

Apprenticeship Completion, Certification and Outcomes

**CANADIAN
STANDARD
OF EXCELLENCE
FOR SKILLED TRADES**



red-seal.ca
sceau-rouge.ca

Key Terms Used in this Report

Apprentice	A person who works in a trade, occupation or craft under an agreement or contract and is registered with the Apprenticeship Authority. The apprentice learns the knowledge, skills, tools and materials of the trade, occupation or craft through on-the-job training and technical instruction under the supervision of a certified journeyperson.
Apprenticeship	A structured system of supervised training leading to certification in a designated trade, occupation or craft. It is systematic programs of on-the-job training supplemented by technical instruction in which an apprentice gains experiential learning and develop skills.
Apprenticeship Term (Nominal Duration)	The normal length of time required for a person to attain journeyperson status from the time of registration as an apprentice and is usually a combination of both formal training and work experience. The length of time is generally expressed in years and hours per year or in hours.
CANSIM	Canadian Socio-economic Information Management System. A database of tables from Statistics Canada surveys.
Certificate of Apprenticeship	A document issued to a person who has successfully completed a formalized apprenticeship training program.
Certificate of Qualification	A certificate issued to a candidate who has successfully completed an apprenticeship program or has met all the requirements of a trade <i>and</i> has attained the prescribed pass mark on the certification examination to qualify as a journeyperson in that trade.
Certification	The acquisition of a Certificate of Qualification or Apprenticeship.
Completion of Apprenticeship	The fulfilment of training requirements, both technical and on-the-job, by registered apprentices. Graduates of an apprenticeship program applicable to the trade and the province and territory will be issued a Certificate of Apprenticeship. In most cases, they will also receive a Certificate of Qualification.
Completer	An individual who has completed an apprenticeship program within a RAIS report year.
Compulsory trade	A trade in which people entering or working must possess a Certificate of Qualification or Certificate of Apprenticeship or register as apprentices with the provincial or territorial authorities. Those working in the trade prior to the compulsory requirement may be exempted by provincial or territorial legislation.

Continuer	An individual who, at the end of a RAIS report year, is registered as an apprentice and who has not completed the program
Discontinuer	An apprentice who terminates involvement in an apprenticeship training program prior to completion.
Journey person	A formally certified, fully skilled worker whose combined work experience and training satisfy all the requirements demanded of those who practice in a designated trade.
LFS	The Labour Force Survey. A monthly survey conducted by Statistics Canada that measures employment, unemployment, wages and other labour force characteristics. LFS data from 1991 to 2011 were used in this study to examine labour force trends.
Linked file(s)	A set of three files created by Statistics Canada which links data from income tax and immigration records with NAS 2007 and RAIS 2002-04 and 2008.
Long-term continuer	An apprentice who, at the end of a RAIS reporting year has been an apprentice for some designated period longer than the apprenticeship term. In NAS 2007 the designated period is defined as more than one and one-half times the apprenticeship term. In this study, the designated period is defined mainly as six or more years, since most apprenticeship terms are four years.
NAS 2007	The National Apprenticeship Survey. A national survey of apprentices conducted by Statistics Canada in 2007.
National Occupational Classification(NOC)	A document that classifies all occupations in Canada. They permit standardization of training and certification programs, and the mobility of tradespersons.
National Occupational Classification-Statistics(NOC-S)	A variation of the NOC classification used in some Statistics Canada surveys, with ten major letter-coded categories (A to J) followed by three digit codes. NOC and NOC-S may be interchanged using a concordance document.
Occupation	A set of skills that, with some variation, are similar in their main tasks or duties or in the type of work performed. The skills that comprise an occupation are considered together for the purposes of classification or setting of standards.
On-the-Job Training	The component or portion of an apprenticeship training program where apprentices spend time working on the job site learning the skills of the trade under the supervision of a journey person.
Top 10 Trades	The trades with the largest numbers of workers and also with large numbers of apprentices. For most sections of this report the Top 10 trades are: automotive service Technicians, carpenters, cooks, electricians, hairstylists/barbers, heavy-duty equipment mechanics, millwrights, machinists, plumbers/pipefitters/ steamfitters, welders. This varies slightly depending on the classifications available in the various data sources.

Red Seal	A nationally registered trademark symbol adopted for the Interprovincial Standards Program to signify interprovincial qualification of tradespersons at the journey person level. It is affixed to the provincial and territorial Certificates of Apprenticeship and Qualifications of those apprentices and tradespersons who have met the national standard in a Red Seal trade. The Red Seal is a passport that allows the holder to work anywhere in Canada without having to write further examinations.
Red Seal Designated Trade	A trade that has been designated by the Canadian Council of Directors of Apprenticeship (CCDA) for inclusion in the Interprovincial Standards Program. The training and certification are based on a national occupational standard, and provinces and territories are permitted to affix a Red Seal to the certificates of candidates who meet the standard.
Registered Apprenticeship Information System (RAIS)	A Statistics Canada individual-level database on registered apprentices and trade qualifiers compiled from administrative data provided by apprenticeship authorities in the provinces and territories.
Technical Training	The part of an apprenticeship training program that is delivered in-school, and includes theoretical aspects of the trade designed to supplement the skills acquired during on-the-job training. It makes up approximately 15 percent of the total apprenticeship training program.
Trade	An occupation for which a provincial or territorial apprenticeship program is available.
Trade Qualifier	A Trade Qualifier is an individual who has amassed sufficient practical work experience to meet the established criteria to attempt the certification journey level (provincial or interprovincial) examination. The criteria require relevant on-the-job experience of at least one year in excess of the apprenticeship term.
Voluntary Certification	A situation in which certification is available in a designated trade, but there is no legislated requirement that apprentices in a trade should be registered, or that workers engaged in the trade should be certified journeypersons.

Executive Summary

This project was commissioned by the Canadian Council of Directors of Apprenticeship (CCDA) as part of a three-year research plan. The research was conducted by four research groups selected from the apprenticeship authorities in several Canadian (provincial/territorial) jurisdictions and from Human Resources and Skills Development Canada (HRSDC), with advice from an independent researcher with experience in apprenticeship research and analysis of large scale survey data.

The purpose of this research was to develop a more comprehensive understanding of the relationship between apprenticeship completion, certification and outcomes. The main focus was on training and labour market outcomes, with a lesser emphasis on socio/demographic outcomes.

Previous research has shown that apprenticeship completion and certification conveys a substantial labour market premium. However, completion remains a challenge, with substantial numbers of apprentices remaining in their programs for longer than the nominal program duration and many others discontinuing. Statistics Canada studies have put the 10-year completion rate at about 50% for cohorts starting in the 1990s. However, until now, no more recent completion results have been available. Also, most studies of labour market outcomes have had to rely on broad educational credentials and self-reported indicators of labour market outcomes.

The unique contribution of this study stems from access to much more comprehensive training and labour market data than was previously available. The key data source was a series of three files constructed by Statistics Canada especially for this study, which linked data from the Registered Apprenticeship Information System (RAIS) to the main income tax return (T1FF) database. This yields much more definitive information on sources of income than any other data base, and provides a link between apprenticeship status and income. In addition, the researchers had access to comprehensive time-series tables from the Registered Apprenticeship Information System (RAIS) and the Labour Force Survey (LFS), which permits tracking of trades occupations and the place of trade and apprenticeship training in the context of the overall labour market.

With respect to training outcomes, the results show that the rapid growth in apprenticeship registrations over the past decade is beginning to yield a substantial increase in completions (allowing for the time lag from registration to completion). However, completion rates may have slightly declined in some jurisdictions, with cohorts from 2000 to 2003 experiencing a 10-year completion rate of close to 40% rather than the 50% rate reported in earlier cohort studies. After about six years, most of those who have not completed have discontinued. However, close to 10% remain as apprentices for 10 or more years.

Trade qualifiers (those who acquire the requisite work experience outside the apprenticeship system and challenge the certification exams) have historically made up 40% or more of those certified each year. This proportion is declining as the number of

apprentice completions increases while the number of trade qualifiers is beginning to show a small decrease.

In the 2006 Census about 17% of the trade labour force reported holding registered apprenticeship certificates and about an equal proportion some other form of trade certificate. About half of all of those holding registered apprenticeship certificates and about one-third of those with other trade credentials are actually working in trade occupations. Taken together, these results suggest a considerable mismatch between credentials and occupations in the trades.

Historically, unemployment rates in the trades have tended to be slightly higher than in other occupations, especially in the construction trades. At all education levels below the bachelor's degree, those working in trades occupations have higher median annual earnings than those in other occupations. Within the trades, those holding registered apprenticeship certificates and those who have completed college programs of two or more years have the highest earnings. Both median earnings and the premium for apprenticeship completion vary widely across trades, with earnings and premiums being highest for some of the mechanical trades and lowest for service trades.

The above results apply to the trade labour market as a whole. Within the apprenticeship status groups identified by RAIS and included in the linked file, apprenticeship completers have the highest employment income levels. One year after certification, apprenticeship completers earn over \$7,000 more than trade qualifiers. Five years after certification, apprenticeship completers earn over \$4,000 more than trade qualifiers. Trade qualifiers out-earn other groups in the years prior to their certification; however, trade qualifiers are on average eleven years older than apprenticeship completers at the time of certification.

In the early years following the registration year, continuers and discontinuers have about the same income trajectories. However, in later years, continuers begin to out-earn discontinuers. Long-term continuers tend to out-earn both continuers and discontinuers but considerably lag both completers and trade qualifiers. Again, in all cases, wide variations were found across trades.

Self-employment is relatively low among the various RAIS status groups. The exception is trade qualifiers in a few occupations (notably hairstylists/barbers, carpenters, plumbers and electricians) where self-employment rates are in the 20-30% range. Net self-employment earnings are much lower than employment earnings, with medians of less than \$5,000 for completers and \$7,000 for trade qualifiers. While about half of those who are self-employed also reported some employment earnings, the combined total for the self-employed was much less than for those employed.

For the 2008 RAIS groups, interprovincial mobility in 2009 was lowest for completers and highest for discontinuers and trade qualifiers. Trade qualifiers and certified apprentices with a Red Seal were more mobile than those without a Red Seal in 2009. Manitoba, Alberta and Saskatchewan were the main destinations for Red Seal trade qualifiers. The Atlantic provinces and Saskatchewan were the 2009 destinations for more of those with no certificate in 2008.

Longer-term mobility was examined by tracking 2004 RAIS registrants for all years from 2002 to 2009. Overall, the highest out-mobility rates were found for Nova Scotia and New Brunswick. The highest out-migration rates were found for trade qualifiers with no Red Seal endorsement. Alberta was by far the most common destination province for all groups except trade qualifiers without Red Seal. British Columbia was the next most common destination, though the proportions there were much lower than for Alberta.

Much less information was available on socio/demographic outcomes. There is some evidence from NAS that apprentices have relatively positive views towards their programs and relatively few reported having significant difficulty with either technical or on-the-job training. Those with higher education levels and with prior work experience tended to have more favourable attitudes. There is some indication that long-term continuers have greater training difficulties than others.

The study confirms that women apprentices are concentrated in a small number of trades, particularly hairstylists (close to 80% women) and cooks (about 30% women), with very small proportions in most other trades. There has been slow growth in the number of women in the top 10 trades other than cooks and hairstylists and somewhat more rapid growth in other trades. Nevertheless, even in the most recent years, women make up only about two percent of the other Top 10 trades and about 11% of all other trades. There are also very few female trade qualifiers in any area.

Immigrants are also under-represented in the trades at about 8% compared to 20% in the population as a whole. The proportion of immigrant apprentices varies considerably across regions, with Ontario having more than the Canadian average, Alberta and British Columbia close to the Canadian average and the Atlantic region, Quebec, Manitoba and Saskatchewan having much lower immigrant participation.

Time series analysis reveals that the trades have occupied a stable place in the overall labour market for the past decade, following a slight decline in the 1990s. The proportion of the trades in the total labour force depends on the specific definition of trades. This ranges from about 11% for the major apprenticeship trades to 17% for trades defined by NOC-S category H (Trades, Transport and Equipment Operators and Related Occupations). Approximately 35% of those working in trade occupations have trade or apprenticeship credentials. This has also increased slightly in recent years. Certification levels tend to be higher in the top 10 trades, averaging about 40% but with wide variations across trades, ranging from 68% for hairstylists to 13% for cooks.

Apprenticeship registrations have shown considerable increase relative to the total trade labor market over the past decade. Much the same pattern is found for apprenticeship completions, with the most rapid increase in more recent years, allowing for the lag between registration growth and completion growth. Since the mid-1990s, apprenticeship registrations have also grown substantially relative to post-secondary enrolments, with the rate of increase accelerating in recent years. Apprenticeship completions relative to post-secondary graduations declined slightly up to about 2002 but have increased in more recent years. Apprenticeship thus appears to be attracting an increasing proportion of the youth population.

Projections of labour market demand derived from the Canadian Occupational Projection System generally show stability or slight decline in demand in selected trades. Projected growth in apprenticeship registrations and completions for the next several years suggests that apprenticeship is likely to play an increasing role in meeting this demand. Nevertheless, these results must be interpreted with great caution because of the many uncertainties in projections as well as other unknown factors such as the proportion of apprentices and completers who are actually working in their trade of training and the issue of whether apprentices and completers should be counted as additions to the labour market or as already part of the labour market.

Acknowledgements

This report was prepared by four research teams, each responsible for one of the main components. The principal chapter authors were:

Chapter 3 Christopher Pepin (lead)
 Kristal Hurrell

Chapter 4 Robert Crocker

Chapter 5 Steven Wald (lead)
 Julia Wiebe
 Gina Wong

Chapter 6 Nina Ahmed

Robert Crocker acted as advisor to the research teams and was the general editor of the final report and the principal author of Chapters 1 and 2 and a separate overview report.

The authors are grateful to Benoit Cadieux and Trent Craddock of HRSDC and to Micheline Racette and Cordella Friesen, Co-Chairs and the other members of the CCDA Research Committee for their advice and guidance throughout the project and their reactions to successive drafts of this report. We also extend our thanks to Anna Rigakis and Louise Desjardins of Statistics Canada for their work on the linked files and their prompt and accurate response to our many requests for statistical output from these files.

Table of Contents

Key Terms Used in this Report	i
Executive Summary	iv
Acknowledgements	viii
1.0 Purpose, Background and Conceptual Framework.....	1
1.1 Purpose.....	1
1.2 Background.....	2
1.3 Conceptual Approach	4
1.4 Data Sources	8
2.0 Literature Review	11
2.1 General.....	11
2.2 Trends in Registration, Completion and Certification	13
2.3 Voluntary versus Compulsory Certification	15
2.4 Long-Term Continuation	16
2.5 Trade Qualification	17
2.6 Alternatives to Apprenticeship Completion.....	18
2.6.1 Long-Term Continuation	19
2.6.2 Discontinuation	20
2.6.3 Uncertified/Unqualified Workers	21
2.6.4 School-Based Training	21
2.6.5 Workplace Training.....	23
2.7 Deterrents to Vocationally-Oriented School Programs.....	24
2.8 Apprenticeship and its Alternatives Internationally.....	24
2.9 Labour Market Supply and Demand in the Trades.....	27
2.10 Outcomes of Apprenticeship	30
2.10.1 Completion and Certification Outcomes	30
2.10.2 Labour Market Outcomes	32
2.11. Issues in Apprenticeship Arising from the Literature	37
Chapter 2 References	39
3.0 Outcomes Definition, Description and Comparative Statistics	44
3.1 Introduction	44
3.1.1 Purpose	44
3.1.2 Background: Definition and Classification of Outcomes	44
3.1.3 Research Questions	46
3.1.4 Training Outcomes	46

3.1.5	Labour Market Outcomes	48
3.1.6	Socio/Demographic Outcomes	49
3.1.7	Data Sources	49
3.2	Education and Training Outcomes	50
3.2.1	Education Levels of the Labour Force	50
3.2.2	Completion	51
3.2.3	Certification of Apprentices	54
3.2.4	Continuation and Discontinuation	59
3.3	Labour Market Outcomes	60
3.3.1	Overview: Trade and Non-Trade Occupations	60
3.3.2	Employment Income: RAIS Status Groups	65
3.3.3	Employment Income by Trade and Jurisdiction	69
3.3.4	Self-Employment	72
3.3.5	Employment Insurance	78
3.3.6	Gender Differences in Income	84
3.3.7	Mobility	85
3.4	Modeling Labour Market Outcomes	92
3.4.1	Regression Modeling	92
3.4.2	RAIS 2008 Model	92
3.4.3	RAIS 2004 Model	95
3.5	Socio/Demographic Outcomes	96
3.5.1	Attitudes and Satisfaction	96
3.5.2	Participation of Target Groups	98
3.6	Summary and Conclusions	101
3.6.1	Completion and Certification Outcomes	101
3.6.2	Labour Market Outcomes	102
3.6.3	Social/Demographic Outcomes	103
3.6.4	Conclusions	104
	Chapter 3 References	106

4.0	Comparison of Outcomes of Apprenticeship and other Training Sources	107
4.1	Purpose and Background	107

4.1.1	Purpose	107
4.1.2	Background	107
4.1.3	Research Questions	108
4.1.4	Data Sources and Methodology	109
4.2.	Pathways to Certification.....	109
4.2.1	Educational Credentials of the Trade Labour Force	109
4.3	Certification of Apprentices and Trade Qualifiers	111
4.3.1	Overall Certification Trends	111
4.3.2	Trends by Jurisdiction.....	112
4.3.3	Trends by Trade	115
4.4	Apprentice and Trade Qualifier Success in Red Seal Exams	118
4.4.1	Overall Success Rates	118
4.4.2	Success Rates by Jurisdiction	119
4.4.3	Success Rates by Trade.....	120
4.5	Selected Characteristics of Apprentices and Trade Qualifiers	123
4.5.1	Age.....	123
4.5.2	Gender	124
4.5.2	Other Demographic Characteristics.....	125
4.6	Labour Market Outcomes.....	125
4.6.1	Employment Income.....	125
4.6.3	Self-Employment Participation and Income	127
4.6.4	Employment Insurance.....	129
4.6.5	Value of the Red Seal for Apprentices and Trade Qualifiers	131
4.6.6	Interprovincial Mobility	133
4.7	Summary and Conclusions	134
4.7.1	Certification and Success Rates.....	134
4.7.2	Characteristics of Apprentices and Trade Qualifiers.....	135
4.7.3	Labour Market Outcomes	135
4.7.4	Conclusions.....	136
5.0	Labour Market Impacts of Apprenticeship Completion by Long-Term Continuers	136
5.1	Introduction	137

5.1.1	Purpose	137
5.1.2	Background	137
5.1.3	Research Questions	138
5.2	Terminology, Data Sources and Previous Research	139
5.2.1	Issues in Defining Long-Term Continuation.....	139
5.2.2	Long-Term Continuation versus Completion	141
5.3	Characteristics of Long-Term Continuers: A Review of the NAS Studies 142	
5.3.1	Overview.....	142
5.3.2	Pre-apprenticeship and Prior Training	144
5.3.3	Labour Market Conditions.....	145
5.3.4	Training Attributes	146
5.3.5	Perceptions of the Quality of Training.....	147
5.3.6	Work and Trade Features.....	147
5.3.7	Demographics and Other Variables.....	147
5.3.8	Summary of NAS Findings	149
5.4	Long-Term Continuers in the RAIS	149
5.4.1	Overall Trends	149
5.4.2	Long-Term Continuers by Trade.....	152
5.4.3	Long-term Continuers by Jurisdiction	155
5.5	A Re-Examination of the NAS Data	157
5.5.1	Obstacles to Completion.....	157
5.5.2	Labour Force Participation by NAS Apprenticeship Status.....	160
5.5.3	Employment Earnings by NAS Apprenticeship Status.....	161
5.5.4	Regression Models: 2008 Income by NAS Apprenticeship Status	164
5.6	Labour Market Outcomes: RAIS	167
5.6.1	Employment Income.....	167
5.6.2	Self-Employment.....	169
5.6.3	Employment Insurance.....	171
5.6.4	Interprovincial Mobility	174
5.7	Summary and Conclusions	174
5.7.1	Summary	174
5.7.2	Conclusions.....	176

Chapter 5 References	177
----------------------------	-----

6.0 Trades and Apprenticeship in the Context of the Overall Labour

Market	178
6.1 Introduction	178
6.1.1 Purpose	178
6.1.2 Background	178
6.1.3 Research Questions	180
6.1.4 Data Sources and Methodology	180
6.2 Overview of the Trades Labour Force, Apprenticeship Training and Trades Certification	181
6.2.1 Definition of Trade Occupations	181
6.2.2 Labour Force Activity by Educational Background	184
6.3 The Demand Side	187
6.3.1 Trade Certification in the Overall Labour Force	187
6.3.2 The Match of Certification to Occupation	188
6.3.3 Trade and Apprenticeship Certification in the Top 10 Trades	190
6.3.4 Trades and Apprenticeship Certification by Province	193
6.3.5 Trades and Apprenticeship Certification by Skill Level	195
6.3.6 Trades and Apprenticeship Certification by Demographics	196
6.4 Supply Side: Sources of Trade Workers	201
6.4.1 Apprenticeship Registration and Completion in the Labour Market Context	201
6.4.2 Apprenticeship Registration and Completion by Province	205
6.4.3 Apprenticeship Registration and Completion in the Context of Post- Secondary Education	206
6.4.4 Apprenticeship Registration and Completion by Gender	208
6.4.5 Apprenticeship Registration among Immigrants	210
6.5 Supply and Demand: The Place of Apprenticeship in the Trade Labour Market	212
6.6 Macro-Economic Factors Related to Trade Employment and Apprenticeship Registrations	216
6.7 Summary and Conclusions	218
6.7.1 The Trades in Context of the Overall Labour Force	218
6.7.2 The Demand Side	218

