment and investment cohorts.

It can be seen from Graph 8A that value-added / revenue is both higher and rising faster for firms with increasing employment than for those with decreasing employment and similarly for the higher investment firms compared to the lower investment firms. Graph 8B illustrates the same result by country of control. Looking at the employment/investment interactions, this ratio is highest for the high investment-increasing employment group and lowest for those with low investment and declining employment.

Turning to the importance of non-manufacturing revenues, Graph 9A shows higher and faster rising ratios for declining employment compared to the rising employment groups and for low investment compared to high investment groups. This ratio is highest and fastest rising for the low investment/declining employment group and lowest and slowest rising for the high investment/increasing employment group. In order to see if there were differences in the country of control make-up of this low investment/declining employment group with such large and rising proportionate non-manufacturing revenues, Graph 9B looks at US versus Canadian controlled firms. The U.S. firms ratio in 1984 is 37% compared to

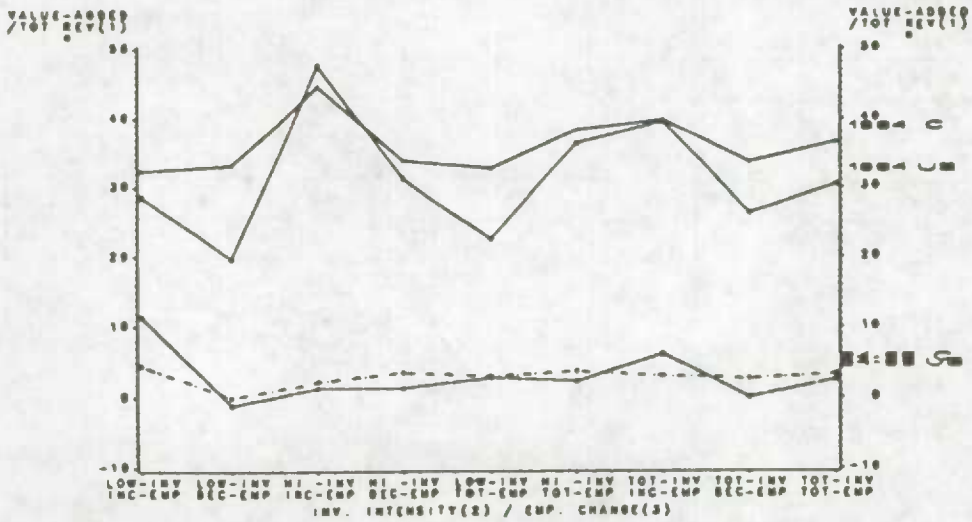
GRAPH 8A: TOTAL VALUE-ADDED / TOTAL REVENUE(1)
BY INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS.
IN 1984, 1988 & CHANGE BETWEEN 1984 & 1988.



(1): This is an indicator of the importance of manufacturing activity in total sales of goods.
(2): INV.INT.: is average investment intensity which is derived 1984-88 investment / 1988 sales.
(3): EMP.CHG.: separates firms into increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

GRAPH 8B: TOTAL VALUE-ADDED / TOTAL REVENUE(1) BY COUNTRY OF CONTROL,
INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS.



(1): This is an indicator of the importance of manufacturing activity in total activity.
(2): INV.INT.: is average investment intensity which is derived 1984-88 investment / 1988 sales.
(3): EMP.CHG.: separates firms into increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

13% for the Canadian firms and the U.S. ratio moves up 6 percentage points by 1989 while the Canadian ratio is unchanged. Not shown, the ratio of the other-foreign controlled firms in this cohort is 16% in 1984 but rises 12 percentage points to 28% by 1989. This group of foreign controlled firms seems to be simultaneously disinvesting, deindustrializing and increasing their warehousing or wholesaling activities. Again not shown here, three industries had high and rising ratios within this particular low investment-declining employment cohort. These were Transportation Equipment (41% in 1984, 45% in 1989, a 4% change), Food (27%, 38%, 11%), and Electrical Products (38%, 44%, 6%).

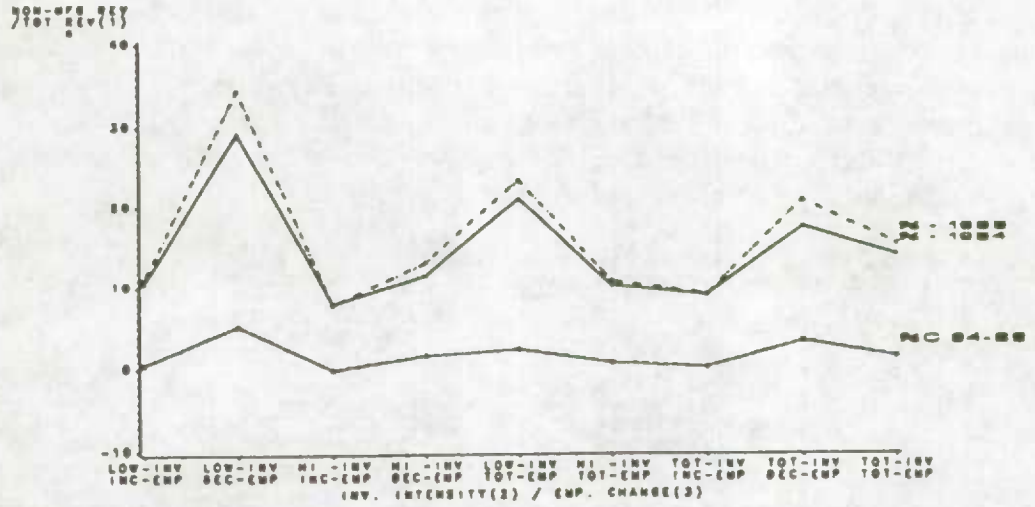
TABLE 6: SELECTED MEASURES OF MANUFACTURING ACTIVITY
BY INVESTMENT INTENSITY, EMPLOYMENT CHANGE, AND COUNTRY OF CONTROL, 1984 - 1989.

