Changing Industrial Structure
Calgary

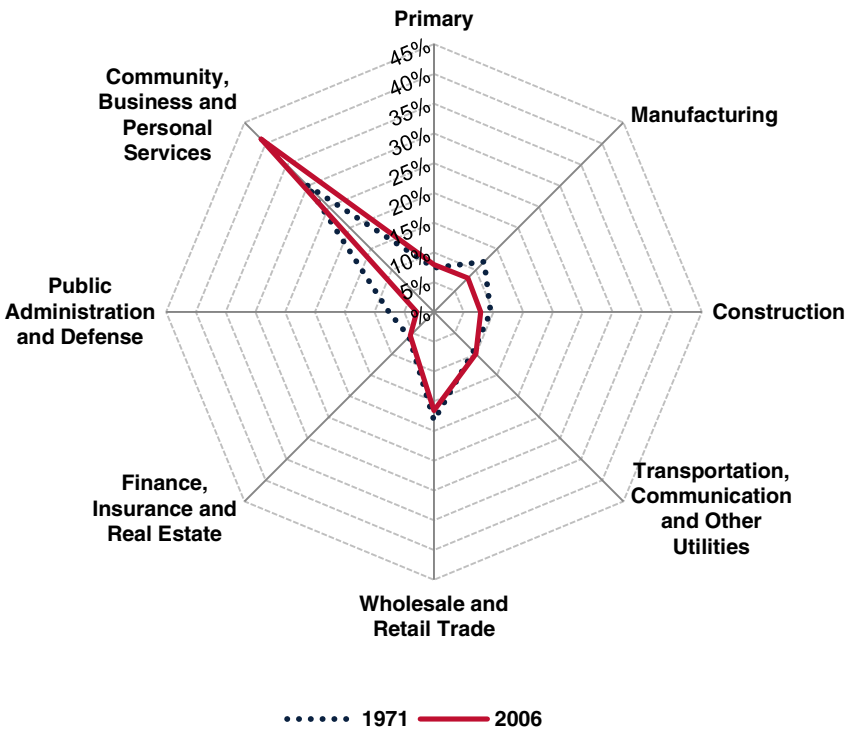
Figure 1 shows the broad shifts in the industrial composition of the regional economy. Most notably, service-based industries continues to be the dominant industrial sector in Calgary, increasing its share of the workforce from 30% in 1971 to 41.1% in 2006. By contrast, the share of employment in public administration and defense declined from 7.6% to 2.9% between 1971 and 2006.

Manufacturing also witnessed a decline from 12% of the workforce to 8.1% by 2006. The wholesale and retail trade, construction, and FIRE sectors all experienced moderate growth rates. Employment more than doubled the number employed between 1971 and 2006 in all three sectors.

The transportation, communications and other utilities sector witnessed moderate changes in its proportionate share through this time, increasing to 10% of the overall structure by 2006, while at the same time experiencing strong annual employment growth.

Primary industries experienced strong annual employment growth (4.2% annually), alongside an increase in the share of employment, growing from 7.4% in 1971 to 8% by 2006.

Figure 1: Change in industrial structure, 1971-2006



Source: Statistics Canada, Census of Population, 1971 and 2006

Table 1: Employment by industry, 1971-2006

	1971	1981	1991	2001	2006	1971-2006	CAGR
Primary	12,285	32,835	37,705	35,917	51,623	39,338	4.2%
Manufacturing	19,830	34,025	36,580	54,041	52,334	32,504	2.8%
Construction	15,825	40,615	31,040	38,385	50,773	34,948	3.4%
Transp., Comm. & Other Utilities	15,560	29,420	36,420	58,141	64,533	48,973	4.1%
Wholesale & Retail Trade	30,215	59,180	76,010	95,599	106,916	76,701	3.7%
Finance, Insurance & Real Estate	9,755	25,230	28,630	32,298	36,303	26,548	3.8%
Public Administration & Defense	12,560	19,025	23,500	15,729	18,722	6,162	1.1%
Community, Business & Personal Services	49,835	106,860	167,090	228,605	265,634	215,799	4.9%
Total	**165,865**	**347,190**	**436,975**	**558,716**	**646,838**	**480,973**	**4.0%**

CAGR = Compound Annual Growth Rate
Source: Statistics Canada, Census of Population, 1971-2006