6.7.3	The Supply Side: Sources of Trade Workers.....	219
6.7.4	Supply and Demand Projections	220
6.7.5	Conclusions	221
	Chapter 6 References	223
	Appendix A Tables	224
	Chapter 3 Tables	224
	Chapter 4 Tables	226
	Chapter 5 Tables	227
	Chapter 6 Tables	229

List of Tables and Charts

Chapter 2

Figure 1.1	Labour Force Flows in the Trades	6
------------	--	---

Chart 2.1	Apprenticeship Registrations and Certificates, 1991-2010	15
-----------	--	----

Chapter 3

Chart 3.1	Percent of Total Employed Population by Education Level, 1990-2011	50
-----------	--	----

Chart 3.2	Educational Attainment: Trades and Other Occupations	51
-----------	--	----

Chart 3.3	Completion Percentages to 2009 for 1994 to 2003 Cohorts, Six Provinces	54
-----------	--	----

Chart 3.4	Certificates Issued to Apprentices by Province, 2000-2010	56
-----------	---	----

Chart 3.5	Certificates Issued to Apprentices by Trade, 2000-2010	58
-----------	--	----

Chart 3.6	Completion, Continuation and Discontinuation Percentages, Six Provinces, 2000 and 2003 Cohorts to 2009	59
-----------	--	----

Chart 3.7	Unemployment Rates for Selected Trade Groups and Other Occupations, 2001-2011	61
-----------	---	----

Chart 3.8	Median Income by Highest Education Level: Trades and Other Occupations	63
-----------	--	----

Chart 3.9	Median Income by Highest Education Level: Top 10 Trades	64
-----------	---	----

Chart 3.10	Median Employment Income 2002-2009 by 2004 RAIS Status	67
------------	--	----

Chart 3.11	Median Employment Income 2002-2009 by 2008 RAIS Status	68
------------	--	----

Chart 3.12	2009 Median Employment Income by Trade and RAIS 2008 Status: Completers Versus Other Groups	70
------------	---	----

Chart 3.13	2009 Median Employment Income by Jurisdiction and RAIS 2008 Status: Completers Versus Other Groups	71
------------	--	----

Chart 3.14	Percent Reporting Self-Employment Earnings in 2009 by Trade and 2008 Status	73
------------	---	----

Chart 3.15	2009 Median Net Self-Employment Income by Trade and 2008 Status: Completers Versus Other Groups	74
------------	---	----

Chart 3.16	2009 Median Net Self-Employment Income by Jurisdiction and 2008 Status: Completers Versus Other Groups	75
------------	--	----

Chart 3.17	Percent Reporting Self-Employment Earnings 2002-2009 by 2004 RAIS Status	76
------------	--	----

Chart 3.18	Median Net Self-Employment Income 2002-2009 by 2004 RAIS Status	77
------------	---	----

Chart 3.19	Gross and Net 2009 Self-Employment Income for 2008 Completers and Trade Qualifiers, Selected Trades	78
------------	---	----

Chart 3.20	Percent Reporting EI Income in 2009 by Trade and 2008 Status	80
------------	--	----

Chart 3.21	2009 Median Employment Insurance Income by Trade and 2008 Status: Completers Versus Other Groups	81
Chart 3.22	Percent Reporting EI Income in 2009 by Jurisdiction and 2008	82
Chart 3.23	2009 Median Employment Insurance Income by Jurisdiction and 2008 Status: Completers Versus Other Groups	83
Chart 3.24	Median Employment Income 2002-2009 for 2004 Completers by Gender, Selected Trades	85
Chart 3.25	Percent Resident in a Province Other than the Province of Registration in 2009 by 2008 Registration Status.....	87
Chart 3.26	2004-2009 Percent Resident in a Province other than the Province of Registration by Type of Certificate Issued in 2008	87
Chart 3.27	Percent Resident in 2009 Outside the Province of Registration by Province of Registration and 2008 Certification Status.....	88
Chart 3.28	2009 Destination Provinces for 2008 Status Groups as a Percent of Each Group within the Destination Province.....	89
Chart 3.29	Percent Mobile 2004-2009 by 2004 Certificate Type and Province of Origin	90
Chart 3.30	Destination Provinces for those Mobile 2004-2009 by 2004 Certificate Group	91
Chart 3.31	Regression Coefficients for 2009 Employment Income by 2008 Status Groups Controlling for Age, Gender, Trade and Jurisdiction	93
Chart 3.32	Proportions of Variance in Employment Income Accounted for by Variable Clusters in the Model.....	95
Chart 3.33	Regression Coefficients for 2009 Employment Income by 2004 Status Groups Controlling for Age, Gender, Trade and Jurisdiction	96
Chart 3.34	Percentage of Female Apprentices and Trade Qualifiers, 2001-2010	99
Chart 3.35	Percent of Immigrants 2008 RAIS by Region	100

Chapter 4

Chart 4.1	Education Levels by Trade	110
Chart 4.2	Certificates Issued to Apprentices and Trade Qualifiers, 1991-2009	112
Chart 4.3	Apprentice and Trade Qualifier Certificates by Jurisdiction, 2000-2010	114
Chart 4.4	Percentage of Completers and Trade Qualifiers Relative to all RAIS 2008 Registrants by Jurisdiction.....	115
Chart 4.5	Apprentice and Trade Qualifier Certificates by Top 10 Trade Groups, 2000-2010	120
Chart 4.6	Red Seal Success Rates for Apprentices and Trade Qualifiers: 2000-2010	119
Chart 4.7	Average Success Rates 2000-2010 for Apprentices and Trade	

	Qualifiers by Province].....	120
Chart 4.8	Average Success Rates 2000-2010 for Apprentices and Trade Qualifiers by Trade	121
Chart 4.9	Trend in Success Rates 2000-2010 for Apprentices and Trade Qualifiers by Trade	122
Chart 4.10	Age Distribution of Apprentices and Trade Qualifiers, 2009	123
Chart 4.11	Median Employment Income 2002-2009 for Apprenticeship Completers and Trade Qualifiers, RAIS 2008	126
Chart 4.12	Median Employment Income 2002-2009 for Apprenticeship Completers and Trade Qualifiers, RAIS 2004.....	127
Chart 4.13	Percent Reporting Self-Employment Earnings 2002-2009 for 2004 Completers and Trade Qualifiers.....	128
Chart 4.14	Median Net Self-Employment Income 2002-2009 for 2004 Completers and Trade Qualifiers.....	129
Chart 4.15	Median Net EI Income 2002-2009 for 2004 Completers and Trade Qualifiers	131
Chart 4.16	Median Employment Income 2002-2009 for 2004 RAIS Completers and Trade Qualifiers with or without Red Seal.....	132

Chapter 5

Table 5.1	Percent Continuing for 1 to 10 Years by RAIS Report Years 2000-2009	151
Chart 5.1	Percent Continuing from One to Ten Years for RAIS Report Years 2001, 2005 2009.....	151
Chart 5.2	Number and Percent Continuing for at Least Six Years, 2000-2009.....	152
Chart 5.3	Percentage Continuing for at Least Six Years by Top 10 Trades .	154
Chart 5.4	Percentage Continuing for at Least Six Years by Jurisdiction	156
Chart 5.5	Percentage Citing “Inconsistent or Lack of Work” as an Obstacle Encountered During Apprenticeship by Apprenticeship Status.....	158
Chart 5.6	Percentage Citing “Technical Training” as an Obstacle Encountered During Apprenticeship by Apprenticeship Status.....	158
Chart 5.7	Percentage Having Difficulty with Written Material by Apprenticeship Status	159
Chart 5.8	Percentage having Difficulty with Technical Training, by Apprenticeship Status.....	160
Chart 5.9	Labour Force Participation Status in the Week Prior to the Survey by Apprenticeship Status.....	161
Table 5.3	Mean 2008 Employment Income for NAS Frame Year Long-Term Continuers and Completers by 2007 Status and Province	162
Table 5.4	Mean 2008 Employment Income for NAS Frame Year Long-Term	

	Continuers and Completers by 2007 Status and Trade.....	163
Chart 5.10	Regression Coefficients for 2008 Employment Earnings of Long-Term Continuers in Frame Period by 2007 Apprentice Status	165
Chart 5.11	Regression Coefficients for 2008 Self-Employment Earnings of Long-Term Continuers in by 2007 Apprentice Status	166
Chart 5.12	Median Employment Income 2002-2009 by 2004 RAIS Status	169
Chart 5.13	Median Employment Income 2002-2009 by 2008 RAIS Status	169
Chart 5.14	Percent Reporting Self-Employment Earnings in 2009 by Trade and 2008 Status	170
Chart 5.15	Median Net Self-Employment Income 2002-2009 by 2004 RAIS Status	171
Chart 5.16	Percent Reporting EI Income in 2009 by Trade and 2008 Status..	172
Chart 5.17	Median 2009 EI Income by Trade and 2008 Status.....	173
Chart 5.18	Percent Resident in a Province Other than the Province of Registration in 2009 by 2008 Registration Status.....	174

Chapter 6

Chart 6.1	Percent of Total Labour Force, 1990-2011, under Four Definitions of Trades Occupations	183
Chart 6.2	Total Labour Force and Trade Labour Force, 1990-2011, Major Apprenticeship Trades.....	184
Chart 6.3	Labour Force Activity by Educational Background, 2006	185
Chart 6.4	Trends in Unemployment Rate by Education Level, 1990-2011...	186
Chart 6.5	Percent Unemployed for Those Holding Trades or Apprenticeship Certificates, 1990-2011	187
Chart 6.6	Trade Certificates as a Percentage of the Total Trade Labour Force, 1990-2011	188
Chart 6.7	Match of Trade and Apprenticeship Certificates to Occupations and Occupations to Certificates, 1990-2011.....	189
Chart 6.8	Total Workers Holding Apprenticeship and Other Trade Certificates Working in Trade and Non-Trade Occupations	190
Chart 6.9	Education Levels of Top 10 Red Seal Trades, 2006	191
Chart 6.10	Percent Holding Apprenticeship or Trade Certificates in the Top 10 trades, 1990-2011	192
Chart 6.11	Percent of Trades Labour Force with Less than High School Education 1990-2011	193
Chart 6.12	Percentage of the Labour Force Holding Apprenticeship or Trade Certificate by Province, 2011.....	194
Chart 6.13	Trends in Percentage with Apprenticeship or Trade Certificates. Selected Provinces, 1990-2011	195

Chart 6.14	Skill Level Classification of Those with Trade and Apprenticeship Certificates.....	196
Chart 6.15	Education Levels by Age Groups	197
Chart 6.16	Education Levels by Gender.....	198
Chart 6.17	Percent of Women in Selected Trade Occupations, 1990-2011	199
Chart 6.18	Distribution of Educational Levels by Immigration Status	200
Chart 6.19	Distribution of Educational Levels by Aboriginal Status.....	201
Chart 6.20	Apprenticeship Registrations as a Percentage of Total Labour Force, Top 10 Trades 1991-2010.....	203
Chart 6.21	Apprenticeship Completions as a Percentage of Total Labour Force, Top 10 Trades, 1991-2010	204
Chart 6.22	Apprenticeship Registrations as a Percentage of the Trade Labour Force by Province, 1991-2010	206
Chart 6.23	Apprenticeship in the Context of Post-Secondary Education 1992-2010	208
Chart 6.24	Apprenticeship Registrations as a Percentage of the Trade Labour Force by Gender, 1991-2010	209
Chart 6.25	Apprenticeship Completions as a Percentage of the Trade Labour Force by Gender, 1991-2010	209
Chart 6.26	Percentage of New Foreign Workers by Skill Level, 2001-2010 ..	211
Chart 6.27	Percentage of Immigrants and Canadian-Born Persons with Trade or Apprenticeship Certificates, 2006	211
Chart 6.28	Projected New Apprenticeship Registrations, Completions and Job Openings, 2010-2020, Selected Trades.....	214

Appendix A Tables

Table A3.1	2009 Employment Income for RAIS 2008 Status Groups.....	224
Table A3.2	2009 Employment Income for RAIS 2004 Status Groups.....	225
Table A5.1	Regression Coefficients for 2008 Employment Earnings of Long-Term Continuers in Frame Period by 2007 Apprentice Status	227
Table A5.2	Regression Coefficients for 2008 Self-Employment Earnings of Long-Term Continuers in Frame Period by 2007 Apprentice Status	228
Table A6.1	Occupational Projections 2010-2020, Selected Trades.....	229
Table A6.2	Regression Model for Number of Employed Canadians with Trade or Apprenticeship Certificates	230

Table A6.3 Regression Model of Apprenticeship Registrations231

1.0 Purpose, Background and Conceptual Framework

1.1 Purpose

This project is the first in a series of research studies identified by the Canadian Council of Directors of Apprenticeship (CCDA) as part of a three-year research plan. This plan grew mainly out of an earlier research series based on the 2007 National Apprenticeship Survey. One of the main issues identified from that research was the need for a focus on apprenticeship completion and certification and on the outcomes of apprenticeship.

The purpose of this research is therefore to develop a more comprehensive understanding of the relationship between apprenticeship completion, certification and outcomes. The specific focus is on defining appropriate outcomes of trades training, with emphasis on indicators of apprenticeship success, and on examining differences in these outcomes among those who enter the trades through apprenticeship versus other routes, those who complete their programs and those who either discontinue or remain in the program for much longer than the nominal time required to complete.

The project had four main goals:

1. To define an appropriate set of outcomes for the trades, identify measures and data sources for these outcomes and compare the outcomes for apprenticeship completers, partial completers and discontinuers by trade and jurisdiction¹;
2. To examine differences in outcomes for journeypersons who have obtained their certification through apprenticeship versus other routes to certification;
3. To compare the outcomes of apprenticeship completers and long-term continuers and investigate the labour market impact of increasing apprenticeship completion rates;
4. To examine the economic contribution of apprenticeship and the contribution of apprenticeship as a source of skills training and estimate the economic value of apprenticeship certification.

The empirical research on the above four goals was conducted by four research teams, each focusing on one of these goals. The work was based on secondary analysis of several large scale Canadian databases, as described in a subsequent section. Each of these sections, along with a literature review,

¹ Throughout this report, the term “jurisdiction” is used to refer to provinces and territories and the apprenticeship authorities within these.

constitutes the main content of the final report on which this overview is based.

1.2 Background

The skilled trades have long been a crucial part of the Canadian economy, with trades occupations spanning several main sectors including construction, manufacturing and services. Over the long-term, the total number of persons working in trades occupations has grown at about the same rate as the overall labour force. However, like many other occupational groups, the trades labour force is ageing. The upcoming age cohorts from which replacements must be drawn are smaller than in previous generations. The trades must also compete with a broad range of other occupations, under the same demographic constraints, for personnel to replace those leaving the labour force due to retirement and other sources of attrition. Additionally, there are indications that trade careers appeal to only a very small proportion of high school students and that most of those who come to the trades do so only after having had other work or school experience. There is therefore reason for concern that the supply of tradespersons may not be sufficient to meet future demand.

It should be noted at the outset that estimates of the total size of the trades labour force differ, depending on the data source and the occupational categories that are counted as trades. For example, one common count is based on the Statistics Canada NOC-S main category H, labeled “trades and related workers”. However this category includes many occupations that are not designated apprenticeship trades and excludes several large occupations, notably cooks and hairstylists/barbers, which are designated apprenticeship trades. Strictly speaking, this report is concerned only with designated apprenticeship trades, as defined by the various provincial/territorial apprenticeship authorities. However, not all data sources can uniquely identify these trades. Thus, even in this report, there are some differences in the specific occupations included as trades.

Chapter 6 of this report gives more specific numbers, based on different definitions of trades occupations.

Apprenticeship is usually thought of as the primary pathway into the trades. Apprenticeship may be defined as a formalized relationship between an employer and an individual in which the employer provides formal on-the-job training. Apprentices are typically paid a stipend in recognition of their contribution to productivity, with the stipend increasing as the apprentice acquires greater skill. Some unions or trade associations run their own training centres and hold contracts of apprenticeship with the apprentice, rather than the employer.

Apprenticeship programs also typically require periods of school-based technical

training. These have traditionally been offered in “blocks” during which the apprentice is released from the workplace. However, alternative modes of technical training including pre-apprenticeship, shorter blocks and distance education have more recently emerged.

Apprenticeship in Canada is primarily industry-driven. However, there is a long history of support for and regulation of apprenticeship by provincial and territorial apprenticeship authorities. These jurisdictions, in partnership with industry, establish the terms of apprenticeship agreements, determine the hours of work experience and amount of in-school technical training required and ultimately issue certificates qualifying individuals as “journeypersons” in their trade. Apprenticeship boards, industry advisory committees and other mechanisms exist to maintain links with industry and to help ensure that apprenticeship training meets the needs of industry. The federal government, through Employment and Social Development Canada, supports the Interprovincial Standards Red Seal program, including the development of National Occupational Standards and a system of interprovincial examinations in designated Red Seal trades.

There are diverse entry pathways to work in the skilled trades. Recent research (Crocker, 2011) indicates that, overall, only a small fraction of the trades work force is supplied through apprenticeship programs. For example, the 2006 Census shows that only 17% of those defining themselves as being in trade occupations had completed a registered apprenticeship program, with about an equal proportion holding some other form of trade certificate. Most of the remainder had high school or lower levels as their highest education level and were thus uncertified. This research also indicated that a large proportion of those with a trade credential as their highest education level are working in occupations other than the trades. This raises some important research questions of pathways to the trades, the labour market outcomes of those who take different pathways and the specific role of apprenticeship in meeting trades labour market demand.

The total number of apprenticeship registrations^{II} in Canada has more than doubled over the past decade, from about 200,000 to over 400,000. Proportionally, completions have increased at close to the same pace, from about 18,000 to 36,000. However, this points to a situation in which many apprentices do not complete and many others remain in their programs for much longer than the nominal duration of these programs. There is evidence (e.g. Desjardins, 2010) that only about 50% complete within a decade and that many individuals can spend several additional years as apprentices before becoming certified.

^{II} Total registrations are tabulated by Statistics Canada using the RAIS database and are published annually. Total registrations in any year include all of those registered at any time during that year.

Because earlier studies looked at cohorts entering apprenticeship in the 1990s, there is a need for more up-to-date statistics. To the extent possible, this will be done in this report.

A substantial amount of new research on apprenticeship in Canada was conducted in 2008-2010 using data from the 2007 National Apprenticeship Survey (NAS 2007). An overview report based on this research identified apprenticeship completion as a main area of focus for further research. In 2010, the CCDA developed a multi-year research plan designed to provide information that will address knowledge gaps in the area of apprenticeship and enable policymaking and program-related decisions to be based on the best information available and on the consensus views and interpretations of the issues to be addressed.

1.3 Conceptual Approach

At the broadest level, this research is guided by the theory of human capital development. This theory holds that economic development is a function, not only of traditional labour and capital but also of the knowledge and skills embodied in the labour force. Public policies on labour market and human resource development are generally driven by the theoretical premise that the economic well-being of a society is enhanced by increasing the store of human capital.

The place of education and training within the human capital model is typically captured by the “human capital earnings function” (Mincer, 1974; Becker, 1993). This function treats income (or sometimes other economic or social outcomes) as the *dependent* variable and education and work experience (usually along with other covariates) as *independent* variables. Thus

$$\text{income} = f(\text{education, experience, other variables} \dots)$$

where f is a mathematical function, the form of which depends on the analysis being performed. The specific definitions and measures of the variables in the model and the specific mathematical function used in particular studies may be developed from theory, previous research, policy, or even conjecture. The typical analytical model takes the form of a regression equation, which yields a measure of the overall predictive power of the model and produces coefficients representing the relative contributions of the predictors to the outcome.