COUNTRY OF CONTROL			INVESTMENT INTENSITY								
			LOW			HIGH			TOTAL		
			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY		
			INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL
CANADIAN	VA/SALES	1984 %	32	33	33	45	34	38	40	34	37
	VA/SALES	1989 %	37	33	36	47	37	42	43	36	40
	VA/SALES	89 - 84 %	5	0	3	2	4	4	3	3	3
	WAREHOUSE	1984 %	9	13	11	7	6	7	8	8	8
	WAREHOUSE	1989 %	10	13	11	6	7	6	7	8	8
	WAREHOUSE	89 - 84 %	1	-0	0	-1	0	-0	-0	0	-0
U.S.	VA/SALES	1984 %	29	20	22	48	31	36	39	26	30
	VA/SALES	1989 %	40	19	25	49	33	39	46	26	33
	VA/SALES	89 - 84 %	11	-1	3	1	1	2	6	0	3
	WAREHOUSE	1984 %	10	37	29	11	17	15	11	26	21
	WAREHOUSE	1989 %	11	43	33	12	20	17	11	30	24
	WAREHOUSE	89 - 84 %	1	6	4	0	3	2	1	5	3
TOTAL	VA/SALES	1984 %	32	25	28	43	34	37	39	31	34
	VA/SALES	1989 %	38	24	31	46	36	41	43	32	37
	VA/SALES	89 - 84 %	7	-1	3	3	2	3	5	1	3
	WAREHOUSE	1984 %	10	29	21	8	11	10	9	17	14
	WAREHOUSE	1989 %	11	34	23	8	13	11	9	21	15
	WAREHOUSE	89 - 84 %	1	5	2	-0	2	1	0	3	1

Explanation of Terms
INVESTMENT INTENSITY: firms are split into 2 groups based on 1984-89 avg annual invest / sales 1989
EMPLOYMENT CHANGE CATEGORY: firms are split between those with increasing and decreasing employment
VA/SALES: ratio of value added to shipments;
WAREHOUSE: ratio of non-manufacturing revenue to total revenue

Source: Business & Trade - Analysis & Integration Group / Statistics Canada

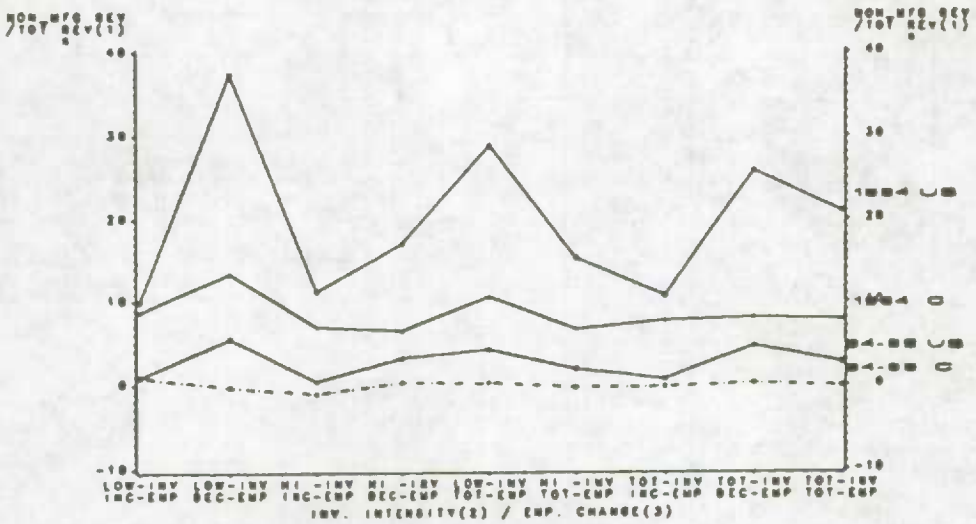
GRAPH 8A: NON-MANUFACTURING REVENUE / TOTAL REVENUE(1) BY INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS, IN 1984, 1988 & CHANGE BETWEEN 1984 & 1988.



(1): Non-manufacturing revenue is mainly from sale of goods purchased for resale.
(2): INV.INT: is average investment intensity which is average 1983-88 investment / 1988 sales.
(3): EMP.CHG: corporate firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

GRAPH 8B: NON-MANUFACTURING REVENUE / TOTAL REVENUE(1) BY COUNTRY OF CONTROL, INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS.