Data Sources
Due to changes in industrial and occupational classification schemes, there are analytical challenges in ensuring that the data are comparable over time. Thus, the data in this report are often presented in aggregate form and for varying time periods. Long term structural change (1971 to 2006) is evaluated using Census data using eight industrial and occupational groups to ensure consistency. *Labour Force Survey* (LFS) data are only available from 1987 onwards. These data can only be used reliably at high levels of aggregation due to the nature of the LFS sampling frame. Cluster analysis relies on detailed 4-digit codes from the North American Industrial Classification System (NAICS). Such employment data are only available from the 2001 and 2006 *Census of Population*, due to changes in the classification scheme. Detailed occupational data from the Census are comparable from 1991 onwards.

Manufacturing Dynamics
Calgary

Figure 2 compares employment in the manufacturing industries to the overall employed labour force in Calgary over the period between 1987 and 2010. Employment is indexed to 100 in the base year (1987) to allow for easier comparison of their relative growth performance over time.

Figure 2 shows that the level of employment in manufacturing has fluctuated over time.

After a slight downturn in the early 1990s, manufacturing employment increased throughout the 1990s and 2000s, growing faster than the economy as a whole. After peaking in 2000, employment in manufacturing has fluctuated, but remains above 1987 levels.

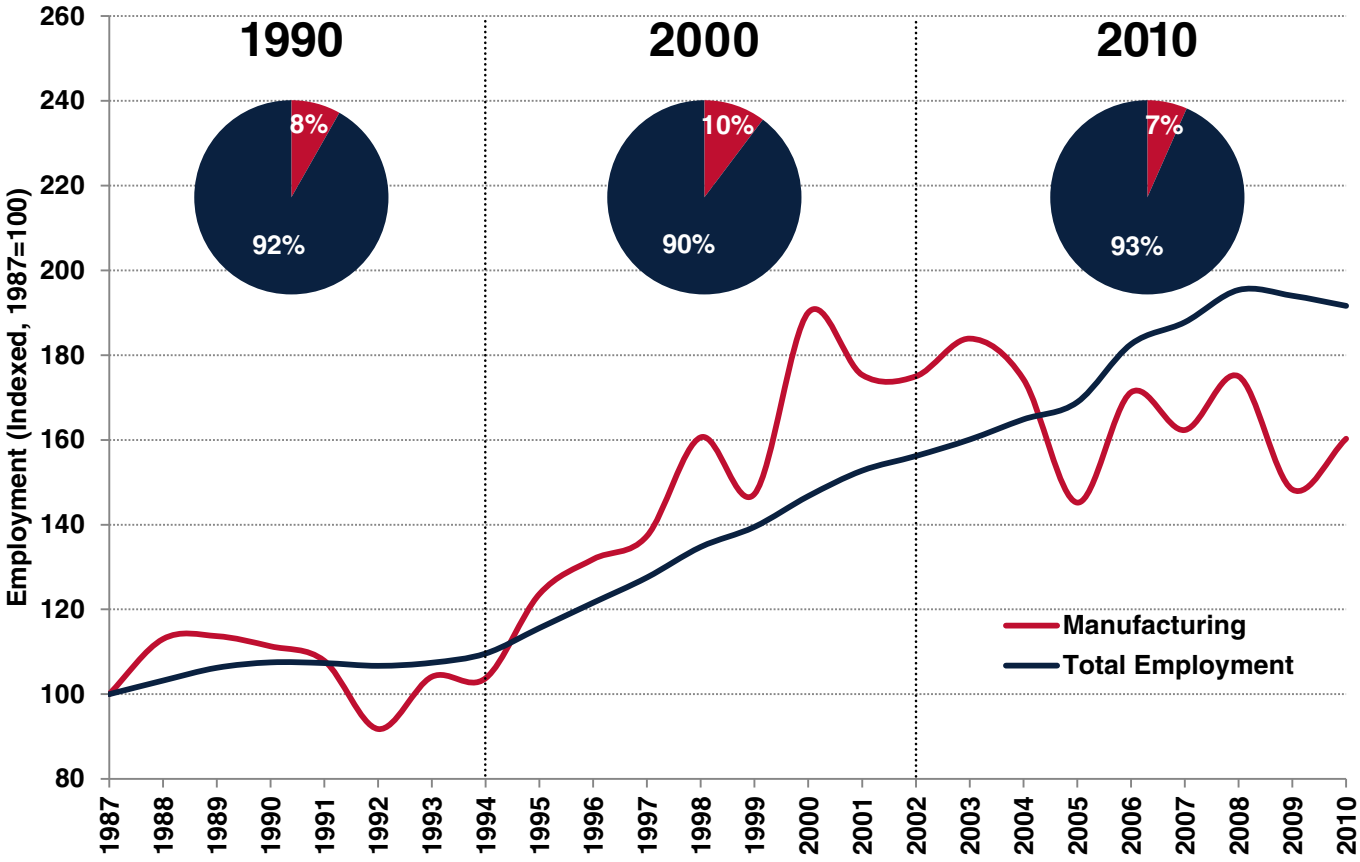
Given the diversification outside of manufacturing, a more detailed examination of the regional economy is warranted. Table 2 shows employment in eighteen industrial groups in 2001 and 2006. While there are high levels of growth and employment in the oil and gas, creative and cultural, and higher education industries, growth performance and levels of specialization vary across sectors. These industrial groups, when demonstrating sufficient size, scope and specialization form the basis of clusters in the regional economy (see next page).