Education, and especially apprenticeship or trades training, is the primary independent variable of interest here. However, labour market outcomes, and especially income, can also be influenced by a large number of other variables. Occupation, geographic location, labour market conditions, sex, and age are some commonly used predictors in the model. Other characteristics of the individual or of the society are also sometimes included. Outcomes may also be

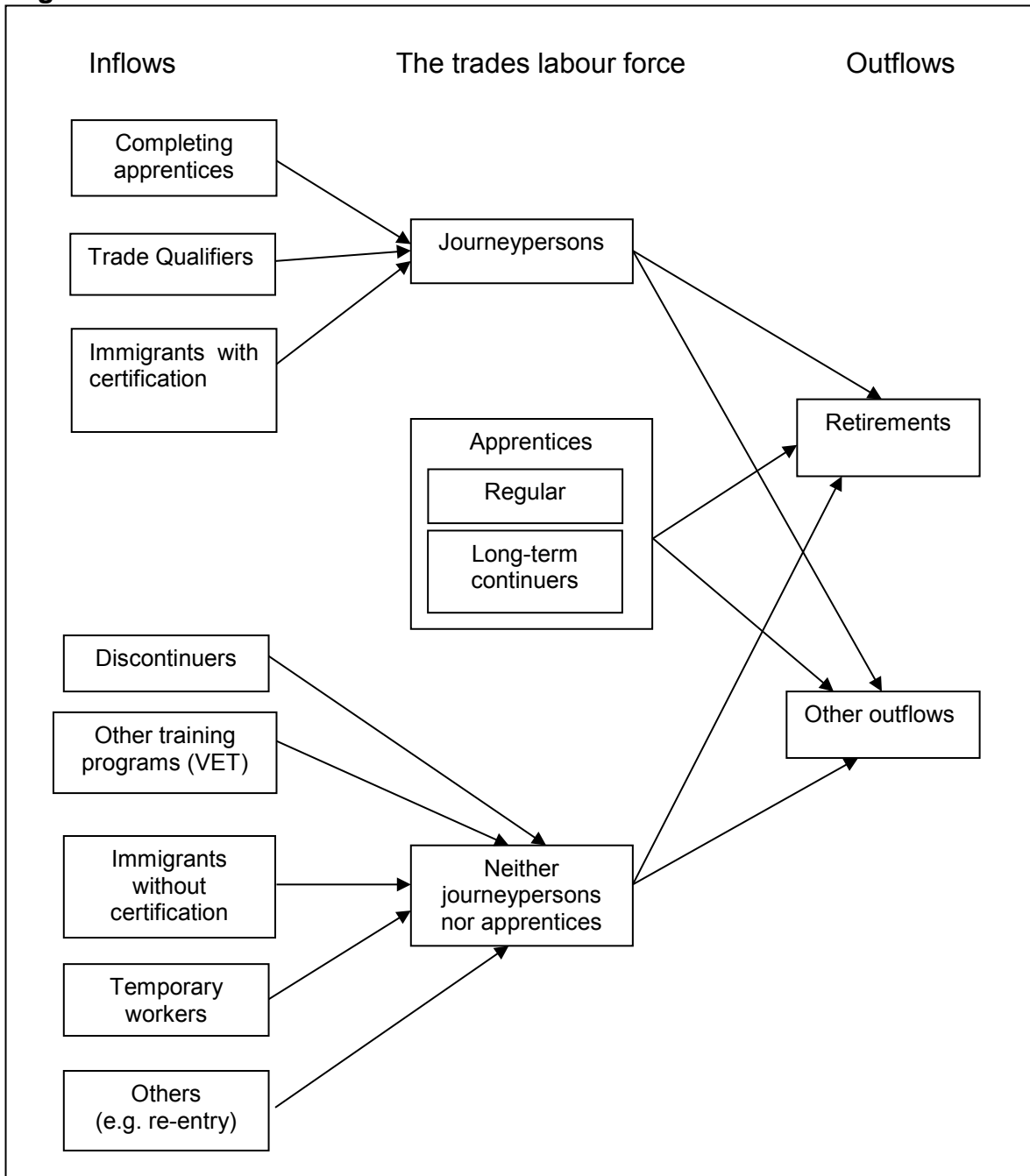
influenced by a large number of unmeasured variables.

Under the assumption that apprenticeship is the primary entry path to the trades, inflows and outflows in trades occupations may be depicted by a simple entry-exit model in which exits from the trades labour, as well as labour force growth, are filled by completing apprentices. Under this model, a labour shortage or surplus can occur if the number of completing apprentices does not match the number leaving trades occupations plus the growth requirements. In reality, this model tells only part of the story because the actual trades workforce includes a large number of persons who have never completed, or even started, apprenticeship. This obviously indicates that labour market demand is being met in other ways. Since this study is concerned not only with apprenticeship completion but also with the existence of other pathways to the trades, it is useful to depict more broadly the various flows into and out of the trades work force.

In practice, the trades labour force may be thought of as comprising two categories of persons; those qualified as journeypersons and those not. In Canada, individuals can become journeypersons by only two routes, apprenticeship completion or trade qualification. The latter category arises because it is possible, with appropriate documentation of work experience, to challenge the final certification examinations without having completed or started an apprenticeship.

A more complete model of flows into and out of the trades is depicted in Figure 1.1. Apprentice completers and trade qualifiers possess journeyperson status while the others do not. Those with incomplete apprenticeships may be active or not active in working towards journeyperson status. Those entering from other sources may, at some point, become trade qualifiers. Apprentices themselves must also be considered part of the work force because of the large work experience component of apprenticeship and because apprentices are paid for their services. Indeed, this raises an important dilemma for this report because it is not clear from the data sources if apprentices are, or should be, counted as part of the labour force or if they are more appropriately treated as students or trainees, who become part of the labour force only after completion. Since there is no place in either the Census or the Labour Force Survey for apprentices to identify themselves, and no place for apprentices to be identified as students, where necessary, this report treats apprentices as already being in the labour force. New registrants are considered in the model as entrants. Completers are also treated in the model as part of the labour force, but as having reached a new level of qualification and, hence filling a different segment of labour market demand, that for certified personnel.

Figure 1.1 Labour Force Flows in the Trades



Certification is not compulsory in most trades, and there are differences across jurisdictions in the trades designated as compulsory. It is thus possible for many in the trades to work an entire career without ever completing, or even starting, apprenticeship and without taking the trade qualifier route to certification. This group may include apprentices who spend significantly more time in the program than the nominal apprenticeship duration (referred to as long-term continuers). If certification is the accepted measure of qualification, these individuals could be considered unqualified or under-qualified and hence a component of labour market shortage. On the other hand, a person who has worked in a trade for years, and has accumulated more than the requisite work hours for apprenticeship completion, but who never writes the certification exams, may not be at any different level of competence from one who does take that last step to certification.

The groups of most direct interest in this study are completing apprentices, trade qualifiers and long-term continuers. However, there remains the question of individuals who have come to the trades from other pathways but who do not become certified. Specifically, it is possible for individuals to learn trade skills in a variety of ways, including pre-apprenticeship or college programs, vocational training programs in high schools or vocational schools or forms of workplace training other than apprenticeship (e.g. employer, vendor or manufacturer training). Unfortunately, these groups are not identifiable in any clear way from the available data sources unless they eventually attempt certification through the trade qualifier route. What is important is that, in Canada, unlike in some other countries, the only routes to certification are apprenticeship or trade qualification. There is no formal recognition for those who use other forms of training.

This study is mainly about labour market and other outcomes for those who come to the trades through a variety of pathways, and particularly about the impact of completion and certification on these outcomes. For purposes of this report, outcomes may be classified into three broad categories as follows:

- Education and training outcomes
- Labour market outcomes
- Socio/demographic outcomes

The available data allow us to give fairly comprehensive results for the first two of these. Much less data are available on the last category. For example, although the participation of Aboriginal persons in trades and apprenticeship is of considerable interest, the available data sources do not adequately identify persons of Aboriginal identity.

Chapter 3 of this report further develops the definition and classification of outcomes and presents descriptive/comparative statistics on those outcomes judged to be of most interest. In particular cross-tabulations are given by apprenticeship/ completion status, jurisdiction and trade and regression models are used to help isolate the contributions of various factors to outcomes.

1.4 Data Sources

Most of the data for this study are drawn from the following sources:

- The 2006 Census
- The Labour Force Survey (LFS)
- The 2007 National Apprenticeship Survey (NAS)
- The Registered Apprenticeship Information System (RAIS)
- A series of three custom files developed by Statistics Canada linking RAIS and NAS data to tax records from the T1 Family File (T1FF) and the Longitudinal Immigration Database from 2002 to 2009.

The main Census file is the 2006 Census, which included for the first time a variable that identifies those who completed a registered apprenticeship program as well as those holding some other form of trade or vocational credential. Combined with information on occupation, this allows us to identify the number of persons working in trade occupations who have come to their occupation through apprenticeship versus other pathways.

The Labour Force Survey (LFS) also includes similar data but has the advantage of being available for more than 20 years, allowing us to trace changes in occupational and training patterns. This project examined LFS data in some detail over more than 20 years.

Both the Census and LFS include a great deal of data on occupation, education and income as well as on geographic and demographic variables of interest in this study. However, both are limited in that they do not uniquely identify apprentices or apprenticeship as a training route. This is because only the “highest” level of education is reported. Thus, those who have completed an apprenticeship program and who have also gone on to complete a college or university program are recorded in the latter categories, with their apprenticeship program being overridden by these additional levels. Also, these data sources do not identify those who have become certified through the “trade qualifier” route, which continues to be a major source of certification.

The 2007 National Apprenticeship Survey (NAS 2007) is a one-time survey based

on a sample drawn from provincial/territorial apprenticeship records between 2002 and 2004. Three groups were sampled from these records:

- Long-term continuers: those who were registered as of 2004 and who had been registered in their program for longer than one and a half times the normal program duration.
- Completers: those who had completed their program at some point between 2002 and 2004.
- Discontinuers: those who had completed their program at some point between 2002 and 2004.

A great deal of research has already been conducted on the NAS 2007, through a research program conducted by CCDA and HRSDC between 2008 and 2010. This research was reviewed and relevant aspects summarized at appropriate places in this report. Some gaps in that research, particularly as they relate to long-term continuation versus completion, were filled as part of this project.

The Registered Apprenticeship Information System (RAIS) is compiled from provincial/territorial administrative data on apprenticeship registrations and completions, along with some background data on registrants. This is a longitudinal data file with records dating back to 1991 and with recent enhancements allowing a more detailed picture of program types. RAIS allows individuals to be tracked throughout their apprenticeship career and provides the main basis for identifying discontinuers, long-term continuers and completers. A 2008 revision of RAIS provides much more background and program information than previous versions.

RAIS does not include any data on outcomes other than completion status. For this reason, CCDA commissioned Statistics Canada to develop a custom data set linking the RAIS and NAS data sets to the T1FF (individual income tax returns) data base. This was done through a combination of exact matching using Social Insurance Numbers and probabilistic matching using names, addresses and other variables common to the files being matched. Three separate files were developed; one using NAS, one using 2004-2004 RAIS and a third using 2008 RAIS, all linked to T1FF data from 2002 to 2009. These files were also supplemented by linking variables from the Longitudinal Immigration Data Base (IMDB), allowing the immigration status of apprentices to be identified. These files, referred to in this report as 'linked files,' provide the data required to examine earnings and other labour market outcomes in more detail than is possible from the Census or the LFS.

Statistics Canada provided to the researchers extensive information on the structure of the linked file and the developmental processes used. For

confidentiality reasons, Statistics Canada also conducted the data analyses on these files, based on specifications prepared by the researchers.

2.0 Literature Review

2.1 General

A substantial literature exists on apprenticeship. Only a couple of broad reviews of this literature are discussed here, before turning to research more specific to apprenticeship completion and outcomes.

Wolter and Ryan (2011) have completed an international review of apprenticeship from an economic perspective. These authors attempted to address a fundamental economic question of apprenticeship training: “Why should an employer provide and finance training for an asset that they do not own and for any investment in which, in a competitive market, it cannot extract a return?”

Wolter and Ryan describe the great variation that exists in apprenticeship models and the differing value of apprenticeship in different countries, pointing out that programs are not driven by any consistent theory of what apprenticeship should be designed to accomplish. The authors argue that apprenticeship is not easily fitted to the conventional Becker human capital model. Investments in human capital, and particularly in general, as opposed to firm-specific training, are different from those in physical capital because the employer does not acquire the property rights to such training. More specifically, according to these authors, apprenticeship differs from firm-specific training in that the apprentice acquires transferable skills that can be taken elsewhere. Thus, in theory, the employee has much more to gain from apprenticeship than the employer. From a human capital perspective, therefore, training costs should be expected to fall more on the apprentice than on the employer. The employer gains from training only if the productive work of the apprentice during training exceeds the cost of training or if the apprentice does stay with the employer.

In attempting to answer the question why firms engage in apprenticeship training, despite the theoretical lack of value to the employer, Wolter and Ryan suggest several possibilities. These include asymmetry of information among the players, compressed wage structures, the *de facto* firm-specific nature of some of the training (which limits the number of firms competing for the skilled worker), and the relative costs and benefits of training as opposed to recruitment of those trained by others. Under such diverse circumstances, it is not surprising that some firms decide to train and others do not, even in seemingly similar circumstances.

Wolter and Ryan examine empirical evidence on the costs and benefits of apprenticeship training from the firm's point of view. They find substantial differences in the relative costs and benefits between firms and systems. For instance, they find that German firms are shown to incur a net cost while Swiss firms receive a net benefit. No North American data are provided and it is not clear that the German and Swiss experience can be generalized to other countries.

Wolter and Ryan also review evidence on the outcomes of apprenticeship, with a main focus on the difficulty of obtaining unbiased comparative estimates. In particular, it is usually not possible to compare apprenticeship training to alternatives (such as full-time schooling) for randomly equivalent samples of persons. This, in fact, is one of the most significant limitations of this study. Selection bias is always present, making it impossible to separate differences in individual attributes from differences in training. Especially relevant to this study, it is also difficult to know what outcomes to examine. Economic outcomes, such as employment rates or incomes are obvious. However, limiting work to such outcomes fails to consider other effects such as reduced educational attainment on the part of those taking the apprenticeship route, particularly in situations where the vocational pathway in secondary schools precludes entry to post-secondary institutions.

The limited empirical research reviewed by Wolter and Ryan indicates that apprenticeship helps smooth the transition from school to work. However, it is less clear that this is a lasting effect. Studies of economic outcomes in different countries yield conflicting results. Overall, the effect of apprenticeship on the wages of tradespersons seems to be positive, though small.

Although this review offers some important theoretical insights, the empirical research examined by Wolter and Ryan is difficult to generalize to Canada because apprenticeship here differs in crucial ways from that in Europe. In particular, apprenticeship in Canada is not an extension of upper-secondary education. The typical person entering apprentice in Canada is in his/her mid-twenties, and has had a variety of post-secondary and/or work experience before registration. To the extent that apprenticeship is linked to the formal education system, this is almost always at the college level, in the form of certificates related to the skilled trade, and not at the secondary level.

A recent review by Gunderson (2009) focuses more directly on apprenticeship in Canada. Gunderson makes a number of important points about factors inhibiting entry to apprenticeship. However, some of these points may now be less valid than in the past because registration numbers have increased dramatically over the past decade.

Gunderson makes the following points relevant to this study:

- Registrations in apprenticeships in Canada tend to be pro-cyclical, increasing during periods of economic expansion when work is available and declining in recessions when it is difficult to work the hours required for apprenticeship certification.³
- In theory, employers are reluctant to pay for general training because they cannot appropriate the returns. Other firms that do not provide training may simply “poach” or hire the trainee by paying them a higher wage commensurate with their higher post-training productivity. (This is essentially the point made by Wolter and Ryan).
- An important deterrent to completion is the lack of continuous employment. This inhibits apprentices from acquiring the on-the-job training credits. This can be especially important in cyclical downturns and in more isolated communities where alternative jobs may not be available.
- Setting of wages for journeypersons who have completed the apprenticeship program can also affect the incentive to complete the program. If the wage is set “too high” this can make them more expensive and hence less likely to be hired. If set “too low” this can reduce the incentive to complete an apprenticeship program since the skill premium is insufficient to offset the cost.
- Overall, the Canadian evidence on the returns to education generally (but not always) suggests that the economic returns are slightly lower for technical/vocational streams compared to general academic streams.
- Apprenticeship substantially improves the transition to work in that apprentices have a considerably higher probability of getting an initial job early compared to unskilled entrants, vocational graduates and even university graduates. However, over time, that advantage dissipates and apprentices have similar job stability as those with general vocational education.
- In the longer-run, the earnings or monetary returns to apprenticeship appear to be about equivalent to (or slightly less than) the returns vocational education in general, with both being lower than the returns to more conventional academic education.

2.2 Trends in Registration, Completion and Certification

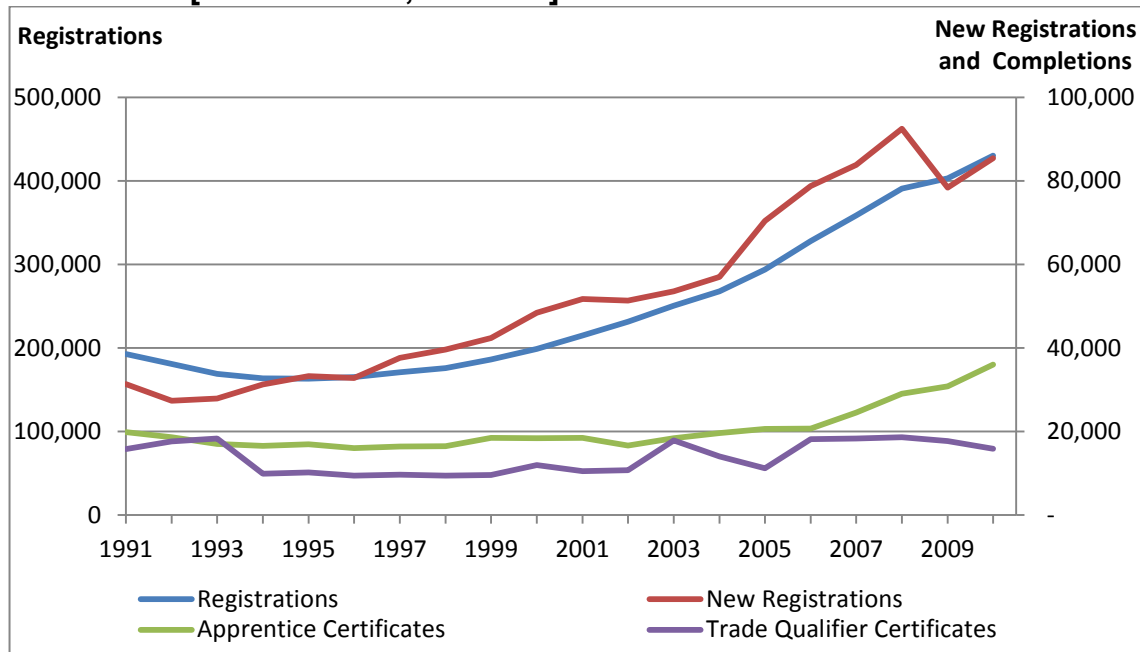
³ Although Gunderson’s report was completed prior to the 2008-09 recession, the pro-cyclical nature of apprenticeship is again shown by a drop in new registrations in 2009, after a decade of growth, and an increase again in 2010.

Statistics Canada reports annually the number of apprenticeship registrations and certifications. Chart 2.1 shows apprenticeship registration and certification numbers from 1991 to 2010. The large increase in registrations over the past decade is the most striking feature of this chart. This can be driven by increases in new registrations, higher retention rates or reduced completion rates or some combination of all of these. A drop in new registrations in 2009 and recovery in 2010 reflects the recent recession. This had little impact on total registrations because new registrations make up only a small part of the total. However, these data do not reveal any possible impact of the recession on employment of apprentices.

The number of apprenticeship completions in a year corresponds almost exactly to the number of apprenticeship certificates issued (completion is defined essentially in terms of certification). However, certificates may also be awarded to trade qualifiers. As the chart shows, the latter group contributes a considerable, though declining, proportion of the number of new certificates each year.

Completions in any given year may reflect new registrations at any time from about two years earlier (the duration of the shortest apprenticeship programs) to any earlier year. Completion rates reflect a combination of discontinuation (those who leave the program and will thus never complete), normal continuation (those who have served for less than the nominal program duration) and long-term continuation (those who remain in the program without completing over the lagged period). Completion rates will be examined in more detail in later sections.

Chart 2.1 Apprenticeship Registrations and Certificates, 1991-2010
[Source: RAIS, CANSIM]



2.3 Voluntary versus Compulsory Certification

Apprenticeship training and certification in the trades is regulated by the provinces and territories. Certification of journeypersons, and award of the Red Seal endorsement in designated trades, requires completion of technical training, documentation of work experience and passing a final examination. Despite this, there is relatively little regulation of actual entry to most trades. Certification or apprenticeship registration is not compulsory in most Canadian jurisdictions for most trades. According to the Ellis Chart⁴ (<http://www.ellischart.ca/h.4m.2@-eng.jsp>), compulsory certification is most prevalent in Quebec, where most trades are compulsory. On the other hand, in some jurisdictions such as Newfoundland and Labrador and British Columbia, almost none of the trades have compulsory certification.

An alternative to compulsory certification is licensing.⁵ Licensing is most common

⁴ The Ellis Chart (<http://www.ellischart.ca/h.4m.2@-eng.jsp>) is a compilation of information on apprenticeship training and trades certification in Canada maintained by Human Resources and Skills Development Canada.

⁵ By definition, compulsory certification or licensing in the trades means that individuals must be either certified or hold a licence, or be a registered apprentice, in order to work in the trade.

in occupations where there is a strong public protection interest. Some trades obviously fit into that category. Electrical work is the most obvious example. Indeed, this is the only trade in which certification or licensing is required in all jurisdictions. Generally speaking, licensing is also the responsibility of provinces but is administered outside the apprenticeship system. British Columbia has, in effect, replaced compulsory certification with licensing in a number of trades, thus locating the compulsory aspect of trades outside the purview of the apprenticeship authority.

The distinction between certification and licensing rests essentially on who issues the credential. In any event, it appears that holding a journeyperson certificate is the essential requirement for licensing in the trades. In some cases licensing applies to contractors, but not to everyone who works for contractors (e.g. <http://www.handycanadian.com/contractor-license-alberta.asp>). This is especially true at the municipal level, where contractor licensing is a component in issuing building permits. For example, many municipalities require that plumbing and electrical work be done by a licensed contractor, even if certification is not required at the provincial level.

One consequence of the absence of compulsory certification is that anyone is free to label themselves as a trades person in most trades. This makes it more difficult, even in the Census and Labour Force Surveys, to distinguish between someone who is functioning at what might be called a “fully qualified” level, whether or not certified, or at some more restricted level. The existence of a “helper” sub-classification in the trades classification within NOC-S system helps make this more specific. However, the space available for the description of work is not necessarily adequate to distinguish, say Carpenters from Carpenters’ helpers, especially if the latter are performing much the same work as Carpenters. For the same reason, there is no way, from the Census to clearly identify apprentices as either an occupational or an educational category. Apprentices may be more akin to “helpers” than to qualified tradespersons, depending on the scope of their work assignments. However, there is no way to determine if apprentices are actually classified as helpers or how apprentices label themselves in the Census or the Labour Force Survey.