(1): Non-manufacturing revenue is mainly from sale of goods purchased for resale.
(2): INV.INT: is average investment intensity which is average 1983-88 investment / 1988 sales.
(3): EMP.CHG: corporate firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

3. Average Annual Earnings and Employment Composition

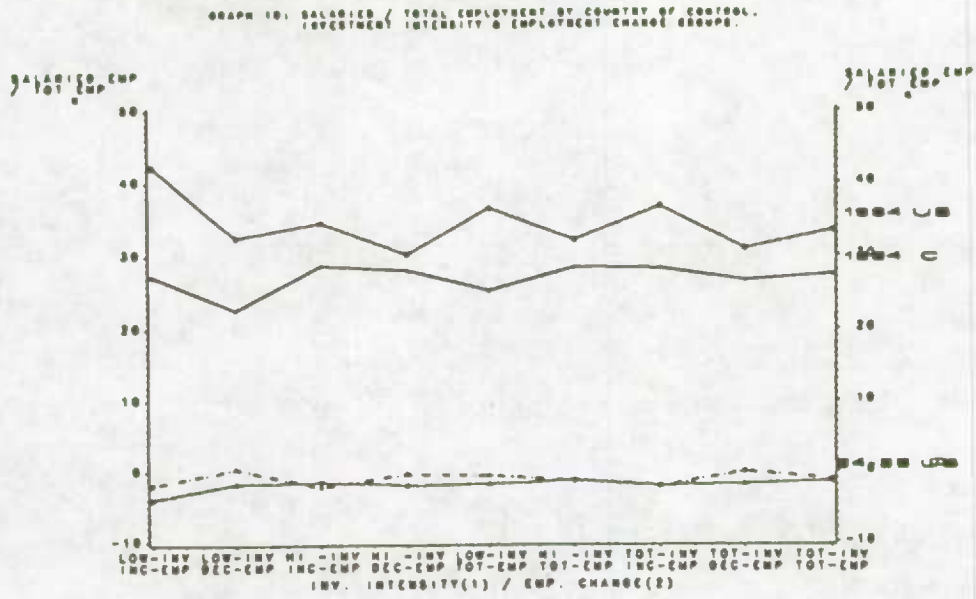
It is seen from Table 7 that there is little variation in the share of salaried to total employment among the four employment change/investment cohorts. In total about 30% of all employment was salaried in 1984 and it dropped slightly to 29% in 1989. Graph 10 shows 4.5 firms overall have about 6% more salaried employees on average and the differential is widest for the low investment/declining employment group (42% US versus 27% Canadian - a 15% point difference).

TABLE 7: AVERAGE ANNUAL EARNINGS AND IMPORTANCE OF SALARIED WORKERS BY INVESTMENT INTENSITY, EMPLOYMENT CHANGE, AND COUNTRY OF CONTROL, 1984 - 1989.

COUNTRY OF CONTROL			INVESTMENT INTENSITY								
			LOW			HIGH			TOTAL		
			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY		
			INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL
CANADIAN	SAL/T.EMP	1984 %	27	23	25	29	28	28	28	27	27
	SAL/T.EMP	1989 %	25	23	25	26	28	27	26	26	26
	SAL/T.EMP	89 - 84 %	-2	0	-1	-2	-0	-1	-2	-0	-1
	AVG EARNGS	1984 $000s	23	21	22	27	28	28	26	26	26
	AVG EARNGS	1989 $000s	28	28	28	33	37	35	31	34	33
	AVG EARNGS	89 - 84 %	21	32	26	24	29	26	22	31	25
U.S.	SAL/T.EMP	1984 %	42	33	37	35	30	32	37	31	33
	SAL/T.EMP	1989 %	38	31	35	33	28	31	35	29	32
	SAL/T.EMP	89 - 84 %	-4	-2	-2	-1	-2	-1	-2	-2	-1
	AVG EARNGS	1984 $000s	27	29	28	28	31	30	27	31	29
	AVG EARNGS	1989 $000s	33	38	35	34	41	38	34	40	37
	AVG EARNGS	89 - 84 %	25	29	26	24	32	27	24	31	26
TOTAL	SAL/T.EMP	1984 %	33	28	31	31	30	30	32	29	30
	SAL/T.EMP	1989 %	30	28	29	29	28	29	30	28	29
	SAL/T.EMP	89 - 84 %	-3	-0	-1	-2	-1	-1	-2	-1	-1
	AVG EARNGS	1984 $000s	25	25	25	27	29	28	26	28	27
	AVG EARNGS	1989 $000s	30	33	31	34	39	36	33	37	34
	AVG EARNGS	89 - 84 %	22	32	25	24	31	26	23	31	26

Explanation of Terms
INVESTMENT INTENSITY: firms are split into 2 groups based on 1984-89 avg annual invest / sales 1989
EMPLOYMENT CHANGE CATEGORY: firms are split between those with increasing and decreasing employment
SAL/T.EMP: ratio of salaried to total employment
AVG EARNGS: average annual earnings

Source: Business & Trade - Analysis & Integration Group / Statistics Canada



Average annual earnings among both investment groups are higher and rising faster among firms with declining employment, relative to increasing employment firms. Conversely, employment is growing in firms with lower and slower growing average annual earnings. If higher paying jobs are 'better' jobs, they are the jobs being lost. Firms with higher investment and declining employment have the highest and fastest growing earnings. This evidence is consistent with the story that as firms become more capital intensive they use relatively less labour, but they become more technically complex thus pushing up average wages and salaries for the fewer remaining employees. U.S. controlled firms on average pay about $3,000 more than Canadian controlled firms, but the structure among the employment-investment cohorts is virtually identical.