Table 2: Employment by industrial group, 2001 and 2006

Industrial Group	2001	2006
Agriculture	14,820	14,970
Mining	14,675	21,205
Oil and Gas	32,745	48,425
Wood & Wood Products	4,685	4,730
Maritime	1,020	1,010
Textiles & Apparel	1,585	1,340
Food	14,865	15,940
Steel	10,115	11,905
Automotive	4,595	5,340
Plastics & Rubber	8,285	9,660
Biomedical	4,650	5,665
ICT Manufacturing	10,405	8,395
ICT Services	31,420	35,820
Finance	34,495	40,835
Business Services	73,685	90,965
Creative & Cultural	17,910	24,550
Higher Education	14,090	20,365
Logistics	34,980	38,245

Source: Statistics Canada, Census of Population, 2001 and 2006

Figure 2: Manufacturing Employment, 1987-2010 (1987=100)



Source: Statistics Canada, Labour Force Survey, 1987-2010 [custom tabulations]

Cluster Dynamics
Calgary

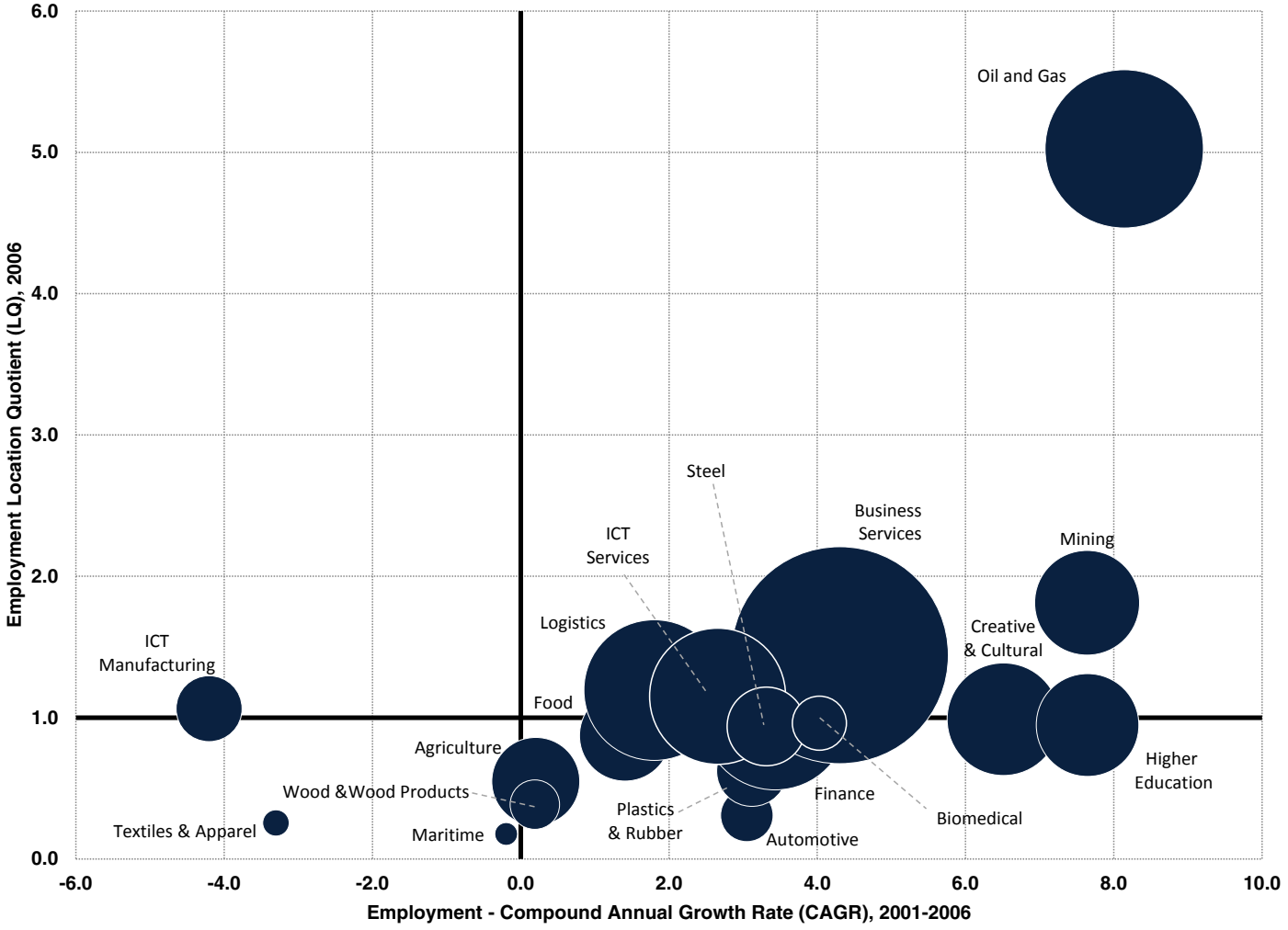
Figure 3 depicts a 'bubble chart' comparing the performance eighteen industrial groups (or clusters) in Calgary. The horizontal axis shows the employment growth rate between 2001 and 2006. The vertical axis shows the employment location quotient comparing the proportion of Calgary's employment in an industrial sector to the Canadian average. The diameter of each 'bubble' is proportional to employment in the specified industrial group in 2006. Industrial groups that appear in the upper-right quadrant have positive growth rates and have a higher-than expected proportion of employment (specialization) in this group of industries.

A more sophisticated analysis of industrial structure involves cluster analysis. Clusters represent groups of inter-related firms and industries that gain competitive advantage by concentrating geographically in certain locations. In this report, industrial groups that meet a set of quantitative criteria are identified as clusters. Clusters are identified based on their relative size (employment), their relative specialization (location quotient), as well as the breadth or scope of activities undertaken in the region.[1]

According to these criteria, in 2006, there were six clusters in the Calgary region: oil and gas, ICT manufacturing, ICT services, finance, business services, and logistics. With the exception of ICT manufacturing, all of these clusters experienced employment growth between 2001 and 2006. Additionally, mining demonstrated high levels of growth between 2001 and 2006.

1. For a more detailed description of the methodology, see: Spencer, G. M., Vinodrai, T., Gertler, M. S., & Wolfe, D. A. (2010). Do Clusters Make a Difference? Defining and Assessing their Economic Performance. *Regional Studies, 44*(6), 697–715.