2.4 Long-Term Continuation

Long-term continuers at any point in time may be defined as those who have been apprentices for a longer period than the nominal duration in a trade (four years for most trades). More specifically, the 2007 NAS used a definition of long-term continuers as those who have been in their programs for at least 1.5 times the nominal program duration. On that basis, 27% of the NAS population was

defined as long-term continuers (Menard, Chan & Walker, 2008). The average time in the program for long-term continuers was 9.0 years (Crocker, 2010). A further interesting finding was that 60% of long-term continuers reported that they had met the minimum requirements for certification, but had not become certified. Part of this may be explained by the existence of persons who have not yet succeeded in passing the certification exam. Many other reasons, including lack of incentive to take that final step, may be advanced. However, NAS offers little evidence on such reasons.

A more detailed view of completion and long-term continuation is given by longitudinal studies which trace individuals through their apprenticeship careers. Several such studies have been completed by Statistics Canada. The most recent of these (Desjardins and Paquin, 2010) examined completion for the 1994 and 1995 starting cohorts in the six provinces for which individual data could be tracked. That study concluded that approximately half of those starting in these years had completed by 2009. Completion rates were higher in the industrial and mechanical trades than in other areas. Approximately 60% of completers took an amount of time equal to or less than 50% beyond the nominal duration of the program to complete it. There appeared to be no explicit link between the completion rate in a trade and the probability of exceeding the time required to complete the program.

Overall, this study indicates that long-term continuation is an established feature of apprenticeship and that completion rates do not reflect the number of persons who may be contributing to the trades labour force without having completed apprenticeship.

2.5 Trade Qualification

Trade qualifiers are individuals who “challenge” the certification exams after accumulating and documenting work hours as designated by the jurisdictions but who need not ever have completed, or even started, an apprenticeship. Those who pass the certification exam under these conditions are issued a provincial Certificate of Qualification and/or an interprovincial “Red Seal” endorsement as a journeyperson in the same way as is done for an apprentice. In most jurisdictions, in designated Red Seal trades, the interprovincial exam leading to the Red Seal endorsement is also the provincial certification exam, so the Red Seal endorsement simply immediately follows provincial certification.

Using data from the Registered Apprentice Information System (RAIS), Desjardins (2011) reported that, in 2007, 43% of all of journeypersons in Canada become certified by challenging the certification exams. However, the long-term average is

somewhat lower than this (Desjardins, 2010, Chart 3). More recent data (CCDA, 2010) show that, of 183,374 Red Seals issued from 2000 to 2009, 50,952, or 27% were to trade qualifiers with a decline in the proportion from 2006 onward.

It is worth noting that the success rate for trade qualifiers is significantly lower than for apprentices. For example, the 2010 CCDA Annual Report shows pass rates in Red Seal Exams for 2010 to be 76% for apprentices and 58% for trade qualifiers).⁶ What is not known is what happens to those who do not pass the exam. In general, it is quite possible for such persons to carry on working in the trade as before as long as they do not seek jobs for which a certificate is a requirement. Success rates for the two groups are examined in more detail under Component 2 of this report.

Presumably, those who take the trade qualification route have been working in the trade before certification without being apprentices. Indeed, the basic data on education levels indicate that a large proportion of the trades labour force is made up of such persons. The important policy question here is whether there is any advantage in encouraging more such persons to become certified using the trade qualifier route.

2.6 Alternatives to Apprenticeship Completion

As noted above, trade qualification is an obvious, and extensively used, alternative to apprenticeship. While not a route to certification, long-term continuation might also be considered a pathway to work in a trade in the sense that long-term continuers may simply work as if they were certified.

Other alternatives identified in the conceptual model are:

- Other training routes (e.g. school-based vocational training; workplace training; informal or self-learning)
- Immigration
- Temporary workers

In contrast to the extensive literature on apprenticeship, there seems to be a dearth of information on alternative pathways. The few sources that have been found are summarized briefly.

⁶ The issue of success in Red Seal examinations is also addressed in some detail later in this report.

2.6.1 Long-Term Continuation

The gap between the number of apprentices registering and the number completing each year has already been noted. An important question is “What happens to those who fail to complete their apprenticeship or who remain as apprentices for much longer than the normal period?” While the NAS 2007 sheds some light on conditions leading to long-term continuation, that survey did not ask detailed questions about outcomes for long-term continuers, on the assumption that these individuals continue to be trainees and not strictly part of the labour force. This is the subject of one of the chapters in this report.

Viewing the decision of long-term continuers to complete as a human capital investment decision is one way to examine the incentives to complete. A variety of reasons suggest that the net benefits from completion are not as obvious in apprenticeship as they may be in other forms of post-secondary education (PSE). This is not meant to imply that strong benefits from completion by long-term continuers do not exist. Instead, it is meant to offer some reasons why remaining an apprentice for a long period may be somewhat more understandable, and perhaps even economically rational, than being a university or college student for a long duration.⁷ For example, the direct and opportunity costs of remaining an apprentice are likely lower than remaining in student-like status in other forms of PSE.

Research by Ferrer and Riddell (2002) concludes that “sheepskin effects” (the gains in earnings associated with a credential, over and above years in school) associated with a bachelor’s degree are over 20% whereas the estimated gains from completing a college or trade program are much smaller, estimated at 3% to 5%. Similarly, Gunderson and Krashinsky (2012) found that males who acquire apprenticeship credentials earn 9.2% more than those who do not complete high school, whereas those who graduate community college earn 11.4% and those with university undergraduate degrees earn 29.1% more. They also conclude that the disparity in returns to program completion is even greater for females, with female university graduates earning 25.9% more than high school graduates but female apprenticeship graduates actually earning less than high school graduates.⁸ Boothby and Drewes (2010) estimate that the earnings premiums (compared to high school graduates) are 17% for male college graduates, 45% for

⁷ Ahmed (2010) concludes, that on average, apprenticeship completers have significantly higher hourly wages, annual income and employment probabilities than discontinuers.

⁸ This counterintuitive finding is likely due to the concentration of female apprentice completers into some very low paying service-sector trades.

male bachelor graduates, but only 12% for male trade graduates. In summary, the foregone earnings of being a long-term learner appear somewhat smaller for apprentices as compared to other types of PSE students.

Another distinction between apprentices and students engaged in most college or university programs is that, since apprentices are already working, program completion (especially in voluntary trades) may be less critical to a successful transition into the workforce.⁹ It has been suggested that program completion is valuable, in part, because it is used by employers to “signal” unobserved characteristics such as motivation and perseverance that are inherently difficult to measure directly (Weiss, 1995).

Returning to the logic of cost-benefit analysis associated with human capital theory, while employers may gain by having their apprentices complete their programs in terms of the increased training capacity and the skills of their workforce, these positive aspects may be partially offset by the higher wage costs that journey person status entails. Similarly, when the trainee does not acquire the credential, their marketability elsewhere is decreased which also may be viewed in a positive light by employers (Gunderson, 2009).

On the basis of interviews with employers of apprentices, Meredith (2011) found that some employers, due to the competitive nature of their industries, feel compelled to use apprenticeship as a “low-wage strategy” implying that the training effort is rather minimal. Meredith speculates that the finding of a prolonged time to completion in compulsory as opposed to voluntary trades (Hurrell, 2010) is evidence that some “apprentices may be choosing to postpone certification (and pay raise) in order to keep their jobs.”

2.6.2 Discontinuation

A second group that might be viewed as potential contributors to the trades labour market is those who discontinued their apprenticeship. At least some of these might be expected to continue to work in the trade as part of the large pool of uncertified workers. According to NAS 2007, only 18% of discontinuers, compared to 57% of completers, do continue to work in their trade (Crocker, Craddock, Marcil and Paraskevopoulos, 2010). As for outcomes for this group, Crocker, et. al. also reported that completers enjoy a 13% premium in annual income over discontinuers, which is close to that reported elsewhere (e.g. Boothby and Drewes, 2010; Gunderson and Krashinsky, 2012) to the premium of completers

⁹ Except for those with significant work-integrated learning components (e.g., co-op programs).

over those with only high school completion.

2.6.3 Uncertified/Unqualified Workers

The existence of trade qualifiers, by definition, implies that there are others who are working in the trades without taking the steps needed to attempt certification through the trade qualifier route. These may include some apprenticeship discontinuers and long-term continuers, but mainly consist of individuals who have not taken the apprenticeship route. 2006 Census data show that 17% of all of those working in the skilled trades have a certificate based on registered apprenticeship (Crocker, 2011). This is a crucial point as it clearly shows that apprenticeship is not the main route to trades work. Some uncertified workers are, of course, apprentices. Others may be presumed to be at various stages of qualification, depending on the specifics of their training and experience. Still others may have undergone firm-specific training, sufficient to do their job but insufficient to permit certification.

Lack of certification does not necessarily mean that persons are unqualified or under-qualified to do their specific jobs. Some individuals may be fully qualified but have not become certified. Nominally, this is the pool from which trade qualifiers are drawn. The important question is “how many persons are in essentially the same position as trade qualifiers but who never challenge the exams or who, after failing, carry on working as before?” There seems to be no way to identify these people. However, the fact that many uncertified workers are found in the trades indicates that jobs exist for which certification is not an essential requirement. Some are likely among the large group who have started but not completed apprenticeship – that is either long-term continuers or discontinuers.

This point permits a further distinction between those who may be considered unqualified (or under-qualified) in the sense of not possessing the required competencies to work in the full scope of the trade and those who may be qualified but have not become certified. The implication of this is that certification may be a sufficient but not a necessary condition for qualification.

2.6.4 School-Based Training

A more specific issue is that of apprenticeship-based versus school-based training. The growth of community colleges in Canada and other countries, particularly the United States and Australia, has led to the emergence of a more direct school-based route to some trades and trades-related occupations, as well

as to a range of “newer” occupations (e.g. in the information technology and medical) fields which might otherwise have used the apprenticeship route to training and certification.

A recent Australian study (Karmel and Fieger, 2012) of school-based vocational education and training (VET) makes some interesting points pertinent to both this form of training and more broadly to non-completion of training programs. The underlying issue was low completion rates in VET programs. The conventional explanation for this is that many participants do not need to complete. They need only to progress as far as needed to acquire the skills required for their jobs. The authors analyzed the benefits of completion for a population of such students. Their main conclusions were that completion of a VET qualification is beneficial, on average, across all outcome variables considered. The overall pay-off from completion is greatest for the ‘further study’ outcome, with the likelihood of a graduate engaging in further study being more than double that of a non-completer. Those students who were not in employment prior to training benefit greatly from the completion of their qualification and significant pay-off from completion in terms of wages were for those in higher level programs.

Many trades-like occupations have certification systems based on a combination of education and job experience without relying on the apprenticeship registration system to track these elements. Expansion of apprenticeship occupations in Canada has occurred mainly by division within traditional trades rather than by many new occupational areas adopting the apprenticeship model.

In Canada, there are some indications of growth in vocationally-oriented programs in high schools. For example, Ontario has four distinct program streams labeled University Preparation, University/College Preparation, College Preparation and Workplace Preparation (<http://www.edu.gov.on.ca/eng/document/curriculum/secondary/oss/oss.pdf>). In Quebec, where the year equivalent to Grade 12 is taken in the CEGEPs, there is more opportunity for school-based technical training prior to apprenticeship. Most other jurisdictions have a less explicit structure but most are also introducing vocational streams or courses into programs that historically, have not been strongly or explicitly differentiated. Provinces also have introduced high school youth apprenticeship programs and cooperative education programs which combine school work with job-experience. However such programs are not focused explicitly on the apprenticeship trades.

It is important to point out that none of these programs are explicitly oriented to apprenticeship, though some may offer credit towards either the technical or on-the-job components of apprenticeship. Following any such programs, the general expectation is that persons interested in a trade will enrol in an apprenticeship program. In non-compulsory trades it is quite possible for an individual to use a

school-based program, in either high school or college level, as an entry point to a trade without registering as an apprentice. Indeed, this may account for the fact that about the same proportion of persons in the trades (about 17% according to the 2006 Census), claim to have some other form of trades or vocational certificate as claim a registered apprenticeship certificate. However, it is not possible to acquire a provincial certificate, which conveys journeyperson status, without completing an apprenticeship or acquiring equivalent workplace experience to challenge the certification exam as a trade qualifier. In compulsory trades, apprenticeship is the only route to journeyperson status. This, itself, is a significant issue because of the variation across jurisdictions in the designation of compulsory trades.

2.6.5 Workplace Training

Apprenticeship is, of course, an important form of workplace training. However it differs from other forms in that the training is not intended to be job- or firm-specific but more generic to an occupational area. Indeed, one of the arguments for a low level of employer engagement in apprenticeship is the “poaching” argument, raised in the Wolter and Ryan and Gunderson reviews. This issue arises specifically because apprenticeship is generic. In contrast, other forms of workplace training may be seen as an investment not just in an individual but also in the firm, and might serve as an incentive to retention.

Workplace training is also related to what is more generally known as non-formal learning or continuing education, in which a worker may acquire skills through a variety of means, not least of which is now the Internet. Indeed, particularly with the growth of internet-based resources, a wealth of material is now available which, diligently pursued, could provide technical training for those already working in trade occupations who wish to become certified without pursuing a registered apprenticeship program. A worker in a trades-related job could potentially use these resources along with job experience, to prepare for certification as a trade qualifier or simply to learn aspects of the trade important to the job. Unfortunately, no information is available on the extent of this type of activity.

Very little information seems to exist on the state of workplace training in Canada. The Canadian Council on Learning (2008) cites Statistics Canada figures indicating that 56% of Canadian workplaces offer some form of workplace training. This figure is considerably lower than comparable figures for most European countries. Most Canadian workplace training seems to be of a basic nature, including occupational health and safety, orientation, or technical matters specific to the organization (CCL, 2008). In the trades, such training might supplement the core training acquired by apprentices. For example, an

automobile dealer may need to train a service technician in manufacturer-specific tools or processes.

To the extent that such training overlaps with aspects of apprenticeship training, it might be seen as filling a gap between the full scope of a trade expected in apprenticeship training and the more limited scope that might be characteristic of a job. Workers trained in this manner may not need a level of training comparable to journeyperson, but may still be considered a practitioner of the trade. The theoretical argument articulated by Wolter and Ryan (2011) may help explain this phenomenon, since employers should be better able to appropriate the returns from firm-based training than from general apprenticeship training, even if the two yield much the same skills.

2.7 Deterrents to Vocationally-Oriented School Programs

One of the deterrents to high school vocational programs is that most of the academic literature is strongly critical of explicit streaming in high schools. The main argument is that streams are generally treated as “levels,” with lower ability students being consigned to workplace preparation streams from which there is no exit. Streaming is also seen by many as discriminatory in that minority or low income students tend more often to be found in the “lower” streams (Oakes, 2005). Taylor (2010) has noted that attempts to bring about greater convergence of academic and vocational programs in Canada are inhibited by the ambivalent position of vocational education, particularly the public perception that vocational programs limit a student’s opportunities. The tendency for most Canadian students to aspire to university attendance, as already noted, relates to this in that students are unlikely to select, early in their high school careers, programs that prevent them from at least having an opportunity for university entrance.

2.8 Apprenticeship and its Alternatives Internationally

A series of reports issued around the 2012 G20 summit in Mexico (G20, 2012; International Labour Organization (ILO), 2012; L20, 2012) attest to the high level of international interest apprenticeship. All of these reports are strongly supportive of apprenticeship as a mode of training and of its contribution to labour force development. Many other countries appear to be experiencing similar issues to Canada in encouraging young people to take up apprenticeship and employers to hire and train apprentices. The underlying concept and definition of apprenticeship appears to be similar across most countries references in these reports. Issues of negative perceptions of trades and apprenticeship, potential labour shortages, and ensuring quality of training are also common. However, apprenticeship models and participation rates vary considerably.

Among 14 countries reviewed in the ILO report to the G20, Canada has one of the higher participation rates, as measured by apprentices per 1,000 persons employed (30 per 100 for Canada compared to highs of 44, 40 and 39 for Switzerland, Australia and Germany respectively and lows of 14 and 10 for Ireland and the United States). However, female participation in Canada is the lowest of all countries, at 15%, compared to a high of 54% in England. Canada also has a low proportion of those aged less than 25 (compared to highs of 100% in Austria and Switzerland but only 5% in the United States). Related to this, youth unemployment tends to be lowest in those countries that have high apprenticeship participation rates. Canada's ten-year average youth unemployment rate of 12.7% is in the mid-range among the countries reviewed.

The organization of trades and apprenticeship training in Germany and some other European countries often is held out as a model for trades training. Tremblay and LeBot (2003) summarize the main features of the German system. German secondary education is divided into three distinct tracks, which students enter at age 15-16. The highest track yields a direct pathway to university. The second "general education" track offers opportunities for various forms of technical education below the university level. Students who do not continue in the general education track enter a "dual system," which combines school-based and workplace-based training. Apprenticeship is part of this system. In Germany, the opportunity to move from the dual system to tracks through which they can qualify for post-secondary studies is limited (though the opposite is possible). This contrasts with systems in most English-speaking countries where tracking is discouraged, for the reasons mentioned above, and the goal is to ensure that pathways to post-secondary education and careers remain open as long as possible.

The dual track is the one that attracts most interest among those interested in apprenticeship. The close integration of school and workplace training that characterizes that track is well established and there is a long history of employer, union and state support of that system. Historically, German employers have been much more accepting of their obligation to train and apprenticeship is thus much better established than in other systems. An obvious contrast with Canada, for example, is that German students typically begin their workplace training at age 15-16, whereas in Canada the median age of a beginning apprentice is more like mid-20s.

The German system has come under considerable pressure in recent years, Lehmann (2004) argues that such a system can thrive only in a society which values apprenticeship and trades occupations. This seems to be less true now than in the past in Germany. There are indications that Germany is beginning to

suffer from some of the same problems as North America, in terms of the mismatch between supply and demand for apprenticeship training (Zwick, 2007).

The argument that early streaming inhibits many German youth from participating in higher forms of education has intensified after results of the early cycles of OECD's Programme for International Student Assessment (PISA) showed relatively poor results for German students (Bulmahn, 2002). The German government has responded by making it easier for employers to take on apprentices and by opening the system to a number of new occupations (Federal Ministry of Education and Research).

Parey (2009), in the British setting, examined vocational schooling as an alternative to apprenticeship in the context of a model in which economic shocks affect the local number of apprenticeship positions available. Parey showed that, at the margin, individuals substitute between apprenticeship training and full-time school-based vocational training. That is, as apprenticeship opportunities dry up, individuals turn to school-based training as an alternative. The results show that firm-based apprenticeship training leads to substantially lower unemployment rates. However, this advantage is transitory and fades out over time. There were significant differences in wages. This suggests that alternatives to apprenticeship confer similar overall levels of productivity but that apprenticeship training improves early labour market attachment relative to vocational schooling.

Jacoby (2010) gives a brief history of apprenticeship in the United States, pointing to the decline of apprenticeship in that country since the 1960s. This decline was driven, first, by concerns over racial discrimination in selection of apprentices but also by the general decline of organized labour. Jacoby also argues that work relations appear to have changed more recently as forms of labor contracting that provide fewer benefits and security are on the rise. On the other hand, Becker's (1993) work on human capital theory seems to have encouraged a rethinking of the economics of training and apprenticeship, and particularly of training as an investment. In contrast to Gunderson's view, Jacoby argues that apprenticeship contracts may be rationalized as efficient devices to prevent youths from absconding with the capital employers have invested in them. However, it remains to be seen whether this will lead to a new era for traditional apprenticeship.

In the United States, certification of tradespersons is a state responsibility. As far as we can determine, apprenticeship and school-based training are alternative routes to work in the trades in many U.S. states. In many trades, completion of a school-based program can serve as a basis for entry without having to register as an apprentice. Many public and private institutions offer such training, with a certificate at the end that can be used as a means of obtaining an entry-level position in a trade. For some trades, contractors must be licensed, and a condition

of licensing is that they employ either apprentices or “trainees,” where the latter have completed or enrolled in a school-based program but are not registered as apprentices. An example is California, (<https://www.dir.ca.gov/DAS/ECU/ElCat.html>) where several classes of trainees, (including apprentices as one class) are identified as eligible to work for licensed electrical contractors. Once trainees accumulate sufficient work experience, they become eligible to write the certification exam. With further experience, they can become eligible for licensing as a contractor.

Much of this literature seems to suggest that alternatives to apprenticeship can contribute to meeting labour market demand in the skilled trades. However, none of these alternatives seems to have taken hold in the Canadian context. Part of the problem is that such programs do not replace apprenticeships and usually carry only a small amount of credit towards the in-school portion of apprenticeship.

The limitation of all of this, from the point of view of this study, is that all of the alternatives involve formal training as some sort as prerequisite to, but not as a replacement for, apprenticeship, as a route to provincial certification. Since, under the current Canadian model, apprenticeship is a prerequisite to provincial certification, alternative routes cannot be treated as a different source of entry to the trades. Trade qualification, common as it is, does not add to the trades work force because trade qualifiers presumably are already established workers. The real issue for trade qualification is whether individuals who take this route should be treated essentially as apprentices before they write the certification exams or whether they are more appropriately treated as part of the regular trades work force. There seems to be no data available on this point.

A key point here is that a fundamental distinction needs to be made between certificates issued by schools or colleges and those issued by provincial/territorial apprenticeship authorities. The first may yield entry to the trade but it cannot lead to journeyman status without also taking the apprenticeship or trade qualification route. In compulsory trades, apprenticeship is the only permitted route (with some exceptions for immigrants and others who may have been working in a trade before it was designated as compulsory).

2.9 Labour Market Supply and Demand in the Trades

This is not fundamentally a study of labour market supply and demand. However, interest in apprenticeship and its alternatives, and especially in improving apprenticeship completion rates, seems to be driven by a widespread perception that there is a current or potential shortage of labour in the skilled trades. It is therefore worth looking briefly at what is known about labour market supply and

demand in the trades.