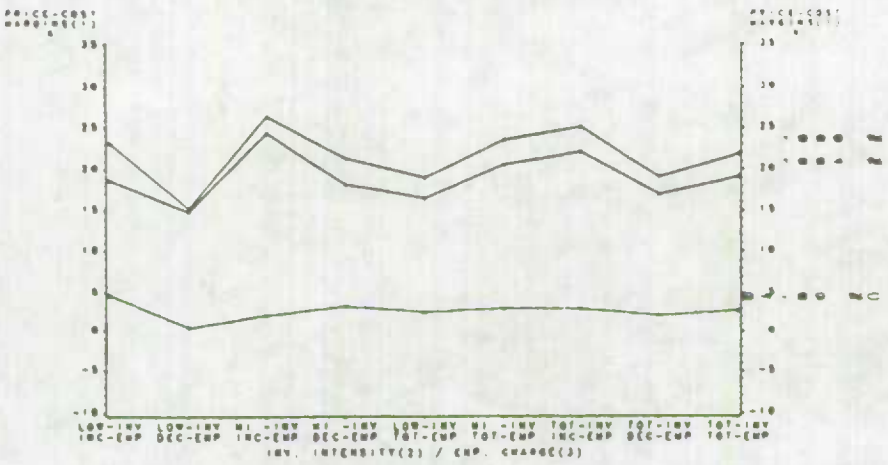
4. Efficiency

The concluding characteristics which were analyzed deal with the impact of employment changes and investment intensity on the efficiency of firms. Two dimensions of efficiency have been used here. The more straight-forward measure is labour productivity computed as value-added/employee. The other, termed a price-cost margin, is designed to proxy firm profitability. This is the closest possible proxy using establishment-based data. It is defined as value-added[16] minus the value of wages and salaries divided by revenue. The

16. Value-added itself is revenue plus net change in inventories minus the cost of fuel, electricity and materials.

GRAPH 11A PRICE-COST MARGINS(1) BY COUNTRY OF CONTROL,
INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS

-- TOTAL ALL FIRMS --

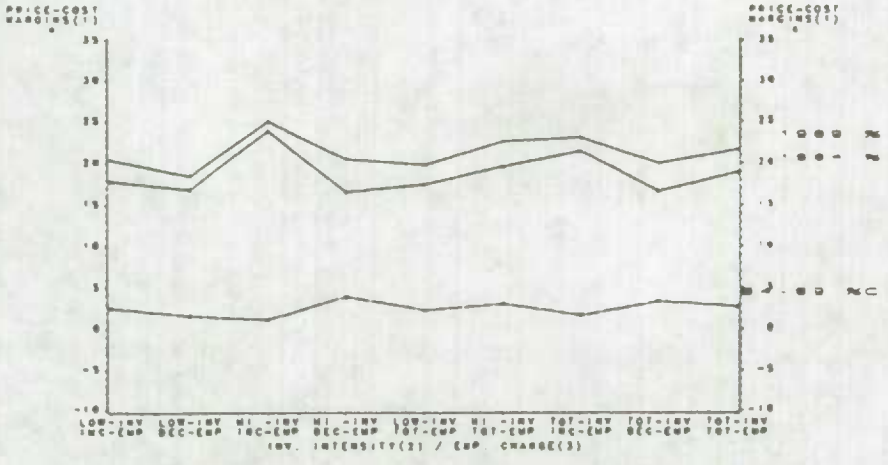


(1) PRICE-COST MARGIN is (value-added minus wages & salaries) / sales x 100
(2) INV.INT. is average investment intensity ratio in sectors 1983-85 investment / 1980 sales
(3) EMP.CHG. separates firms into increasing & decreasing employment from 1980 to 1988

Source: Business & Trade / Analysis & Integration, Statistics Canada

GRAPH 11B PRICE-COST MARGINS(1) BY COUNTRY OF CONTROL,
INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS.

-- CANADIAN CONTROLLED FIRMS --

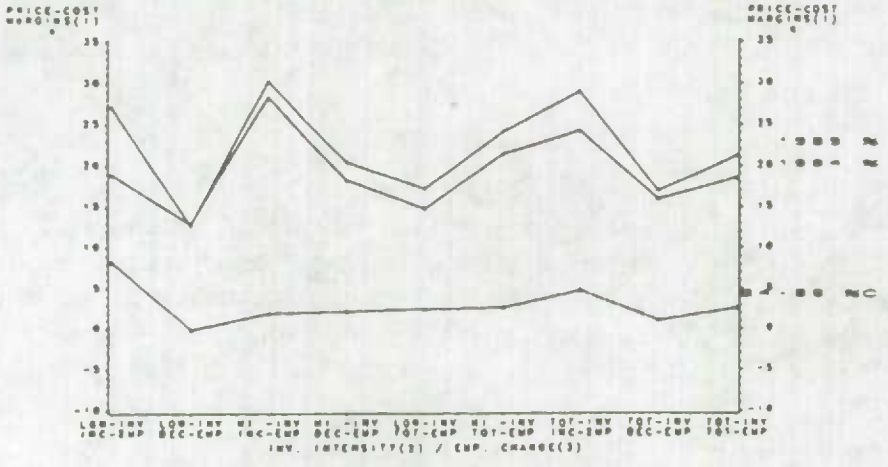


(1) PRICE-COST MARGIN is (value-added minus wages & salaries) / sales x 100
(2) INV.INT. is average investment intensity ratio in sectors 1983-85 investment / 1980 sales
(3) EMP.CHG. separates firms into increasing & decreasing employment from 1980 to 1988

Source: Business & Trade / Analysis & Integration, Statistics Canada

GRAPH 11C PRICE-COST MARGINS(1) BY COUNTRY OF CONTROL,
INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS.