Figure 3: Cluster growth and specialization, 2001-2006



Source: Statistics Canada, Census of Population, 2001 and 2006

Changing Occupational Structure
Calgary

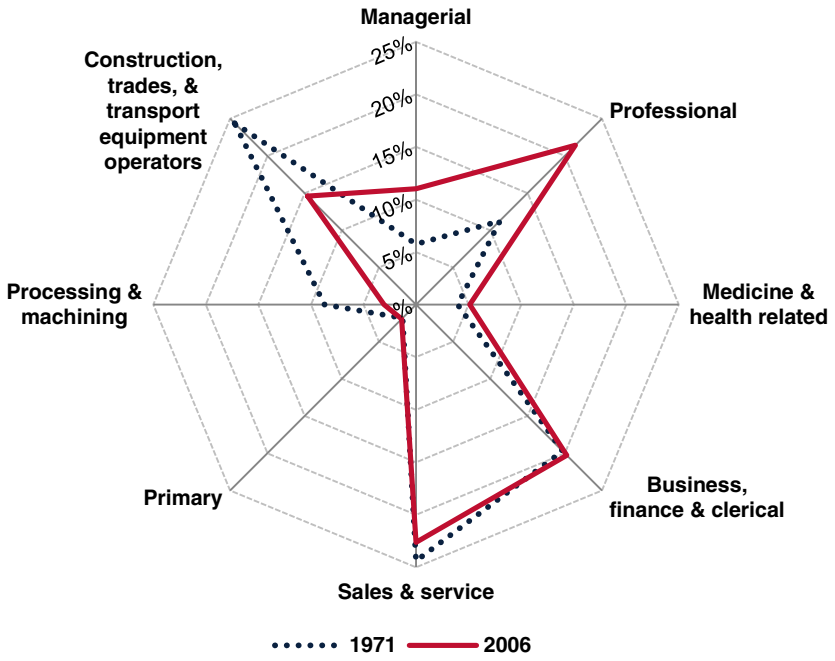
In addition to a broad shift in the industrial composition of the regional economy, Calgary's workforce has undergone a substantial transition in the forms of work over the past 25 to 30 years. Figure 4 shows the broad shifts in the occupational composition of the regional economy.

Most notably, the proportion of employment accounted for by construction, trades and other related occupations has decreased from 24.4% of the workforce in 1971 to 14.6% in 2006. Similarly, employment in processing and machining occupations decreased from 8.7% to 3% in the same time period.

By contrast, employment in professional occupations increased from 11.3% to 21.4% between 1971 and 2006. A similar pattern is apparent in managerial occupations. The share of employment in managerial occupations nearly doubled from 5.8% in 1971 to 11% of the workforce by 2006. Medicine and health-related occupations saw strong annual growth (4.5% annually), though only accounted for 5.1% of the workforce by 2006 (Table 4).

Modest gains in business, finance and clerical occupations mirror the slight decline in sales and service occupations: the former increased from 19.7% in 1971 to 20.3% by 2006, while the latter declined slightly from 24.4% of the workforce to 22.6% in the same period.

Figure 4: Change in occupational structure, 1971-2006



Source: Statistics Canada, Census of Population, 1971 and 2006

Table 4: Employment by occupation, 1971-2006

	1971	1981	1991	2001	2006	1971-2006	CAGR
Managerial	10,245	40,570	58,760	68,445	72,100	61,855	5.7%
Professional	20,035	49,215	67,125	113,610	140,010	119,975	5.7%
Medicine & health related	7,030	12,310	19,740	25,815	33,355	26,325	4.5%
Business, finance & clerical	35,095	76,380	87,350	113,915	132,355	97,260	3.9%
Sales & service	43,390	72,945	107,470	131,130	147,810	104,420	3.6%
Primary	3,225	5,695	9,050	10,940	12,635	9,410	4.0%
Processing & machining	15,505	30,490	31,375	21,125	19,870	4,365	0.7%
Constr., trades, & transport equip. operators	43,470	59,605	56,115	79,070	95,370	51,900	2.3%
Total	**177,995**	**347,210**	**436,985**	**564,050**	**653,505**	**475,510**	**3.8%**

CAGR = Compound Annual Growth Rate
Source: Statistics Canada, Census of Population, 1971-2006

Emerging Knowledge Economy
Calgary

Figure 5 provides additional perspective on how the occupational composition of Calgary has changed over time. The share of employment in service-oriented jobs has declined at the same time that a mirror increase in knowledge-based occupations can been seen. Employment in service-oriented occupations peaked at 46% of the workforce in 1988, as knowledge-based work has increased in importance.

As Table 5 shows, employment in knowledge-based occupations increased at 3.8% per year between 1991 and 2006, strongly outpacing the region's overall employment growth rate of 2.8% per year. Also noteworthy is the steady proportion of employment accounted for by routine, production-oriented work. Employment in production-oriented jobs stayed close to around 18% throughout the period between 1987 and 2010. Not surprisingly, agricultural work accounted for only a fraction of employment throughout the period.