One of the largest international surveys of labour market demand is that regularly conducted by Manpower, Inc. The latest survey in this series (Manpower, Inc., 2010) contacted 39,000 employers in 33 countries. Worldwide, respondents cited the skilled trades as the field in which employers are having the most difficulty in filling positions. Canada was among the countries in which the fewest employers reported having difficulty filling positions (24% compared to a global average of 38%). Nevertheless, skilled trades were at the top of Canada's list of areas of shortage.

Within Canada, Pyper (2008) investigated the general issue of skilled trades employment using data from the Labour Force Survey (LFS). This study shows that unemployment rates in the trades were substantially higher than for the labour force as a whole during the 1990s; however, by 2007 the gap had narrowed to the point where the trades had very similar unemployment rates to other occupations. The age distributions also showed trades workers to be slightly younger than the average for all occupations. The ratio of entrants to near retirees in 2007 was less than one (i.e. fewer entrants than retirees) the lowest for the period under study. This indicates a net outflow of workers. This reflects the more general trend in the labour force, where the baby boom generation is nearing retirement but the replacement cohorts of younger workers are much smaller than in that generation.

A recent report by the House of Commons Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities (2012) provided projections of labour market supply and demand in major occupational areas for the period to 2020. For the skilled trades, a mixed picture emerged. According to COPS projections, many trade areas will be in balance or have a surplus of supply over the rest of this decade. However, these projections may mask shortages in specific regions or specialized jobs. This is consistent with results found by Crocker (2011). Also, the COPS projections indicate a slight shortage of mechanics over the period. However, the Canadian Automotive Repair and Service Council reported to the Committee that a shortage exists in this area. Also, the Construction Sector Council was reported as projecting a shortage of some 156,000 workers between 2012 and 2020. (This includes occupations other than the trades).

The most recent version of the Construction Sector Council projections (Construction Sector Council, 2013)¹⁰ reports continued growth in the construction

¹⁰ This is a more recent report than that used in the House of Commons Committee report

sector since the 2009 recession. However, the rate of growth is projected to be slower than that given in the 2012 outlook, due to continued expansion in the non-residential market and a decline in jobs in the residential market. Some of the change is attributed to delays in infrastructure projects. The national profile is described as one of mild recovery and limited expansion.

Overall, the construction labour force is projected to increase over the 2013-2021 period by 42,000 due to expansion and to require about an additional 210,000 workers to replace those retiring. (Again, this includes occupations other than the trades). The outlook varies considerably by region, with continued recovery anticipated in British Columbia, Alberta, Manitoba, Ontario and Prince Edward Island, higher peaks and valleys in Newfoundland and Labrador and Saskatchewan and sustained peaks in Quebec, New Brunswick and Nova Scotia.

The report points to a number of challenges in projecting and managing the construction workforce. These include working in remote areas for extended periods, concentration of demand in a few trades and in specializations within trades, highly volatile and uncertain project labour requirements, above-average age profiles and increasing numbers of temporary foreign workers and new immigrants.

The Crocker (2011) report already cited also gave projections of labour market supply and demand in selected trades. Demand projections for carpenters/cabinetmakers, electricians, automotive service technicians, chefs and cooks and plumbers/pipefitters/steamfitters, for the period 2008 to 2018 were first derived from the Canadian Occupational Projection System (<http://www23.hrsdc.gc.ca/w.2lc.4m.2 @-eng.jsp>). These were then fitted to the projected number of apprenticeship completions in these trades over the same period. While the picture is different for different trades, the general pattern is one in which the number of completing apprentices will exceed total labor market demand from about 2014 onward. In the pipe trades, in particular, the number of completing apprentices is expected to more than double the projected demand. The exception to the pattern is for chefs and cooks, where demand is expected to exceed apprenticeship completions by a factor of about three. The latter area, of course is one of high demand, with much of this demand being filled by individuals without apprenticeship credentials. Also, it is important to note that there is no assurance that all apprenticeship completers will actually continue to work in trade occupations.

These projections were not conducted on a regional basis because the numbers by trade and region tend to be small and unreliable. It is quite likely, as indicated

references in the previous chapter.

by the Construction Sector Council projections and the House of Commons committee report, that the national figures mask significant regional differences. Indeed, it is possible that much of the concern over labour shortages is driven by regional employment demands rather than by any general shortage. If so, the labour shortage issue is more a matter of mobility than of overall demand and supply. This is particularly relevant to this study because facilitating mobility is a core goal the Red Seal program, and also because it points to a need for regional and occupational breakdowns in any analysis of supply and demand.

On the surface, the available evidence suggests that a balance may be emerging between supply and demand for the rest of this decade. However, the age distribution of the trades work force is such that the greatest demand from retirements may not be felt until the next decade. This, of course, is a cursory view and does not take account of varying demand across trades and regions or other factors which may yield shortages in some areas and surpluses in others. It also does not explicitly address the qualifications of trades persons or the balance of supply and demand for certified workers. Chapter 6 of this report addresses this issue in somewhat more detail, in relation to the increase in apprenticeship registrations and completions.

2.10 Outcomes of Apprenticeship

Wolter and Ryan (2011), as previously noted, addressed issues of defining the outcomes of apprenticeship and particularly of the methodological difficulties inherent in obtaining unbiased comparative estimates of outcomes. However, these authors provide only a limited review of empirical research on outcomes, all from European studies. Since outcomes are at the heart of this study, it is necessary to examine any Canadian research on outcomes. While this is also limited, a few recent studies do shed some light on the issue. In particular, work based on the 2006 Census and the 2007 NAS has helped advance our understanding of apprenticeship outcomes.

2.10.1 Completion and Certification

Completion and certification are the most obvious short-term outcomes. Completion numbers and rates in Canada have been extensively documented, with the basic results already given in Section 2.2. This section looks more specifically at completion and certification as outcomes.

Cadieux (2010) looked at factors contributing to apprenticeship completion and time to completion, based on the 2007 NAS survey. Both bivariate cross-

tabulations and regression models were used, with effects being considered robust if they were statistically significant under both forms of analysis.

The main results may be summarized as follows:

Completion Incidence (whether or not the apprentice had competed at the time of survey)

Positive effects

- Prior technical training in the trade

Negative effects

- Older age at registration
- Less than high school education

Time to Completion (shorter time to complete is the positive result)

Positive effects

- Better high school grades
- Prior post-secondary experience
- Prior technical training in the trade
- Registration in British Columbia

Negative effects

- Older age at registration
- Lack of high school education
- Registration in Newfoundland and Labrador, Nova Scotia or Quebec
- Being married, having dependents or having a disability at registration
- Employed in a larger firm or in a unionized environment
- Lack of work
- Employer not following rules

Assuming that one of the goals of apprenticeship policy is for individuals to complete and obtain certification at the end of their training, these results provide a number of insights into possible policy directions. Some of these, such as providing technical training prior to completion or requiring high school completion as a condition of entry, are at least nominally within the control of provincial apprenticeship authorities. Of course, taking measures of this type might have the side effect of depressing initial registrations. This raises the more important point of whether this would have an overall negative or positive effect on the trades labour market. Other factors, such as age at entry, may also be subject to policy influence. For example, age of entry is likely related to the preference of students for other post-secondary options and to the absence of secondary school programs that yield a direct path to apprenticeship, as already noted. This could potentially be changed by policies designed to strengthen the link between secondary education and apprenticeship.

It is interesting to note that, since all of those participating in the NAS 2007 survey were apprentices, it would be expected that all of those completing would also have become certified. In fact, the NAS results show that 11% of those classified as completers in 2007 had not received certification. Also, 60% of those classified as long-term continuers in 2007 reported that they had met the technical and on-the job training requirements for completion but had not become certified (Ménard, Menezes Chan and Walker, 2008). This gap is likely related to persons not having taken or passed the final certification examination. On the other hand, since trade qualification is also a route to certification, a significant proportion of those becoming certified (See Chart 3.1) have not followed the apprenticeship route to certification. The implication is that apprenticeship completion and certification must be examined as distinct outcomes. This point is addressed in more detail in Chapter 5.

It is well established that apprenticeship registration tends to be pro-cyclical. However, there seems to be little evidence on whether this is also true for completion. Ahmed (2010) investigated this point in a study based on the NAS 2007 data. Multiple measures of unemployment rates at national and provincial levels, and within occupational groups, were examined in relation to completion rates and time to completion for NAS participants, controlling for other socio-demographic factors.

The results indicate that an increase of one percentage point in the provincial unemployment rate decreases the probability of completion by two percent and increases the probability of long-term continuation by more than one percent among NAS participants. However, the impacts of unemployment rates are inconsistent across outcomes and across measures of unemployment rates used. For example, provincial unemployment rates are negatively related to the probability of completion and positively related to the probability of long-term continuation. Unemployment rate by NOCS shows the opposite effect. This may suggest that provincial economies exert a differential, and offsetting, effect relative to the occupational employment picture.

Ahmed noted that her study was limited by the fact that Canada did not experience any major labour market downturn during the 2002-2007 period of the NAS sample selection and survey. The results are comparative over provinces and occupations but not over time. In this sense, it is not possible from Ahmed's study to determine in any definitive way the sensitivity of completion to the business cycle. However, there is some indication, as shown in Figure 3.1, of a drop in apprenticeship registrations during the 2009 recession.

2.10.2 Labour Market Outcomes

The Census has been the main source of estimates of labour market returns to education in Canada. However, until the 2006 Census, apprenticeship could not be separated from trades training more generally. Early estimates (Boothby and Drewes, 2006; Gunderson and Krashinsky, 2004) were thus based on undifferentiated data. These show that returns to vocational education to be generally higher than for high school completion but lower than for academic post-secondary programs. For example, in the 2000 Census, weekly earnings for those with a trades certificate were 11.5% higher than for high school graduates among men but only 3.6 percent higher for women. This compares to a premium of 18.8% and 51.2% for male college and university graduates and 19.6 and 62.1% for female college and university graduates, all relative to high school completion (Boothby and Drewes, 2006).

The 2006 Census included for the first time two categories, “registered apprenticeship certificate” and “other vocational or trade certificate”, intended to separate trades certification from other forms of degrees or certificates. While limited in a number of ways, these categories do permit some analysis of labour market and other outcomes for individuals in these categories relative to other education levels.

Boothby and Drewes (2010) used this feature of the 2006 Census data to make more precise estimates of the apprenticeship outcomes. Among men in the construction and technology trades, earnings premiums were 13.8% and 13.5%, compared to high school graduates. For the production and mechanical trades, the premiums were 12.0% and 8.6%. However, for males in the personal services and culinary arts trades, the earnings gap was negative, at more than 17% below those of high school graduates.

For the few women in male-dominated apprenticeship trades, premiums were higher than for males, at 27%. However, the gap was also negative for women in those trades where women are highly represented, specifically personal services and culinary arts.

Crocker (2011) focused mainly on alternative pathways to entry to the trades. However, in a brief section on labour market outcomes, also based on 2006 Census data, Crocker found results similar to those of Boothby and Drewes, with some greater detail being presented for individual trades, specifically for the top 15 trades (by total numbers) and for all other trades as a group.

Overall, the employment rate in the trades was higher than that for the labour force as a whole. However, there was considerable variation across trades, ranging from 93% for hairstylists/barbers and automotive service technicians to 83% and 82% for painters/decorators and cooks respectively. Overall median

annual income was lower for the top 15 trades as a group than for all other trades and for all other occupations combined. However this reflects that fact that the top 15 trades includes several large groups (e.g. cooks, hairstylists, painters and decorators) that are at the low end of the income distribution. Those in the traditional mechanical and construction trades tended to have incomes substantially higher than the median for all other occupations. In general, these results reveal more about variations across the trades than about overall incomes, indicating the value of conducting separate analyses by trade.

Consistent with other studies, income was also found to be affected by education level. Those holding registered apprenticeship certificates tended to have the highest income levels within individual trades. Indeed, the picture for the trades is shown to be significantly different from that for other occupations. In the latter case, income is related to education level in a relatively linear way. However, for those in the trades, the relationship is non-linear, with those holding registered apprenticeship certificates having higher incomes than those with more academic education, including college or university graduation.

The large gender gap revealed in other studies was also apparent in this study. Aboriginal persons working in the trades were also found to have lower incomes than others. However, immigrants tended to have slightly higher incomes than did native-born Canadians.

Gunderson and Krashinsky (2012) also used 2006 Census data, but somewhat different methodology, to arrive at estimated premiums of 24% for male apprentices relative to high school graduates, 15% relative to those with other forms of trades training and 2% more than college graduates. Again the picture for women was drastically different, with lower returns for apprenticeship relative to high school graduation and substantially lower than to college graduation. Like Boothby and Drewes, these authors observe that the male/female difference lies in the concentration of women in food and personal services.

Because Gunderson and Krashinsky used multiple methods, including regression decomposition, to arrive at their estimates, these may be considered more robust than other estimates. This suggests that earlier studies may have underestimated the effects of apprenticeship. The ability to differentiate apprenticeship training from other forms of trade training yields a significant improvement in the precision of estimates.

Nevertheless, there are also some limitations in these studies. First, there is the inherent limitation that the 2006 Census does not identify those with post-secondary qualifications in addition to apprenticeship. All education levels are coded as highest, so those with apprenticeship certificates are identifiable only if

they have no higher form of education, as defined by the Census categories. A second major limitation is that the studies do not give detailed breakdowns by individual trade or by region and thus do not adequately account for overall wage differences by occupation or geographic location. Finally, the studies do not differentiate between those with and without apprenticeship certificates who are actually working in the trades and those who are working in other occupations.

One of the NAS 2007 research studies (Ahmed, 2010) was specifically concerned with the labour market impact of apprenticeship completion compared to discontinuation. This issue is of particular importance because of the large number of uncertified persons working in the trades. The latter group comes from many sources, including apprentices themselves and those who may have started but discontinued their apprenticeship program.

Ahmed showed that, on average, completers have significantly higher hourly wages, annual income and employment probabilities than discontinuers. Overall, completers' average annual income is about \$8,000 more than that of discontinuers. Similarly, considerably higher percentages of completers than discontinuers have permanent and full-time jobs with monetary and non-monetary job satisfaction.

Ahmed also found that outcomes vary considerably by region and by trade, and that these effects are independent of the completion effect. Indeed, these factors account for more of the variation in incomes than the human resource factors of education, age and completion status. Relative to those in Ontario, respondents in the Atlantic region and Quebec have significantly lower, while those in the Prairie region, British Columbia and the territories have higher probabilities of employment. Those in the Atlantic region have the lowest average hourly wage and annual income, while those in the Prairie region the highest. Among the provinces, Alberta has the highest average hourly wage, annual income and probability of employment, while P.E.I. has the lowest hourly wage and income.

Among all the trade groups, on average, welders have the highest wage and annual income, followed by heavy equipment operators. Wages and incomes are lowest in the hairstylist/esthetician and food services worker trade groups. The differences are quite large, with the average annual income of welders about \$23,000 more than that of automotive services workers, while that of hairstylists/estheticians and food services workers is about \$16,000 less than that of automotive services workers. Gender differences are also quite large, with a strong interaction between gender and trade. Women earn less mainly because they find themselves mainly in low-income trades.

Regression analysis results indicate that the factors influencing labour market outcomes act largely independently of each other, rather than being highly inter-correlated. This suggests that future studies should separately examine especially regional and occupational differences.

A recent study by the Canadian Apprenticeship Forum (CAF, undated) compared labour market outcomes for apprentice completers relative to three other groups: trades program completers, graduates of selected trades/technical college programs and all college completers (including trades programs). The data sources used included the 2007 NAS, the Labour Force Survey, along with provincial college graduate follow-up surveys. Provincial results were presented for four provinces, British Columbia, Alberta, New Brunswick, and Newfoundland and Labrador.

The following are the main findings of this study:

- Individuals who pursue and complete an apprenticeship are more likely than any other selected group to be in the labour force, both shortly after completion and several years after completion
- According to several provincial data sources, apprenticeship completers find jobs much sooner after graduation than those in any of the comparison groups
- According to both the British Columbia and Alberta college data, completers of apprenticeship programs are most likely to be employed in a job that is directly related to their training.
- Individuals who pursue and complete an apprenticeship earn higher wages than those who complete only a trades program, those who complete a technical/applied program, or those who do not complete any post-secondary program.
- Apprenticeship completers who received their Certificate of Qualification earned about 20% more than those who completed their apprenticeship but did not have a Certificate of Qualification.
- Apprenticeship completers appear to be more likely to enjoy greater job satisfaction and better job security than those in other groups.

The authors note that the findings are limited by the exclusion of the two largest provinces, Ontario and Quebec and by the small sample sizes available for some trades. Also, results are not comparable across data sources because of differences in time periods covered by the various surveys. We would also add that the results are based mainly on univariate analysis, without controls for demographic factors or other externalities. Finally, no sampling error estimates were given, making it difficult to distinguish between significant and chance

effects. Nevertheless, the results are similar to those found in some other studies and many of the observed differences are large enough to exceed the sampling error rates of major data sources such as the Labour Force Survey.

2.11. Issues in Apprenticeship Arising from the Literature

The evidence indicates that many persons have historically found their way into trades occupations by routes other than apprenticeship. Meredith (2010) argues that the conventional view of apprenticeship as the primary entry vehicle to the trades does not represent the reality of today's labour market, where sources of labour supply and employer commitment to apprenticeship are both widely variable. Meredith's essential argument is that demand for trades labour is being met in a variety of ways, of which apprenticeship is only one. Meredith's direct evidence is based on interviews with a small number of employers in a single jurisdiction. Meredith reports that

"The interviews revealed sharp variations in employers' workplace training efforts, challenging the twin suppositions that employers of apprentices are uniformly high contributors to skill formation, and that high training-related costs risks generally deter their participation. Differences in training behaviour are attributed to high-skill versus low-skill business strategies that in turn reflect differing product markets and regulatory constraints. Whatever the level of their training effort, all of the participating employers are able to minimize the training-related risks that have been cited as the principal rationale for employer subsidies." (Meredith, 2008)

Meredith also reports that 2006 Census data "show strong inter-occupational differences in the certification rate and in the ratio of certified to less-than-certified workers, suggesting a de facto hierarchy of trades occupations." This is supported by the Statistics Canada "cohort studies" cited earlier, which show an overall completion rate of about 50% after a decade, for apprentice cohorts in the 1990s but also show wide variations in completion rates, and hence of the proportion of certified personnel across trades.

Gunderson (2009) identifies a number of other issues in the relationship of apprenticeship to the trade labour force. Aside from the perennial issue of low completion rates, these issues include barriers to entry, the dominance of men in most trades, employer responsibilities, the balance between in-school and workplace training components, recognition for prior learning, the appropriateness of current apprenticeship durations and approaches to in-school training.

A broader issue noted in the Gunderson review and in Meredith's report, is the

low level of industry participation, despite the fact that apprenticeship is viewed fundamentally as an industry-driven enterprise. Gunderson's perspective (along with that of Wolter and Ryan previously cited) is that many employers are reluctant to take on apprentices because of the generic nature of the training, which makes it easy for individuals to move on once trained. The absence of compulsory certification is also a likely cause because in most trades there is no requirement to hire certified personnel. The specifics of labour market demand for certified personnel, and specifically for those trained through apprenticeship, have been adequately investigated. Related to this, industries such as construction tend to rely on short-term contracts so that employers cannot ensure employment for a long enough period to allow apprentices to complete or promise work after completion

An important question arising from all of this is whether apprenticeship, or more specifically certification, is a necessary or valued requirement for work in the trades. Certification obviously conveys substantial economic value, as evidenced by higher wages for certified trade persons. The question is whether work in some trades where certification rates have historically been low can be capably done with a few certified personnel, alongside many others who are not certified, including long-term apprentices, those who might be more appropriately classified as "trades helpers" (e.g. NOC-S H82) or those who perform tasks of a more limited scope than those expected of certified workers.

Chapter 2 References

- Ahmed, N. (2010). National Apprenticeship Survey 2007: *Labour Market Outcomes of Canadian Apprentices*. Ottawa: human Resources and Skills Development Canada.
- Ahmed, N (2010). National Apprenticeship Survey, 2007: *Influence of Labour Market Conditions on Completion and Long-Term Continuation of Apprenticeship Programs in Canada*. Ottawa: Human Resources and Skills Development Canada.
- Alberta Contractor License Requirements. Retrieved February 23, 2012 from (<http://www.handy canadian.com/contractor-license-alberta.asp>)
- Becker, G. (1993). *Human capital: A Theoretical and Empirical Analysis with Special Reference to Education*. Chicago, MI: University of Chicago Press.
- Boothby, D. and Drewes, T. (2006). *Postsecondary Education in Canada: Returns to university, college and trades education*. Canadian Public Policy. 32,1,1-22.
- Boothby, D. and Drewes, T. (2010). *Returns to Apprenticeship in Canada*. Working Paper #70 Canadian Labour Market and Skills Researcher Network.
- Bulmahn, E. (2002). *PISA: The Consequences for Germany*. OECD Insights, 231-232. Paris: OECD.
- Cadieux, B. (2010). *National Apprenticeship Survey 2007: Factors Affecting Completion of Apprenticeship*. Ottawa: Human Resources and Skills Development Canada.
- California Department of Industrial Relations (2011). *Electrician Certification Program*. Retrieved, February 10, 2012 from (<https://www.dir.ca.gov/DAS/ECU/EleCat.html>).
- Canadian Council on Learning. (2008). *Availability of Workplace Training*. Retrieved May 8, 2011 from (http://www.ccl-cca.ca/pdfs/CLI/2008/CLI2008WorkplaceTraining_EN.pdf).
- Canadian Council of Directors of Apprenticeship (2009). *CCDA Annual Reports, 2004-2009*. Retrieved February 15,2012 from (<http://www.red-seal.ca/images/PastAnnualReports.html>)

Canadian Council of Directors of Apprenticeship (2011). *CCDA Annual Report, 2010*. Retrieved February 15, 2012 from (http://www.red-seal.ca/images/2010AR_index-eng.html).