-- U.S. CONTROLLED FIRMS --



(1) PRICE-COST MARGIN is (value-added minus wages & salaries) / sales x 100
(2) INV.INT. is average investment intensity ratio in sectors 1983-85 investment / 1980 sales
(3) EMP.CHG. separates firms into increasing & decreasing employment from 1980 to 1988

Source: Business & Trade / Analysis & Integration, Statistics Canada

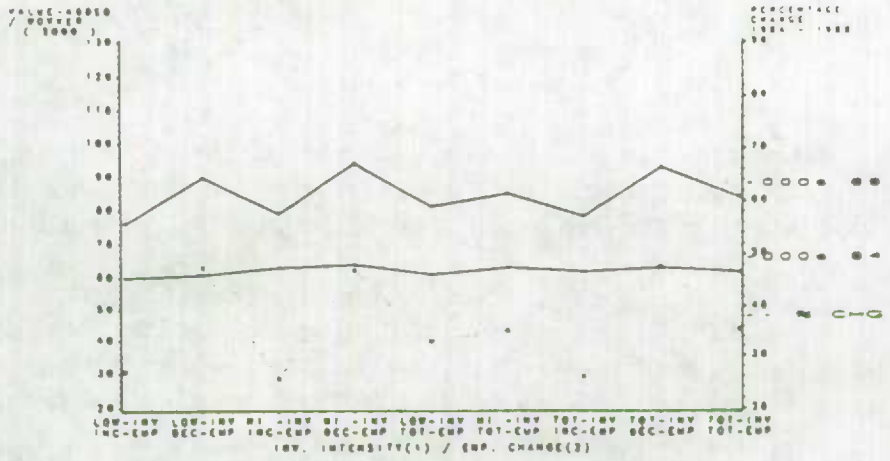
numerator includes a return to capital employed, certain other expenses not captured in this survey such as advertising costs, and residually profits. Accepting its limitations, it is nevertheless presented as a proxy for firm profitability. These measures are found in Table 8.

Dealing with price-cost margins first, they are seen from Graph 11A to be higher for both the high investment and increasing employment groups than their opposite counterparts. There is a slight positive growth in these margins in 1989 over 1984, but they don't vary much across these cohorts. These two factors reinforce each other with the high investment/increasing employment group exhibiting the highest margins and the low investment/declining employment group the lowest margins. From Graphs 11B and 11C showing Canadian and U.S. firms' results, it can be seen that both groups have the same average margins overall. However, the differences noted among the four cohorts, while still present in each control group, are much more pronounced for the U.S. relative to the Canadian controlled firms.

Turning to labour productivity, as shown in Graphs 12A, -B,& -C, it would be expected a priori that high investment firms would have higher initial levels and faster growing productivity, as would firms with increasing compared to those with declining employment. From Graph 12A it is seen that there is very little difference in 1984 among the four groups, while firms with declining employment have faster growing productivity (48% vs 25%) contrary to initial expectations. This means that firms which restructure and shed labour improve their productivity more than growing firms. Looking even further beneath the surface, U.S. firms have both higher initial levels and faster growing productivity than their Canadian controlled counterparts, as seen from Graphs 12C and 12B. Between these two groups the pattern of productivity growth rates among the four investment/employment change cohorts was the same; however, their initial 1984 levels are completely opposite one another, which results in the flat line for all firms when they are combined together. This may be because foreign firms are predominantly large firms, while the Canadian group includes many smaller sized firms. Were the comparison restricted to large firms some of this 1984 difference might disappear.

GRAPH 12A. VALUE-ADDED / WORKER BY COUNTRY OF CONTROL,
BY INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS

-- TOTAL ALL FIRMS --

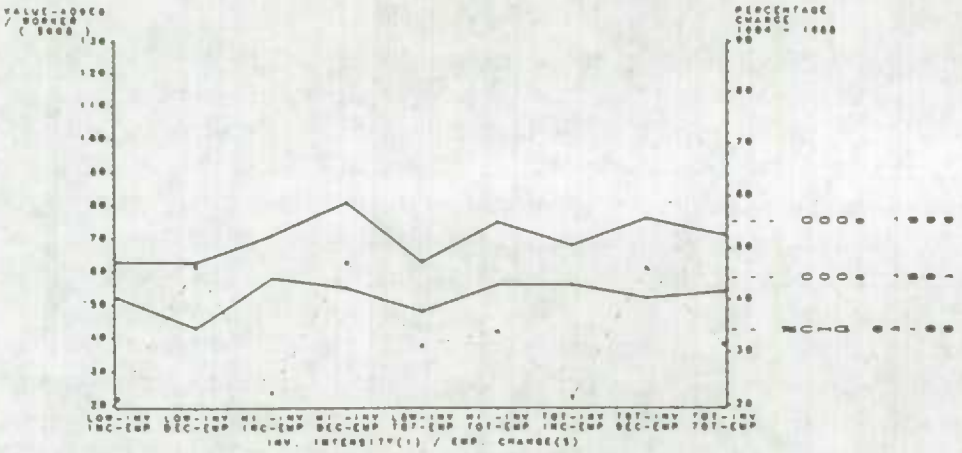


(1): INV.INT. is average investment intensity which is average 1984-88 investment / 1988 sales.
(2): EMP.CHG. indicates firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