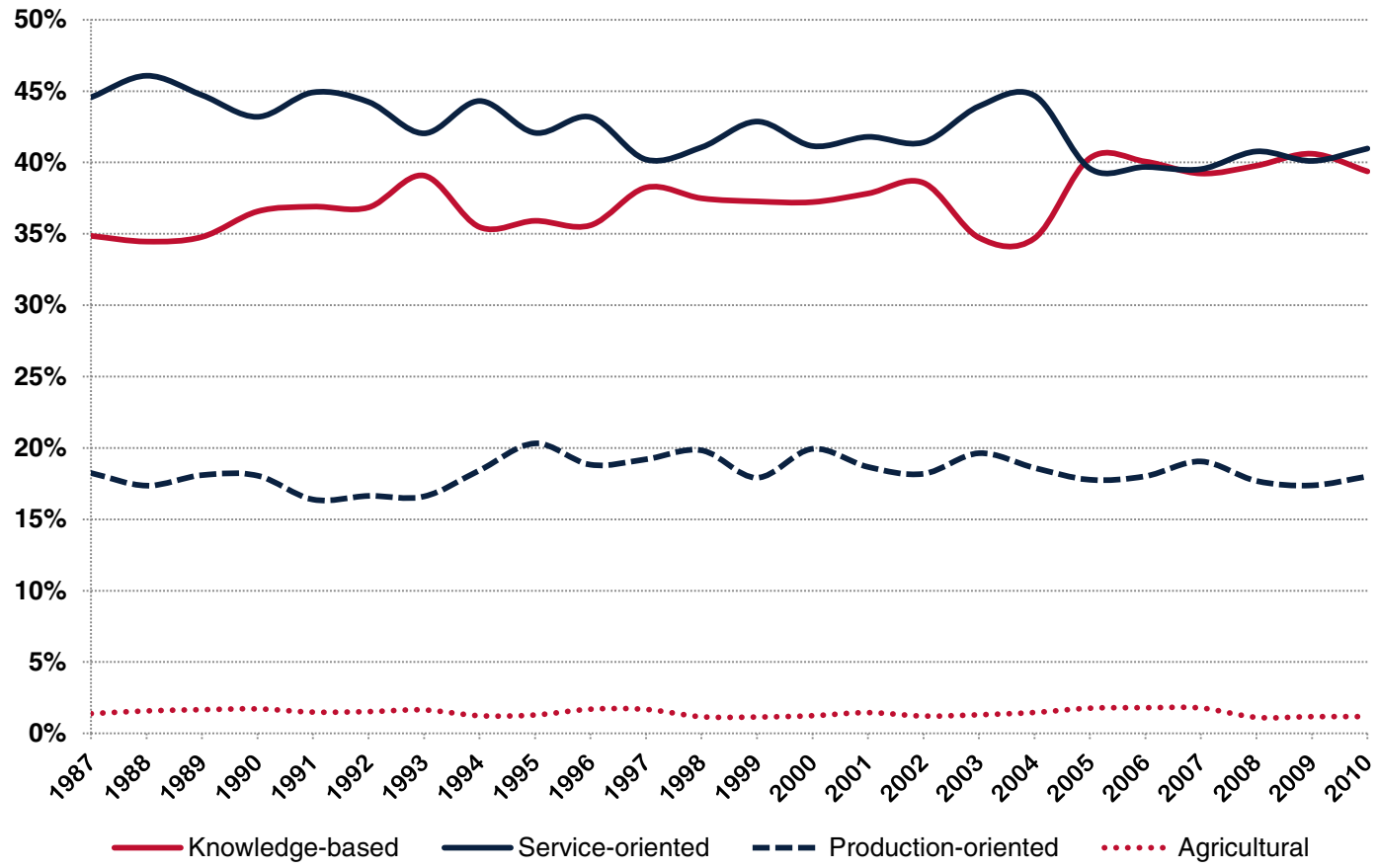
Table 5: Employment by occupation class, 1991-2006

	Agricultural occupations	Knowledge-based	Service-oriented	Production-oriented	Total Workforce
1991	5,705	150,790	201,705	78,780	**441,195**
1996	5,835	157,495	217,375	84,650	**473,190**
2001	6,480	220,890	232,035	104,650	**568,510**
2006	7,075	262,430	263,195	120,800	**658,510**
1991-2006	1,370	111,640	61,490	42,020	**217,315**
CAGR	1.4%	3.8%	1.8%	2.9%	**2.7%**

CAGR = Compound Annual Growth Rate

Source: Statistics Canada, Census of Population, 1991-2006 (custom tabulations)

Figure 5: Changing occupational composition of the labour force, 1987-2010



Source: Statistics Canada, Labour Force Survey, 1987-2010 [custom tabulations]