Canadian Occupational Projection System. (<http://www23.hrsdc.gc.ca/w.2lc.4m.2@-eng.jsp>)

Construction Sector Council (2011). *Construction Forecast Reports*. Retrieved February 10, 2012 from (<http://www.constructionforecasts.ca/>)

Crocker, R. (2010). *National Apprenticeship Survey 2007: Summary Report*. Ottawa: Human Resources and Skills Development Canada.

Crocker, R. (2011). *Understanding Pathways to the Skilled Trades*. Unpublished Report Submitted to Human Resources and Skills Development Canada.

Crocker, R. Craddock, T., Marcil, M and Paraskevopoulos, J. (2010). *National Apprenticeship Survey 2007: Profile of Participants*. Ottawa: Human Resources and Skills Development Canada.

Desjardins, L. (2010). *Trade qualifiers in the Skilled Trades in Canada: An Overview*. Education Matters, Vol. 7, No. 5. Ottawa, Statistics Canada. Retrieved February 2, 2012 from (<http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?lang=eng&catno=81-004-X201000511367>)

Desjardins, L and Paquin, N. *Registered Apprentices: The Cohorts of 1994 and 1995, One Decade Later*. Ottawa: Statistics Canada. Retrieved February 2, 2012 from <http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=81-595-m&lang=eng>.

Ferrer, A.M., and W.C. Riddell. 2002. "The Role of Credentials in the Canadian Labour Market." *Canadian Journal of Economics*. Vol. 35, No. 4. p. 879–905.

Human Resources and Skills Development Canada/Canadian Council of Directors of Apprenticeship. *Ellis Chart*. <http://www.ellischart.ca/home.jsp?lang=en>.

G20 Task Force on Employment (2012). *Country Experiences in Quality Apprenticeships*. Author

Gunderson, M. (2009). *A Review of Canadian and International Literature on*

Apprenticeship. Ottawa: Human Resources and Skills Development Canada. Retrieved May 1st, 2011 from (<http://www.handycanadian.com/contractor-license-alberta.asp>)

Gunderson, M. and Krashinsky, H. (2004). *Rates of Return to Apprenticeship and Post-Secondary Education in Canada*. Ontario Ministry of Training Colleges and Universities.

Gunderson, M. and Krashinsky, H. (2012). *Returns to Apprenticeship: Analysis Based on the 2006 Census*. Working Paper #99. Canadian Labour Market and Skills Researcher Network.

House of Commons Canada (2012). *Labour and Skills Shortages in Canada: Addressing Current And Future Challenges*. Report of the Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities. Ottawa: Author.

Human Resources and Skills Development Canada. *Ellis Chart*. <http://www.ellischart.ca/h.4m.2@-eng.jsp>

International Labour Organization. (2012). *Overview of Apprenticeship Systems and Issues*. Geneva: Author.

Jacoby, D. (2010). *Apprenticeship in the United States*. Economic History Encyclopedia. Retrieved February 10, 2012 from (<http://eh.net/encyclopedia/article/jacoby.apprenticeship.us>)

Karmel, T. and Fieger, P. (2012). *The Value of Completing a VET Qualification*. Adelaide: National Centre for Vocational Education Research.

Lehmann, W. (2007). *Is Germany's Dual System a Model for Canadian Youth Apprenticeship Programs?* Canadian Public Policy, 26,2,

L20. (2012). *Quality Apprenticeships A Common Approach by G20 Countries* An L20 Note for the G20 Employment Task Force. Author.

Manpower, Inc. (2010). *2010 Talent Shortage Survey Results*. Milwaukee, WI: Manpower Inc., Retrieved February 15, 2012 from

(http://docs.google.com/viewer?a=v&q=cache:DdtKJymb9nEJ:files.shareholder.com/downloads/MAN/817822014x0x297372/dab9f206-75f4-40b7-88fb-3ca81333140f/09TalentShortage_Results_USLetter_FINAL_FINAL.pdf+2009+Talent+Shortage+Survey&hl=en&gl=us&pid=bl&srcid=ADGEESi7laGXBguj0XhRIDntFJVjMwZMgkbQOqkq2aeclec0LZV3plF0SZZnAmVeNa8GO3KwdZhlkgrhRY4UsXW3CsQuvkXVcm4IOqygLbP9zQaER7PU1txIWzGKvrYOwnR5GmVv9CD&sig=AHIEtbRkovmzYQSisKqyOFB7Vw4qf-C67g)

Ménard, M., Menezes F., Chan, C. and Walker, M. (2008) *National Apprenticeship Survey 2007: National Overview Report*. Ottawa: Statistics Canada, Catalogue 81-598-X.

Meredith, J. (2010). *Crucial Contributors? Re-examining Labour Market Impact and Workplace-training Intensity in Canadian Trades Apprenticeship*. Working Paper #64, Canadian Labour Market and Skills Researcher Network. Retrieved February 10, 2012 from (<http://www.clsrn.econ.ubc.ca/workingpapers.php>).

Meredith, J. 2011. "Apprenticeship in Canada: Where's the Crisis?" *Journal of Vocational Education and Training*. Vol. 36, No. 3. p. 323-344.

Mincer, J. (1974). *Schooling, Experience and Earnings*. New York: Columbia University Press.

Morissette, D. (2008) Registered Apprentices: *The Cohort of 1993, a Decade Later*. Ottawa: Statistics Canada.

Oakes, J. (2005). *Keeping track: How schools structure inequality (2nd ed.)*. New Haven, CT: Yale University Press.

Ontario Ministry of Education and Training (1999). *Ontario Secondary Schools Grades 9-12: Programs and Diploma Requirements*. Retrieved, May 15, 2011 from (<http://www.edu.gov.on.ca/eng/document/curricul/secondary/oss/oss.pdf>)

Parey, M. (2009) *Vocational Schooling versus Apprenticeship Training: Evidence from Vacancy Data*. Retrieved, February 10., 2012 from (www.aeaweb.org/aea/2011conference/program/retrieve.php?pdfid=465)

Pyper, W. (2008). *Skilled Trades Employment*. Ottawa: Statistics Canada, Catalogue 75-001.

Sharpe, A. and Gibson, J. (2005). *The Apprenticeship System in Canada: Trends and Issues*. HRSDC-IC-SSHRC Skills Research Initiative Working Paper 2005 B-06, Retrieved February 10, 2012 from (<http://strategis.ic.gc.ca/epic/internet/ineas->

aes.nsf/en/ra01963e.html).

Skof, K. (2009). *Trends in the Trades: Registered Apprenticeship Registrations, Completions and Certification, 1991 to 2007*. Statistics Canada: Education Matters, 6,6.

Taylor, A. (2010). *The Contradictory Location of High School Apprenticeship in Canada*. *Journal of Education Policy*, 25,4,503-517.

Tremblay, D-G., and LeBot, I. (2003). *The German Dual Apprenticeship System Analysis of its Evolution And Present Challenges*. Research Note No 2003-4a, Chaire de recherche du Canada sur les enjeux socio-organisationnels de l'économie du savoir. Télé-université, Université du Québec. Retrieved, February 22, 2012 from (www.telug.ugam.ca/chaireecosavoir/pdf/NRC03-04A.pdf)

Weiss, A. 1995. "Human Capital vs. Signaling Explanations of Wages." *Journal of Economic Perspectives*, Vol 9, Issue 4. p. 133-154.

Wolter, S. and Ryan, P. (2011). *Apprenticeship*. In Hanushek, E., Machin S., and Woessmann, L. *Handbook of the Economics of Education* (Volume 3). Amsterdam: Elsevier.

Zwick, T. (2007). *Apprenticeship training in Germany – Investment or productivity driven?* Discussion Paper # 07-023. Centre for European Economic Research. Retrieved February 22, 2012 from ([ftp://ftp.zew.de/pub/zew-docs/dp/dp07023.pdf](http://ftp.zew.de/pub/zew-docs/dp/dp07023.pdf))

3.0 Outcomes Definition, Description and Comparative Statistics

3.1 Introduction

3.1.1 Purpose

The general purpose of this Chapter is to define an appropriate set of outcomes for the trades, identify measures and data sources for these outcomes and compare the outcomes for apprenticeship completers, partial completers, discontinuers and trade qualifiers by trade and jurisdiction (provinces/ territories). More specifically, this chapter has the following goals:

- Identify a standard set of education and training, labour market and socio/demographic outcomes;
- Develop indicators of these outcomes, with particular emphasis on indicators of apprenticeship success;
- Identify data sources for these indicators;
- Compare outcomes for apprenticeship completers, partial completers, discontinuers and trade qualifiers;
- Compare outcomes across trades and jurisdictions (provinces/territories);
- Examine the added benefits of the Red Seal endorsement.

3.1.2 Background: Definition and Classification of Outcomes

An outcome may be defined as anything which follows the event of interest and which bears some plausible connection to that event. In this case the starting events are registration as an apprentice or, for some aspects of the study, certification as a trade qualifier or entry to the trades by some other path. Ideally, the connection should be causal. That is, it should not only follow the event but should be uniquely determined by the event. An obvious example is apprenticeship completion, which must follow registration and which cannot occur in the absence of registration. However, many outcomes of interest should be interpreted as correlational as opposed to causal. For example, annual income in the year following completion may be linked to completion, but may also be linked to many factors other than completion.

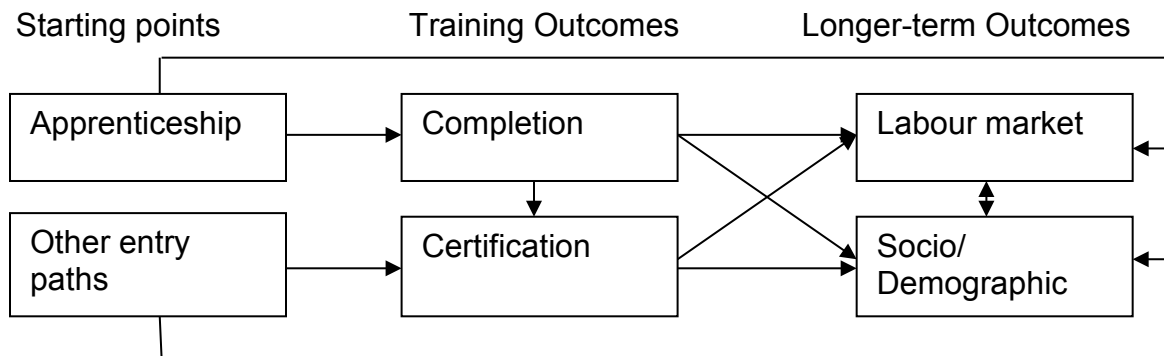
Some analytical techniques, specifically multiple regression analysis, may help

determine the relative contributions of various factors to an outcome and, in this case, especially separating the effects of apprenticeship-related factors (such as completion or non-completion) from external factors such as age or gender. Such models will be used in subsequent sections of this report. This section is limited to “bivariate” relationships between apprenticeship status and outcomes, with breakdowns by jurisdiction and trade where appropriate. For example, the relationship between apprenticeship completion and annual income can be examined for Canada as a whole and for provinces/territories and for selected trade groupings.

For purposes of this study a variable is treated as an outcome only if a case can be made that the variable can be thought of as a measure of apprenticeship success (or failure). Completion or non-completion would be an example of a categorical (dichotomous) variable that is an obvious measure of success. Income (which can be measured in many ways, as we shall see), can be taken as a continuous measure of success, as long as we assume that higher income represents greater success. While the latter assumption may be arguable in principle, this seems to be well enough accepted to use higher income as an indicator of greater success.

The initial statement of goals for this component identified two broad types of outcomes, labour market and social. The researchers have added a third category called training outcomes. This allows completion, and other factors linked to completion such as certification, long-term continuation and trade qualification to be treated as immediate outcomes of apprenticeship. Under this approach, apprenticeship registration or, more generally, entry to trades work is the starting point for analysis. Subsequent events related to these starting points are treated as outcomes. This approach recognizes those who start their trade careers in ways other than apprenticeship and, more specifically, an analysis of trade qualification as a pathway to certification.

Conceptually, the model may be depicted in the following diagram. The direct pathways from the starting points to the longer-term outcomes are intended to convey the idea that these outcomes are not necessarily contingent on completion or certification. Indeed, the differences between the longer-term outcomes for completers and those with certificates compared with those without these attributes is one of the issues of most direct interest in this study. The two-way arrow between labour market and socio/demographic outcomes is intended to imply that these are not necessarily independent of each other.



For all of these outcomes, it is necessary to develop operational definitions that can be expressed in measurable terms. For example, “income” is an obvious labour market outcome indicator. However, income may be measured in a myriad of ways such as hourly earnings, annual earnings, earning from employment, earnings from self-employment and so on. Some selection must be made among outcomes to reduce the complexity of the analysis and to reduce the degree of overlap among outcomes. The following sections outline in more detail the outcome measures to be used throughout this report.

3.1.3 Research Questions

The research questions for this chapter follow directly from the goals stated in Section 3.1.1.

- Of the many possible outcomes of apprenticeship and trades training, which should be selected for detailed analysis?
- What indicators of these outcomes are available from the data sources? How are these defined operationally in the data sources?
- How do these outcomes vary across trades and jurisdictions (provinces/territories)?
- Are there any added benefits to the Red Seal endorsement and what are these benefits?

3.1.4 Training Outcomes

The two most obvious training outcomes are completion and certification, as depicted in the above model. While these may, on the surface, seem to be the same variable (i.e. certification directly follows completion for most apprentices) they must be treated independently in some parts of the analysis. For example,

the 2007 NAS research found that some respondents had completed all of the requirements of an apprenticeship program without having taken the final step to certification. A specific group of this type would be those who have not written the certification exam or who were not successful in that exam. Also, as discussed earlier, certification can also be attained through the trade qualifier route. There is also the issue of partial completion and, specifically, that of long-term continuation. The latter may, itself, be considered an outcome, even a positive one, for those who have acquired an appropriate skill level for the job they are performing, and for whom certification is not a requirement or a goal.

More specifically, training outcomes are appropriately thought of in terms of the following groupings:

- Completion
- Certification
 - by apprenticeship completion
 - with or without Red Seal
 - by trade qualification
 - with or without Red Seal
- Partial completion (continuing)
 - Normal (within or near the nominal duration of apprenticeship)
 - Long-term (beyond the nominal duration – by some specified time)
- Discontinuation

Each of these groupings is identifiable from the RAIS database and can be examined directly as training outcomes. These are also linked to labour market outcomes through the linked RAIS/T1FF database. This allows the training outcomes to be used as starting points for the analysis of market outcomes. The ability to link these groupings to socio/demographic outcomes is more limited because RAIS gives only limited data on the latter outcomes and because there is a large amount of missing data in RAIS for some of these variables.

3.1.5 Labour Market Outcomes

The available data sources allow the following more detailed classification of labour market outcomes:

- Labour market engagement
 - Participation
 - Employment
 - Unemployment
- Income
 - Total income
 - Employment income
 - Self-employment income
 - Employment Insurance dependence
 - Other income (e.g. income support, government transfers, investment income)
- Interprovincial labour market mobility
 - outward (contributing jurisdictions)
 - Inward (destination jurisdictions)

Not all of these variables are examined in detail in this study. For example, because employment and unemployment rates are highly (negatively) correlated, the study focuses mainly on unemployment rates. Also, total income for most trades persons is made up of a combination of employment income, self-employment income and Employment Insurance, with relatively few having other sources of income. This study thus focuses on these three main sources rather than on more minor ones.

Measures of some of these variables are available from more than one source with each source in some cases yielding subtle differences in how the outcome is measured and in the sub-groupings possible. For example, the 2006 Census gives a one-time measure total annual income. This allows breakdowns by education level, with specific educational classifications for those with registered apprenticeship certificates and other types of trade certificates. On the other hand, the Labour Force Survey gives only hourly and weekly wages, with no separation of apprenticeship or other forms of trade certificates. However, the Labour Force Survey gives time series data, which allows income to be tracked over more than 20 years for the groups of interest.

The RAIS/T1FF file breaks income down into a variety of sources, and allows

some time series tracking, but does so only for those in the RAIS system in any one year, and not for the labour force as a whole. The RAIS figures are therefore not comparable to those from the Census or the LFS, but are useful in comparing the various training status groups. Indeed, the unique contribution of this study to our knowledge of labour market outcomes stems from the much greater detail and precision available from income tax data rather than the self-report data found in other sources

3.1.6 Socio/Demographic Outcomes

This category is meant to capture a variety of outcomes related to social engagement, attitudes and demographic patterns in apprenticeship participation. While this may include a large number of variables, our examination of this area is limited to those few that are included in the data sources available. Other sources, notably the General Social Survey, were consulted briefly but limitations of access, time and clear links to apprenticeship precluded the use of these sources.

The following variables were considered under this grouping:

- Attitudes
 - Satisfaction with the apprenticeship experience (NAS)
 - Job satisfaction
- Demographics (participation of selected target groups)
 - In apprenticeship
 - In the trades labour force

3.1.7 Data Sources

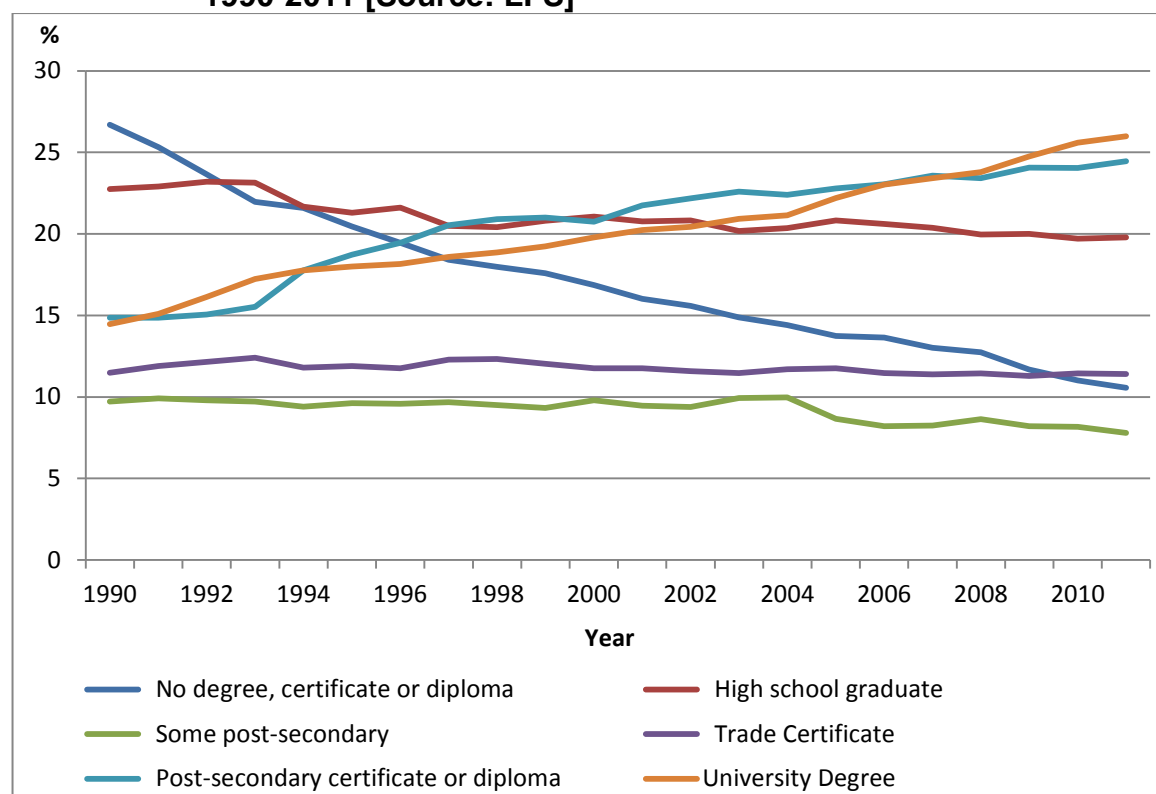
All of the data sources referenced in Chapter 1 provided data for this chapter. The main sources were NAS 2007 and the RAIS/T1FF/IMDB linked files. In addition, some results were drawn from the Canadian Socio-Economic Information Management System (CANSIM), a database that includes summary statistics on various education and labour market outcomes by occupation.