GRAPH 12B. VALUE-ADDED / WORKER BY COUNTRY OF CONTROL,
BY INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS

-- CAN CONTROLLED FIRMS --

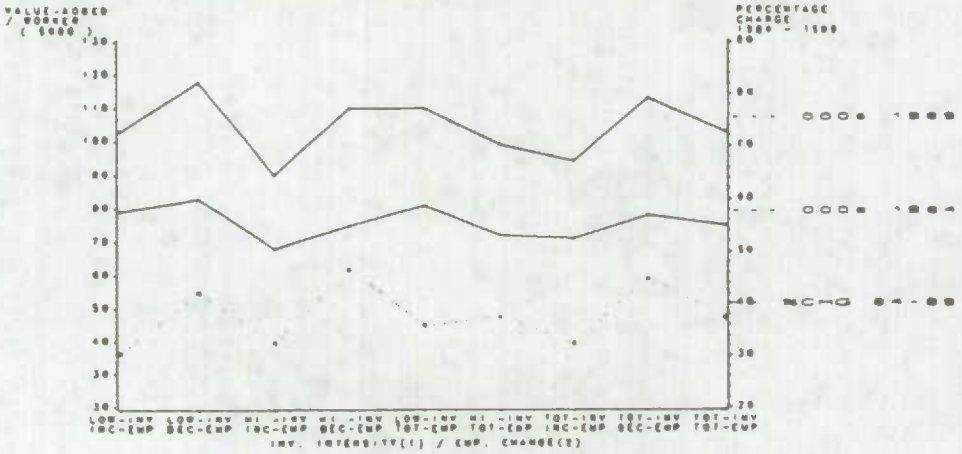


(1): INV.INT. is average investment intensity which is average 1984-88 investment / 1988 sales.
(2): EMP.CHG. indicates firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

GRAPH 12C. VALUE-ADDED / WORKER BY COUNTRY OF CONTROL,
BY INVESTMENT INTENSITY & EMPLOYMENT CHANGE GROUPS.

-- US CONTROLLED FIRMS --



(1): INV.INT. is average investment intensity which is average 1984-88 investment / 1988 sales.
(2): EMP.CHG. indicates firms with increasing & decreasing employment from 1984 to 1988.

Source: Business & Trade / Analysis & Integration, Statistics Canada.

TABLE 8: PRICE-COST MARGINS AND VALUE-ADDED PER EMPLOYEE
BY INVESTMENT INTENSITY, EMPLOYMENT CHANGE, AND COUNTRY OF CONTROL, 1984 - 1989.

COUNTRY OF CONTROL			INVESTMENT INTENSITY								
			LOW			HIGH			TOTAL		
			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY			EMPLOYMENT CHANGE CATEGORY		
			INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL	INCR.	DECR.	TOTAL
CANADIAN	C. MARGIN	1984 %	18	17	17	24	17	20	21	17	19
	C. MARGIN	1989 %	20	18	20	25	20	23	23	20	22
	C. MARGIN	89 - 84 %	3	2	2	1	4	3	2	3	3
	VA/ EMP	1984 $000s	52	43	48	58	55	56	56	52	54
	VA/ EMP	1989 $000s	63	63	63	71	81	75	68	76	71
	VA/ EMP	89 - 84 %	21	47	31	22	47	34	21	46	31
U.S.	C. MARGIN	1984 %	19	13	15	28	18	21	24	16	19
	C. MARGIN	1989 %	27	13	17	30	20	24	29	17	21
	C. MARGIN	89 - 84 %	8	-0	2	2	2	3	5	1	3
	VA/ EMP	1984 $000s	79	83	81	68	75	72	71	78	75
	VA/ EMP	1989 $000s	103	118	110	90	110	99	94	113	103
	VA/ EMP	89 - 84 %	30	42	36	32	47	38	32	45	37
TOTAL	C. MARGIN	1984 %	19	15	16	24	18	21	22	17	19
	C. MARGIN	1989 %	23	15	19	26	21	24	25	19	22
	C. MARGIN	89 - 84 %	5	0	3	2	3	3	3	2	3
	VA/ EMP	1984 $000s	60	61	61	63	64	63	62	63	62
	VA/ EMP	1989 $000s	76	90	81	79	94	85	78	93	84
	VA/ EMP	89 - 84 %	27	48	33	25	47	35	26	48	35

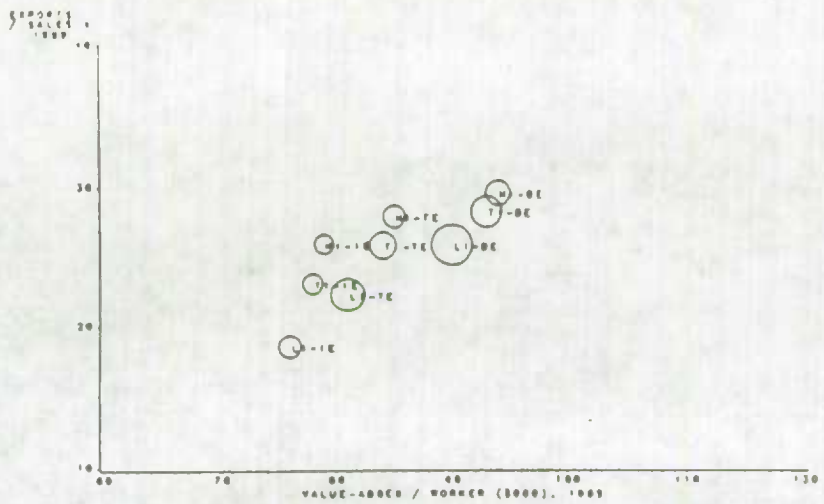
Explanation of Terms
INVESTMENT INTENSITY: firms are split into 2 groups based on 1984-89 avg annual invest / sales 1989
EMPLOYMENT CHANGE CATEGORY: firms are split between those with increasing and decreasing employment
C. MARGIN: price-cost margin is (value-added - wages & salaries) / total revenue
VA / EMP: is value-added per employee