3.2 Education and Training Outcomes

3.2.1 Education Levels of the Labour Force

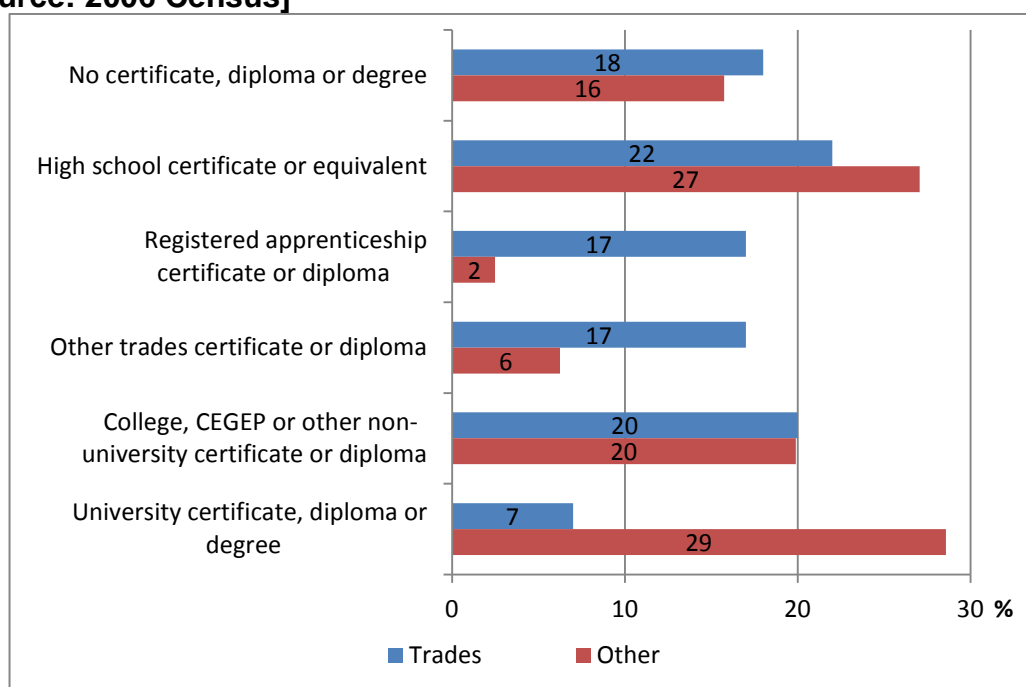
Before moving to a detailed examination of completion and certification outcomes, it is useful to look briefly at trends in education levels, and particularly at trades certification, in the labour force as a whole. Chart 3.1 gives time series results from the Labour Force Survey. This shows that the proportion of employed individuals with no degree, certificate or diploma has been declining quite steadily over time. The proportion of employed persons holding trades certificates has remained almost constant over the whole period, at about 12% of the labour force. Over the same period, the proportion with post-secondary certificates/diplomas and university degrees has been increasing. Thus, the decline in those with no certification is being offset by an increase in college and university credentials and not by any change in trade certification,

Chart 3.1 Percent of Total Employed Population by Education Level, 1990-2011 [Source: LFS]



The Labour Force Survey does not separate those holding registered apprenticeship certificates from those with other forms of trade certification (such as those obtained from a college or trade school). This distinction is possible using the 2006 Census, as is shown in Chart 3.2. In this case a further breakdown between those in trades and in other occupations is also given. This shows that about 17% of those in trades occupations in 2005 held registered apprenticeship certificates with an equal proportion having other forms of trade certificates. The more complete breakdown of trade occupations shows that about 40% of those working in the trades have high school education or less, with 27% having some form of college or university credential. Since the Census captures only the “highest” education level, there is no way to determine how many of those in the latter groups also hold trades or apprenticeship certificates.

Chart 3.2 Educational Attainment: Trades and Other Occupations
[Source: 2006 Census]



3.2.2 Completion

Chart 2.1, page 13, shows that total registrations, new registrations and apprenticeship completions have all been increasing rapidly over the past few years. There is an obvious lag between registration and completion, resulting from the fact that apprenticeship programs are normally from two to five years in

duration (with most being four years). Completions in any given year thus should not be compared directly to total registrations that year because the number of apprentices in the system is always much larger than the number that could plausibly complete in the same year, especially when annual registrations are increasing. A more conventional way of looking at completions, comparing completions to registrations in some specific earlier year (e.g. four years earlier), also does not work well because many apprentices take longer than the nominal duration to complete. Completers in any one year can come from registrations in any number of starting years, with earlier years having much smaller starting cohorts than later years.

The most definitive way to look at completion rates is to track individuals over the years from start to completion. This allows completion rates for each start year up to any subsequent year to be computed directly. This is essentially the methodology used in a series of “cohort studies” conducted by Statistics Canada (Desjardins and Paquin, 2010; Morissette, 2008; Prasil, 2005), using start year data from RAIS. In practice, the ability to do this has been compromised somewhat by missing start-year data for some jurisdictions. For example, Sandril (2005) reported results for only three provinces. The most recent study by Desjardins and Paquin (2010) used data from six provinces. Overall, these studies show that about half of those in an annual cohort complete their program within a decade and that relatively few remain in the system after that period.

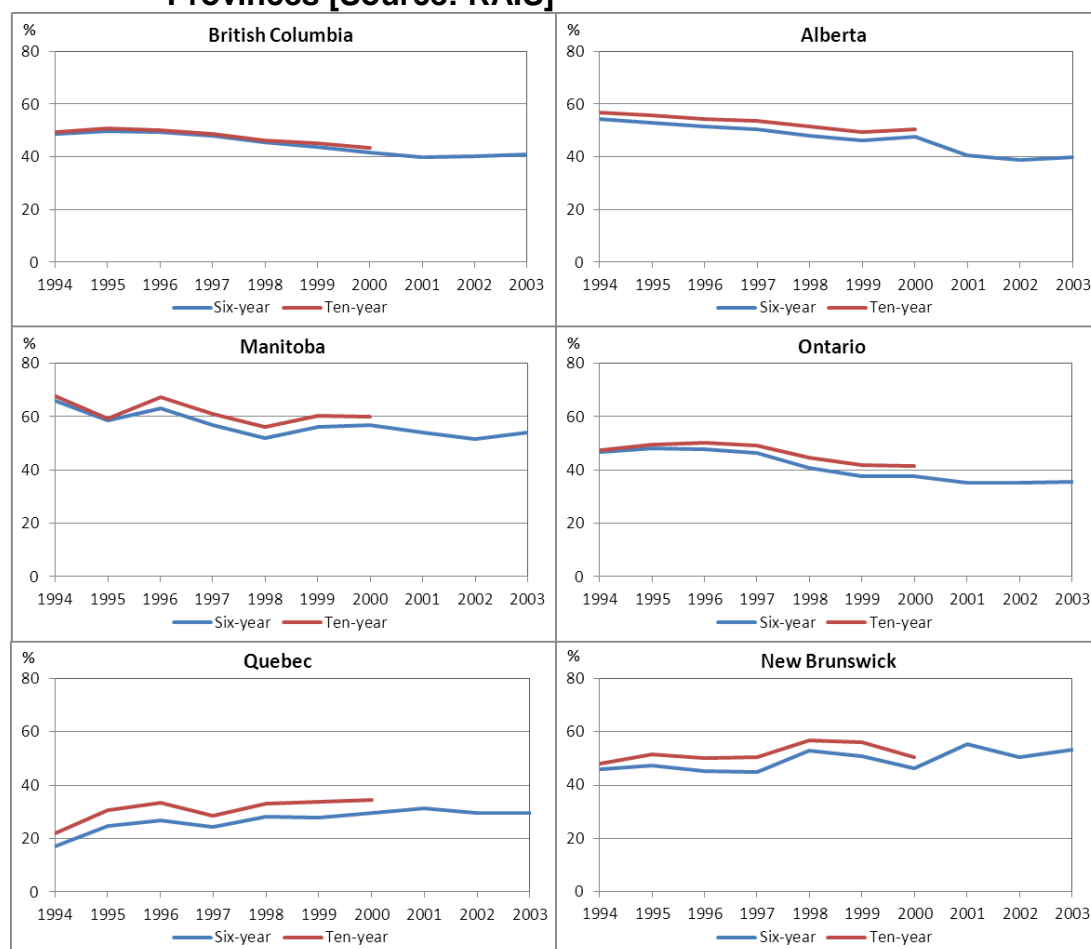
The latest Statistics Canada study looked at completions for the 1994 and 1995 cohorts. In an attempt to bring the information somewhat more up-to-date, this study looked at entry cohorts from 1994 to 2003, tracing progress to 2009, the latest year for which RAIS data were available. The need for a fairly lengthy tracking period arises because of evidence that many apprentices remain in their program for more than the nominal duration. The Statistics Canada cohort studies used a ten-year horizon, which has also been used here for consistency. This study also gives six-year completion rates because this allows more recent cohorts to be included and because six years has been used as the primary cutoff point for long-term continuation in Chapter 5 of this report.

Again, results can be given for only six provinces as was the case for the most recent Statistics Canada cohort study. The figures given are thus exact for these provinces, representing the entire cohort for each start year. Averaged across these provinces, these results should also be closely representative of the national completion rate since these six provinces account for more than 90% of apprentices. However, the possibility must be acknowledged that completion rates may be different for the missing provinces.

Chart 3.3 presents the results for starting years 1994 to 2003,¹¹ expressed as completion percentages six and ten years after the start year. The ten-year rates for British Columbia, Alberta and Ontario show some decline from the 50% range to closer to 40% in the early 2000s, before stabilizing at about that level from 2000 to 2003. The trend for Manitoba is about the same, but at higher levels (65% to about 54%) and with greater fluctuation (likely due to smaller numbers). Quebec shows improved rates, from a low of close to 20% in the 1990s to stability in the 30% range in more recent years. Finally, New Brunswick also shows improvement from the 45% range to the low 50% range over the period, again with some fluctuation because of low numbers.

¹¹ Because RAIS data were available only to 2009, 2003 is the latest year for which we could track apprentices for at least six years. With the methodology used here, these figures can fairly easily be updated as more recent RAIS data become available. Also improvements in start date reporting in recent years will make it possible in future to compute completion rates for all jurisdictions.

Chart 3.3 Completion Percentages to 2009 for 1994 to 2003 Cohorts, Six Provinces [Source: RAIS]



3.2.3 Certification of Apprentices

National results for number of certificates have already been given (Chart 2.1, p. 13). This section gives breakdowns of certificates issued to apprentices by jurisdiction and trade. In the RAIS system the number of apprentices certified each year is essentially the same as the number of completers.¹² Completion rates are thus directly related to certification numbers. Nevertheless, because

¹² NAS 2007 does identify some persons as completers without certification. However, this is considered to be a function of a time lag between completing apprenticeship requirements and successfully passing the certification exam. In RAIS, with very few exceptions, individuals are not counted as completers unless they have also been certified.

certification numbers are available for all jurisdictions and because completion numbers show absolute rather than relative changes, with no time lag, it is useful to look at these numbers by jurisdiction and trade.¹³

Chart 3.4 shows the jurisdictional breakdown of apprenticeship certificates (with the time frame limited to the 2000-2010 period to simplify the graphics). Keeping in mind that the actual numbers (and thus the graphics scales) differ substantially across jurisdictions, the focus here is mainly on the trend over time.

For the most part, the jurisdictional patterns are similar to the national ones given in Chart 2.1. In particular, the significant increase in certificates seen in the more recent years is evident for several jurisdictions. The exceptions are New Brunswick and Nova Scotia, where the increase has been slower and steadier. British Columbia is unique in showing a slight decline in the early part of the decade, followed by a steeper than usual increase in the latter part of the decade.

¹³ Trade qualifiers add significantly to the total number certified each year. Certification numbers for trade qualifiers are given in Chapter 4.

Chart 3.4 Certificates Issued to Apprentices by Province, 2000-2010
[Source CANSIM]

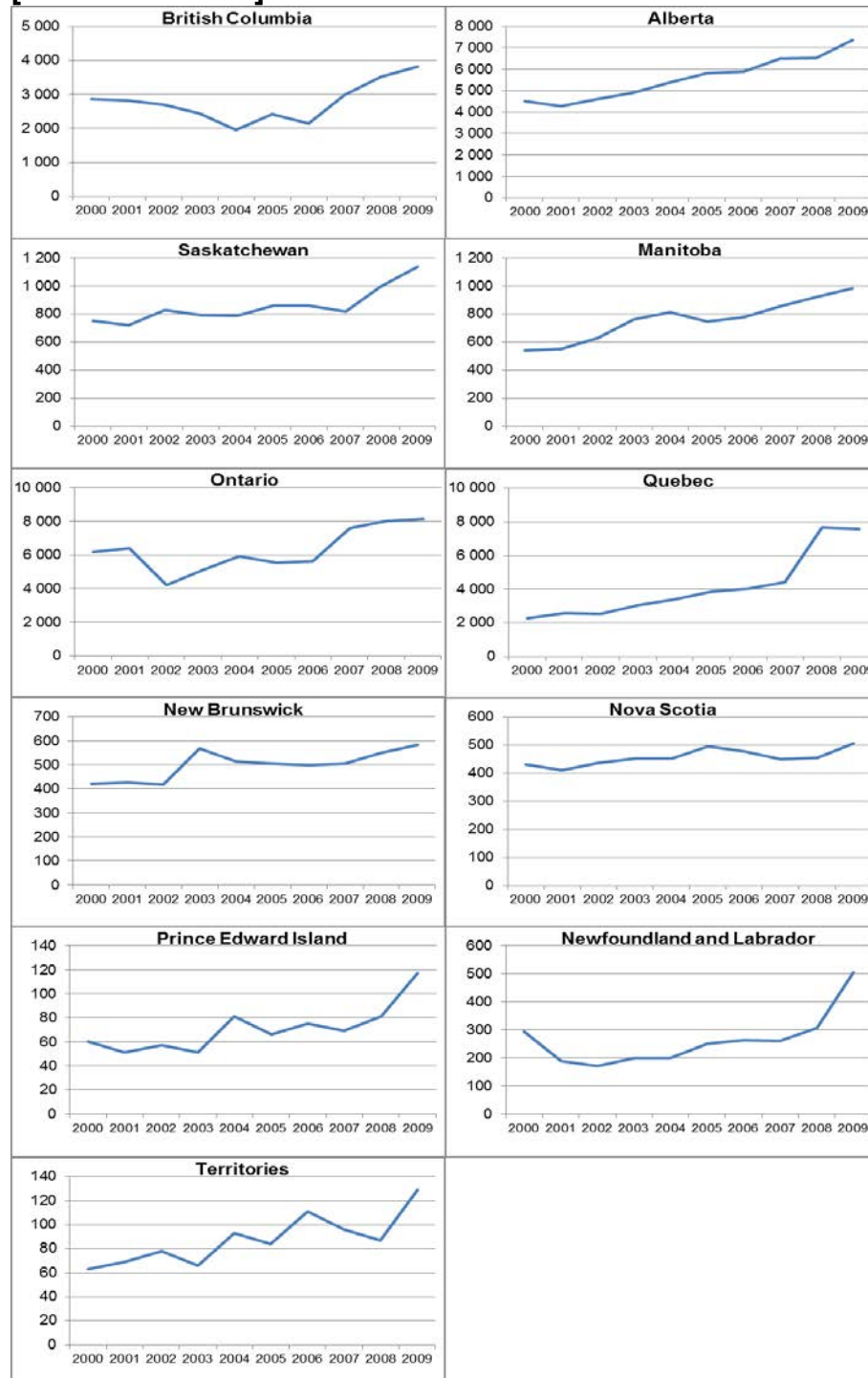
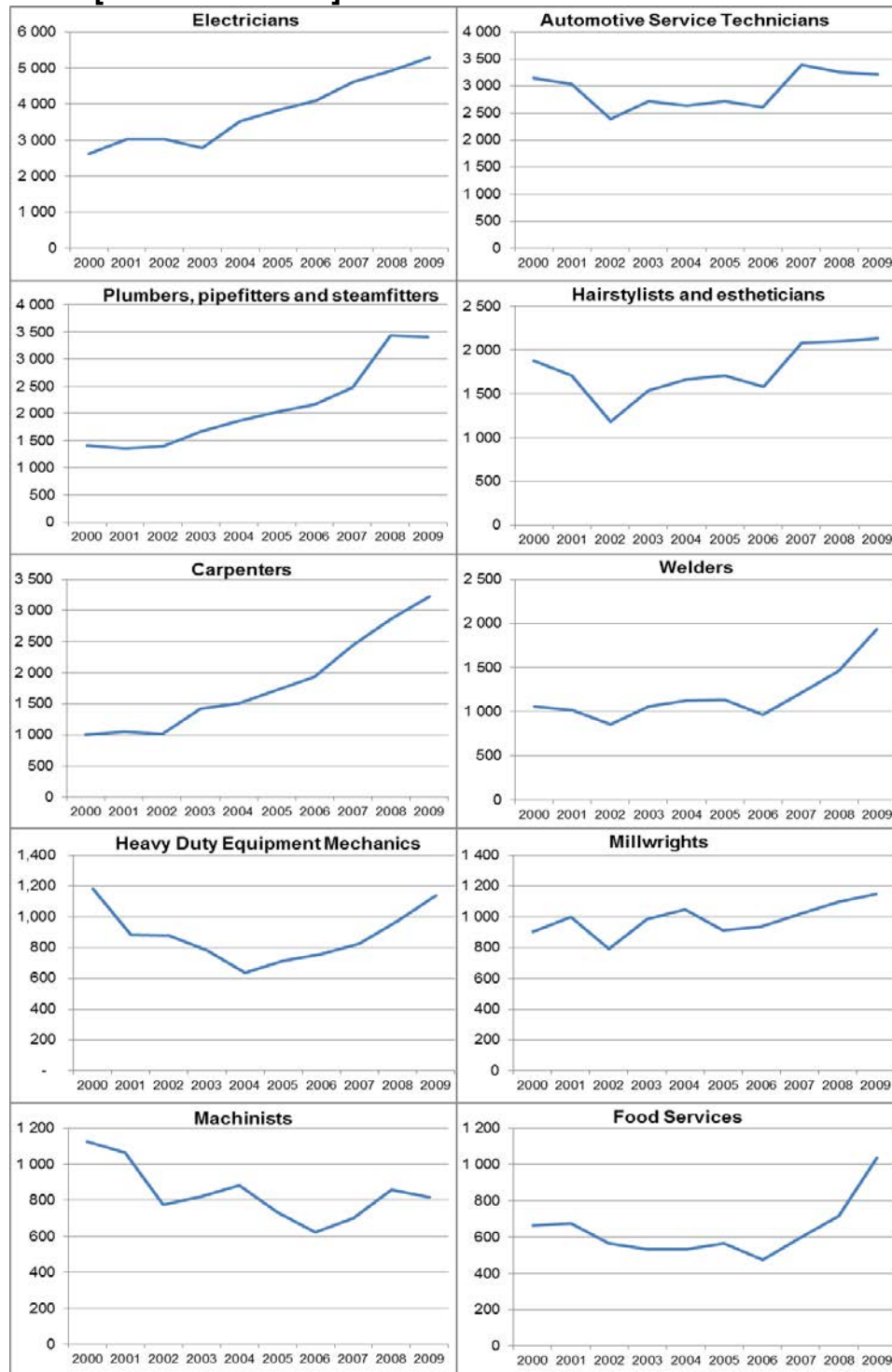


Chart 3.5 gives the corresponding breakdowns for the Top 10 trades. This shows substantial differences among trades. Some of the highlights of these results are:

- Electricians, carpenters and plumbers/pipefitters/steamfitters have seen a substantial and consistent growth in the number of apprentice certificates over the period.
- For automotive services and millwrights the number of certificates has increased slowly over most of the period.
- Heavy equipment mechanics and hairstylists/estheticians showed some decline in the early part of the decade followed by growth in more recent years.
- Welders show a relatively stable pattern in the early part of the decade followed by sharp growth since 2006.
- Machinist is the only trade that shows an overall decline over the period.

Chart 3.5 Certificates Issued to Apprentices by Trade, 2000-2010
[Source CANSIM]



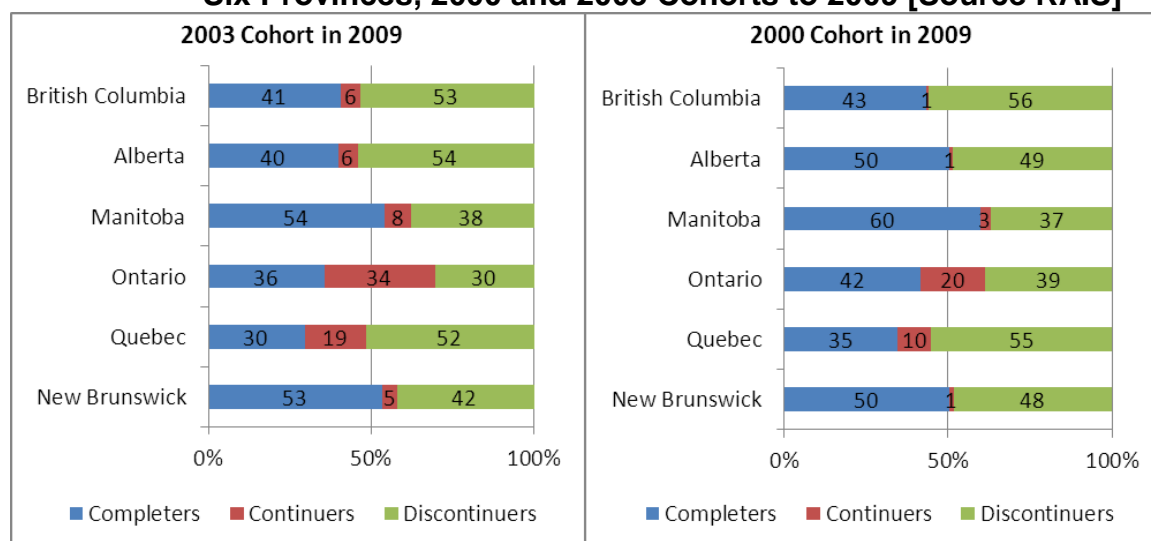
3.2.4 Continuation and Discontinuation

Those who do not complete by a given time must either continue or have discontinued their programs. Continuers and discontinuers may be tracked using RAIS in the same way as for completers. Rather than attempting to track each of these groups over all years since 1991, the three possible status groups were examined for two cohorts, 2000 and 2003, up to the last RAIS year available, 2009. This gives a picture six and ten years from the start year.

Results for the six provinces for which start year data are available are given in Chart 3.6. These graphs are comparable for provinces within a cohort but not directly across the two cohorts. Nevertheless, the later comparison can be treated as a rough indicator of change in status from six to ten years.