Source: Business & Trade - Analysis & Integration Group / Statistics Canada

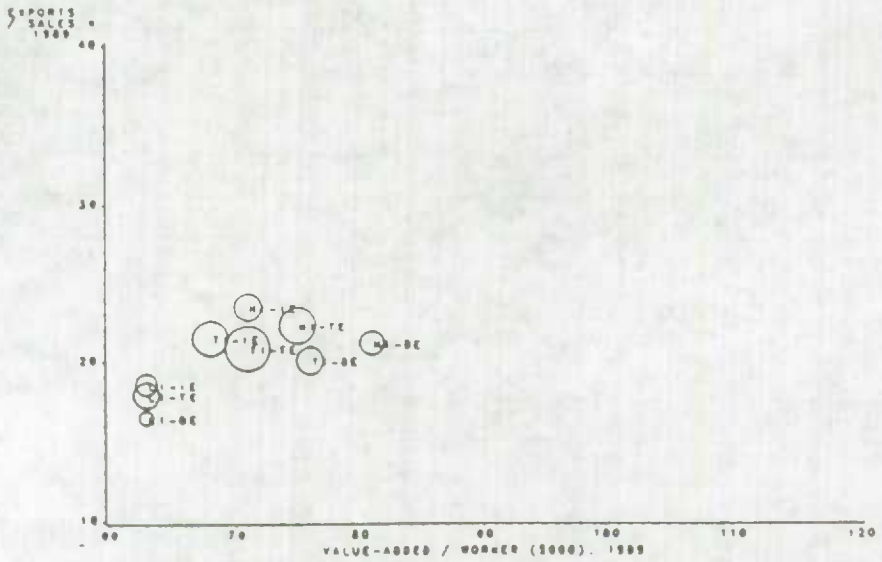
To conclude the analysis, a brief example is presented which inter-relates several of the dimensions discussed separately. Graphs 13 A, B, and C plot export intensity in 1989 against value-added/worker in 1989 for each of the four investment / employment cohorts and associated sub-totals. The diameter of the circle drawn varies with the size of the ratio of non-manufacturing revenue to total revenue in 1989. The three panels cover all firms, Canadian, and U.S. controlled firms. Graph 14 is essentially the same except the axes represent the percentage difference in the respective ratios between 1984 and 1989.

GRAPH 13. EXPORT INTENSITY & VALUE ADDED PER WORKER, BY CATEGORIES OF FIRM INVESTMENT INTENSITY & EMPLOYMENT CHANGE FOR TOTAL MANUFACTURING, 1988

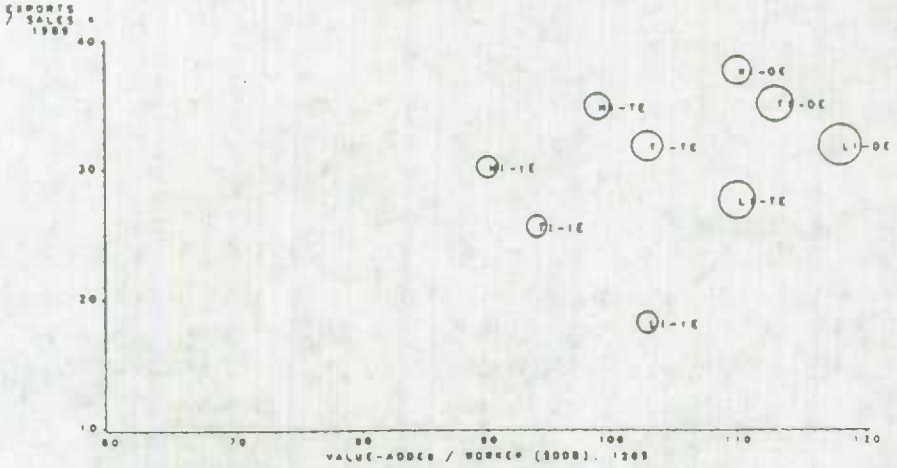
-- TOTAL ALL FIRMS --



-- CANADIAN CONTROLLED FIRMS --



-- U.S. CONTROLLED FIRMS --

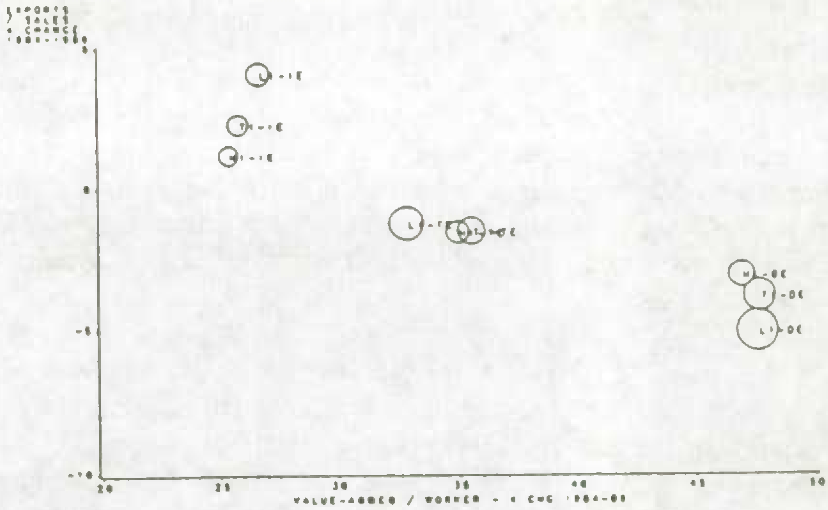


NOTE: The bubbles are based on ratio of exports revenues / total revenues, 1988. Firms are divided into groups with high, low & total gross investment between 1984 & 1988 and with increasing, decreasing & total employment over this same period.

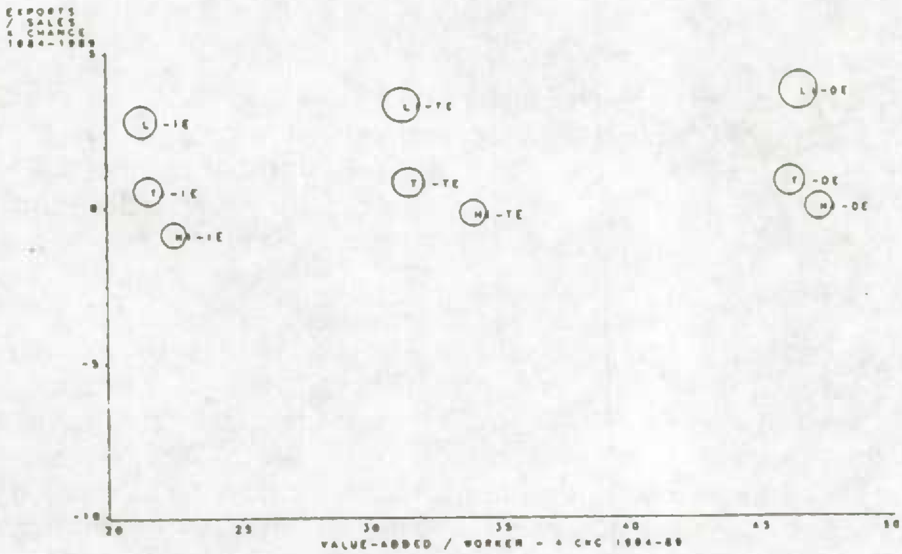
Source: Business & Trade / Analysis & Integration, Statistics Canada

GRAPH 16 PERCENTAGE CHANGES BETWEEN 1984 & 1989 IN
EXPORT INTENSITY & VALUE ADDED PER WORKER
BY CATEGORIES OF FIRM INVESTMENT INTENSITY & EMPLOYMENT CHANGE

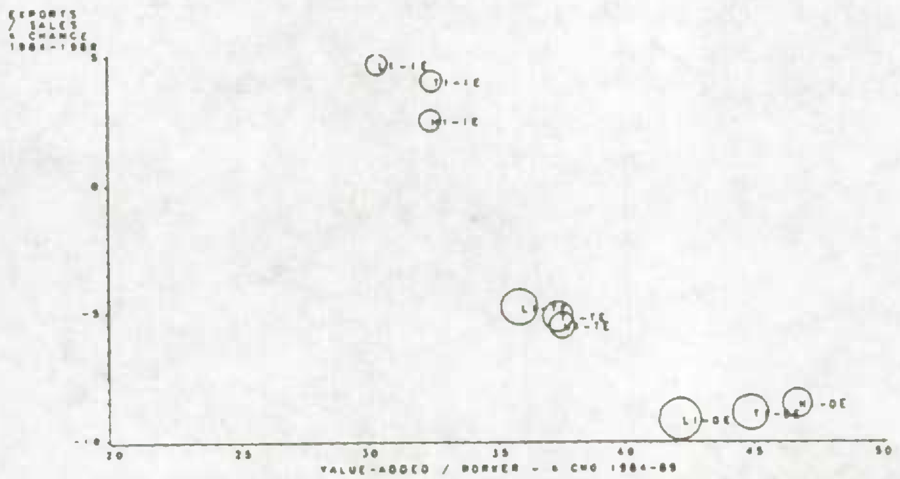
-- TOTAL ALL FIRMS --



-- CANADIAN CONTROLLED FIRMS --



-- U.S. CONTROLLED FIRMS --



NOTE: The bubbles size are based on the ratio of non-mfg revenues / total revenues, 1989. Firms are divided into groups with High, Low & Total avge investment between 1984 & 1989 and with INCreasing, DECreasing & TOTal Employment over this same period.

Source: Business & Trade / Analysis & Integration, Statistics Canada

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From Graph 13, the points in the US panel lie largely to the right and above those of the Canadian panel. Within the US panel, holding investment intensity constant, it is seen that firms with increasing employment have both lower export and productivity levels than comparable firms with declining employment. A different set of results emerges from the Canadian panel, where among the high investment firms the increasing employment firms have higher exports but lower productivity, while the declining firms in the high investment group have the reverse.

In the U.S. panel of Graph 14, the low investment/declining employment cohort, which as was noted earlier had a very high and faster growing ratio of non-manufacturing revenues, also had the weakest export performance, despite exhibiting sharp improvements in labour productivity. More could be read into these charts, but perhaps multivariate regression analysis controlling for firm size and industry would be better recommended at this point.

CONCLUSION

Through the use of longitudinal analysis and a number of cross-classifications, it has been possible to show that there are many interesting developments taking place under the surface, which are not evident when simply comparing aggregates at two different points in time. A number of dimension such as employment change, investment intensity, and export orientation have been seen to vary considerably by country of control, industry and region.

This database has been shown to be a rich source of analytical material with which to evaluate various events taking place that impact Canadian manufacturing, such as the recent F.T.A.. When this base is updated, future adjustments and restructuring can be compared with the 1984-1989 period, to assess its relative impact. Further breakdowns could be made, singling out various cohorts, such as the biggest employment gainers and losers. Multivariate regression analysis could be employed to gain further insights into the interplay among the various characteristics discussed here. As was noted, since foreign firms are mainly large, a better comparison of Canadian and U.S. firms would be obtained by restricting some of the analysis to large firms. In addition to updating the years covered in this base, additional investment detail and other series such as R&D expenditures could be usefully merged at the firm-level to widen the analytical possibilities still further. This study has shown the usefulness of longitudinal analysis at the individual firm level. It has demonstrated that many new insights can be gained by probing under the surface of aggregates.