The completion percentages here are the same as those in Chart 3.3 for the same years. Continuation rates are relatively low after both six and ten years in four of the provinces, but are somewhat higher in Ontario and Quebec than in the others. In British Columbia, Alberta and Quebec, more than 50% had discontinued after six years, with little change in these percentages for the 2000 cohort after ten years. For Ontario and Quebec, there is a distinct decrease in continuation rates from six to ten years, with shifts to both completion and discontinuation. The apparent decrease in completion rate for New Brunswick at ten years is a function of the fact that these are not the same cohorts.

Chart 3.6 Completion, Continuation and Discontinuation Percentages, Six Provinces, 2000 and 2003 Cohorts to 2009 [Source RAIS]



3.3 Labour Market Outcomes

3.3.1 Overview: Trade and Non-Trade Occupations

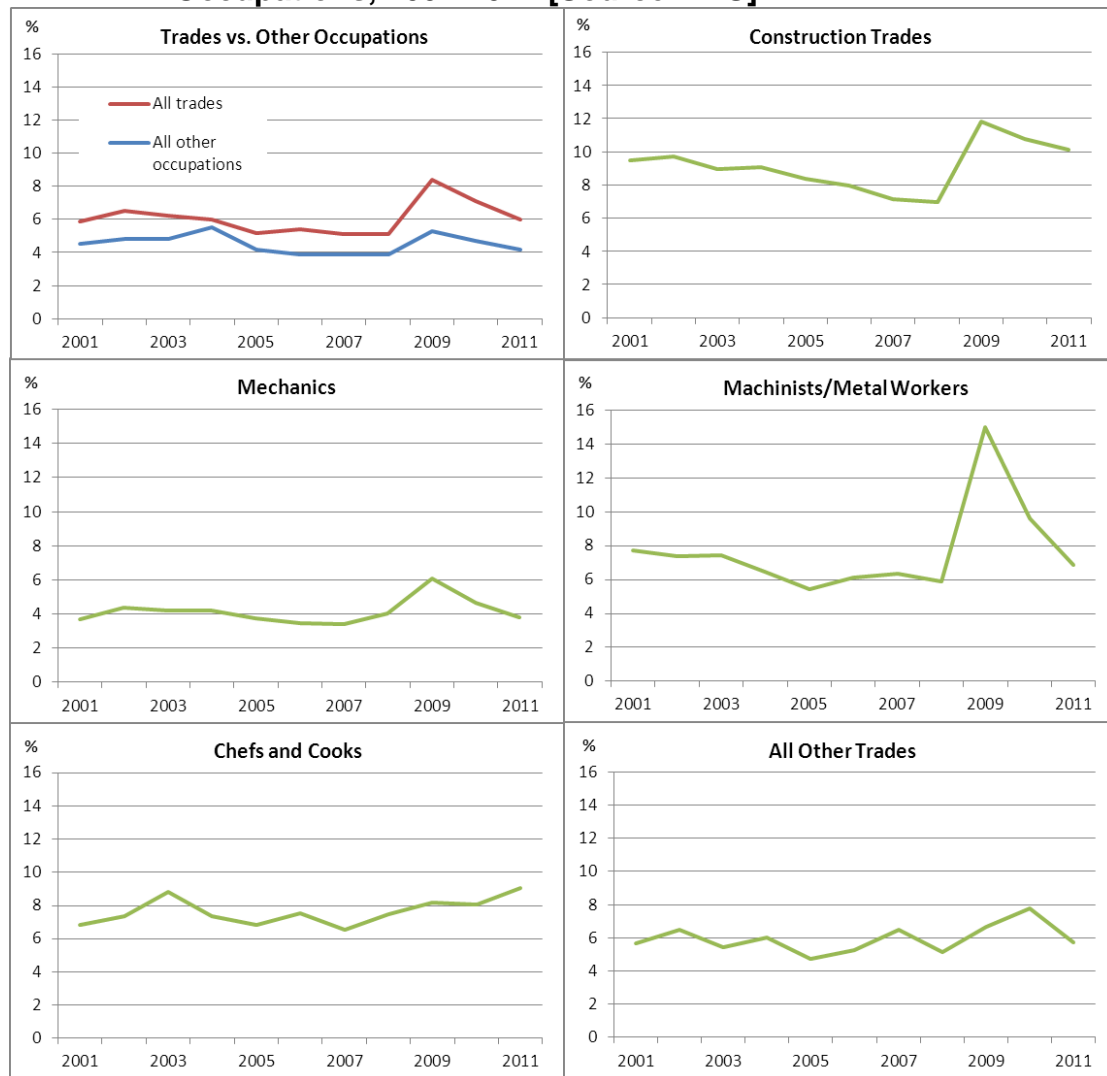
The labour market outcomes chosen for this study were designed to represent labour force engagement and income. Interprovincial mobility is also included as a labour market outcome because one of the main purposes of the Red Seal program is to facilitate such mobility. Each of these types of outcomes may be measured in many ways. For example, labour market participation may be measured by employment or unemployment rates, duration of unemployment, periods of withdrawal from the labour force and so on. Similarly, there are also many measures of income. In particular, the taxation records included in the linked file give annual income from a variety of sources including employment, self-employment, Employment Insurance and others.

For purposes of this report, the available data sources have some significant limitations. The main limitation is that education levels and credentials are defined in different ways in different databases. It is thus not possible to identify clearly the pathways taken to trade occupations. In particular, RAIS encompasses only apprentices and trade qualifiers in a given year and does not give overall numbers in the labour force who took other pathways to the trades. Added to this, occupations are not defined consistently because of different levels of aggregation and especially because four digit NOC codes are not available from all data sources. Nevertheless, by approaching the issue from a variety of sources, it is possible to give a fairly complete picture of comparative labour market outcomes.

We begin by looking at labour force participation. The specific indicator used is the unemployment rate. Chart 3.7 gives an overview of unemployment rates for major trade groupings¹⁴ and for other occupations from 2001 to 2011. This shows that unemployment rates in the trades have been slightly higher than in other occupations, with a peak higher than in other occupations in the 2009 recession year. Within the trade groups, unemployment has generally been higher in the construction trades than in other areas, no doubt reflecting the seasonal nature of these trades. The construction trades also show the largest peak in 2009, following some years of declining unemployment. Machinists and metal workers also showed a large increase in unemployment in 2009 but an equally large recovery in 2010 and 2011. Unemployment is generally lowest, and the effect of the recession smaller, in the mechanical trades.

¹⁴ These numbers were computed from the Public Use Microdata File for the LFS. The trade groupings are thus somewhat broader than the Top 10 trades used elsewhere in the report.

Chart 3.7 Unemployment Rates for Selected Trade Groups and Other Occupations, 2001-2011 [Source: LFS]



The 2006 Census gives detailed information on labour market outcomes as they relate to education levels. Studies by Boothy and Drewes (2010), and Gunderson and Krashinsky (2012) point to a substantial income premium for those with apprenticeship certificates compared to those with only high school graduation. The premium is much higher for males than females. However, the picture is reversed for females in trades that are traditionally dominated by males. That is, the gender gap in income is mainly a consequence of the fact that women are concentrated in a few low-paying trades.

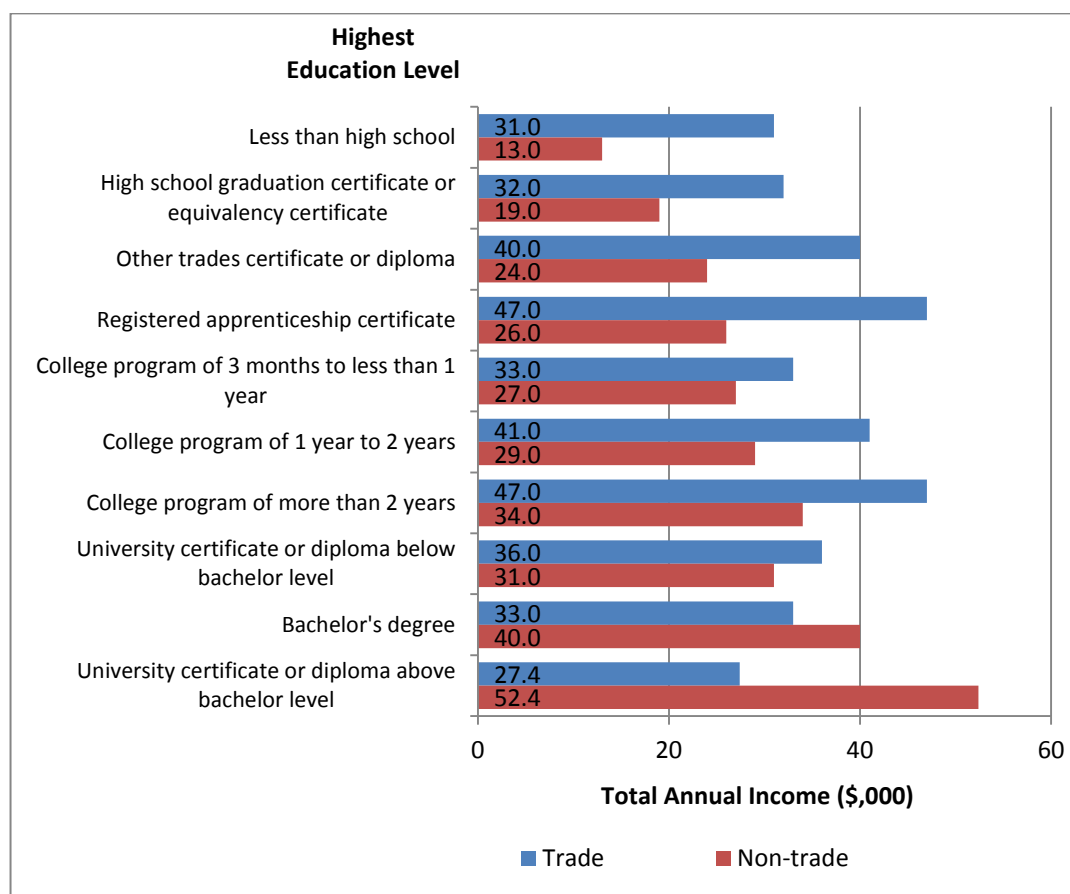
In this report, we take a slightly different approach, comparing incomes for those working in the trades with those in other occupations at the same levels of education. Our focus is thus more on comparing the trades with other occupations at each education level than on comparing education levels within the trades.

Chart 3.8¹⁵ shows median annual income for trade and non-trade occupations for those at various levels of education, as reported in the 2006 Census. This shows that, at all levels of education below the bachelor's degree, those in trade occupations have higher median income than those in non-trade occupations. The results also show a nearly linear pattern of increased income with higher education for those in non-trade occupations. However, the pattern for trade occupations is different, with higher income being associated with higher education at levels up to the registered apprenticeship certificate but a drop after that.

For those with college certificates or diplomas, there is an increase in income with program length. However, only those with college programs of more than two years reach a comparable income level to those with registered apprenticeship certificates. For those with bachelor's degrees or higher, the pattern is reversed, with those in non-trade occupations having higher income. At the same time having a registered apprenticeship certificate and working in a trade yields higher median income than having a bachelor's degree, no matter what the occupation. It is only at education levels higher than the bachelor's degree that median income in non-trade occupations exceeds that for registered apprenticeship certificate holders who are working in the trades.

¹⁵ These results were derived from the Census public use microdata file, which includes as trades all occupations under NOCS major category H (H8-Helpers was excluded in preparing this table). In reality, a few apprenticeship trades are in categories other than NOCS-H and not all NOCS-H sub-categories are apprenticeship trades. Nevertheless, NOCS-H does capture most trade-like occupations so the numbers are accurate for a broader group of trade-like occupations.

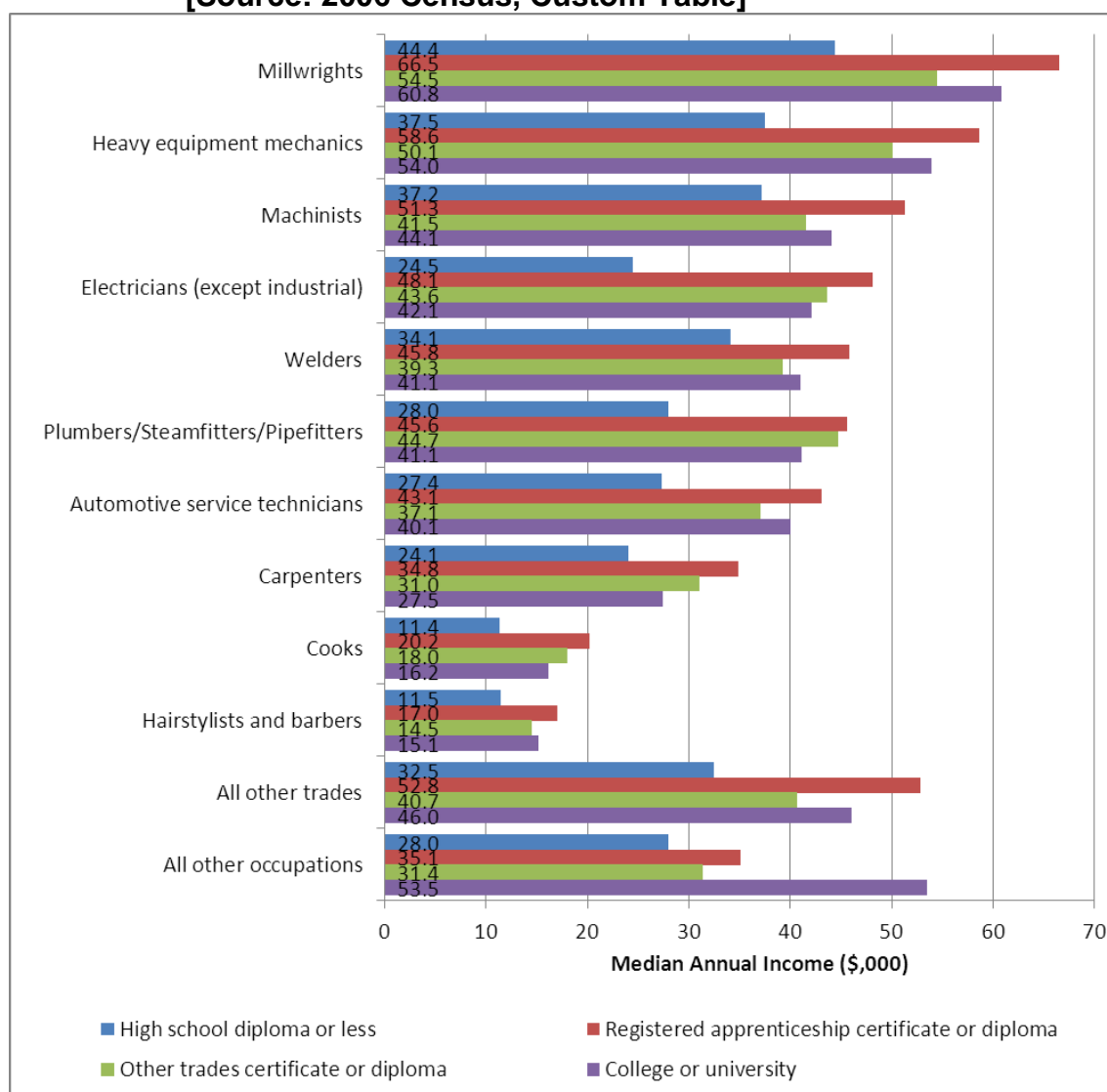
Chart 3.8 Median Income by Highest Education Level: Trades and Other Occupations [Source: 2006 Census]



The general picture here is that working in the trades conveys a substantial income advantage relative to working in areas other than trades, especially for those with lower levels of education. Moreover, these results suggest that the education-income gap is as much a matter of type of occupation as of education. For example, those with less than high school education who find trades work have median income more than double their counterparts who work in other areas. The results also show clearly that completing a registered apprenticeship program or a college program of more than two years conveys a greater income premium than any other educational pathways to work in the trades. The chart also shows that those with apprenticeship certificates who work in the trades do better than those with the same credential who work in other occupations.

A more detailed picture is available using the full Census 2006 data file, which gives more refined occupational breakdowns than the public use microdata file. Chart 3.9 shows median income by education level for selected trades. In this case, some of the education categories have been combined to simplify the presentation, particularly since very few of those working in trades have university credentials.

Chart 3.9 Median Income by Highest Education Level: Top 10 Trades
[Source: 2006 Census, Custom Table]



The most obvious feature of Chart 3.9 is the wide variation in income across trades, regardless of education level. Income is thus more trade-specific than education-specific. Of greater interest for this report is that, for those working in the trades, completing a registered apprenticeship certificate conveys an income premium relative to all other education levels, including college or university levels.

The income premium for the registered apprenticeship certificate differs substantially across the trades, varying by a factor of close to fourfold for millwrights compared to hairstylists/barbers. Also, in most trades, the premium for holding a registered apprenticeship certificate is much larger relative to high school education than to college or university levels. Since the Census cannot distinctly identify those with both registered apprenticeship certificates and college or university education, it is possible that many of those at the latter levels also hold registered apprenticeship certificates.

In most trades, having some form of trade credential other than a registered apprenticeship certificate is better than high school or less but is not as good as the registered apprenticeship certificate. Similarly a college or university credential conveys no advantage over a registered apprenticeship certificate for those in the trades. What we cannot tell from the graph, of course, is whether higher credentials are additional to or in place of apprenticeship credentials.

The trades stand in contrast to all other occupations for which the largest premium is on college or university credentials. Even in non-trade occupations, however, the apprenticeship certificate yields an advantage over all levels other than college or university.

3.3.2 Employment Income: RAIS Status Groups

This and subsequent sections present results for a selection of labour market outcomes by apprenticeship status, based on the RAIS/T1FF linked files. These are given for RAIS 2004, where income is tracked “forward” from 2002 to 2009 from an individual’s 2004 RAIS “end status”¹⁶ and for RAIS 2008, where income is traced “backward” from 2009 to 2002. Both perspectives are useful because the forward view allows us to observe the income trajectory for those certified through apprenticeship or trade qualification in 2004, and the backward view looks at a

¹⁶ The five end status groups used for this purpose are completer, continuer, long-term continuer, discontinuer and trade qualifier.

historical period in which most individuals would have either been apprentices or had worked in a trade long enough to have completed in 2008.¹⁷

Chart 3.10 gives the picture projecting forward to 2009, for RAIS 2004 status groups.¹⁸ A significant limitation of these results is that they apply to only six provinces¹⁹ because individual level data were not available in 2004 for the remaining jurisdictions. These results are therefore not directly comparable to those presented later for RAIS 2008, particularly since data for Alberta are missing.

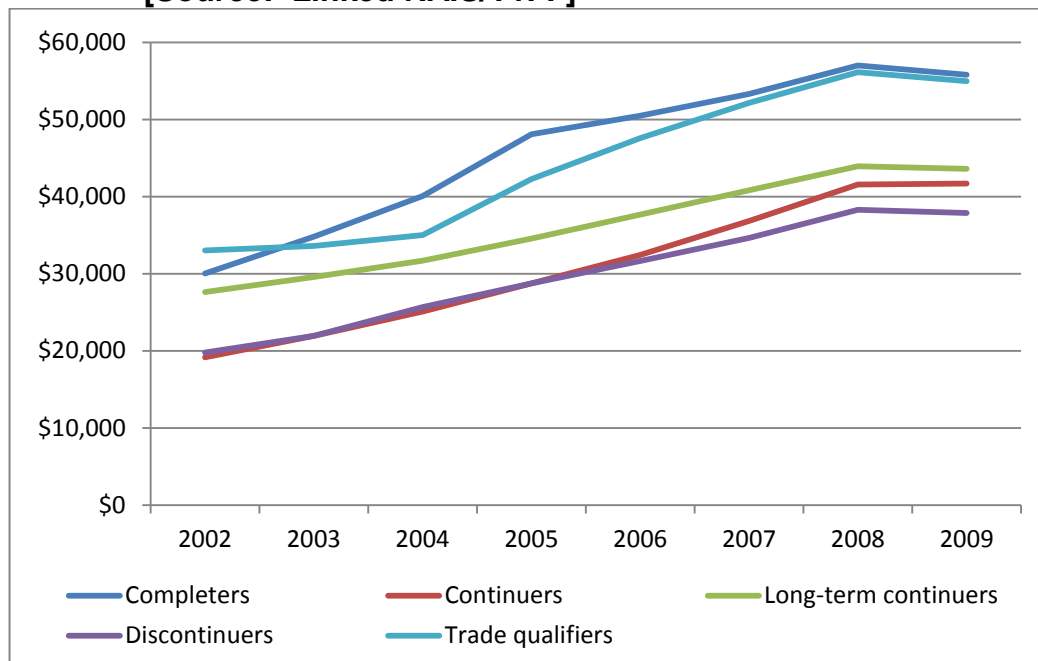
First, this chart shows a slight decline in income from 2008 to 2009, likely reflecting the recession. In this case, both completers and trade qualifiers had become certified in 2004. The income trajectories for these two groups are closely parallel, with completers having a slight advantage over trade qualifiers up to the last couple of years in the series. Incomes for the remaining groups are lower, as expected. Nevertheless, the trajectory for others is quite similar or slightly lower than for completers and trade qualifiers. This is a bit surprising since one would have expected that many continuers and long-term continuers would have completed over the period, driving median incomes upward at a steeper slope than for those already complete.

¹⁷ In reality, we do not know the exact status of every individual for all of the years for which we have income data because RAIS status is not included longitudinally in the linked file. Status is known definitively only for RAIS years 2004 and 2008.

¹⁸ These are annual incomes for the year reported and not constant dollars.

¹⁹ Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, and Saskatchewan.

Chart 3.10 Median Employment Income 2002-2009 by 2004 RAIS Status
[Source: Linked RAIS/T1FF]

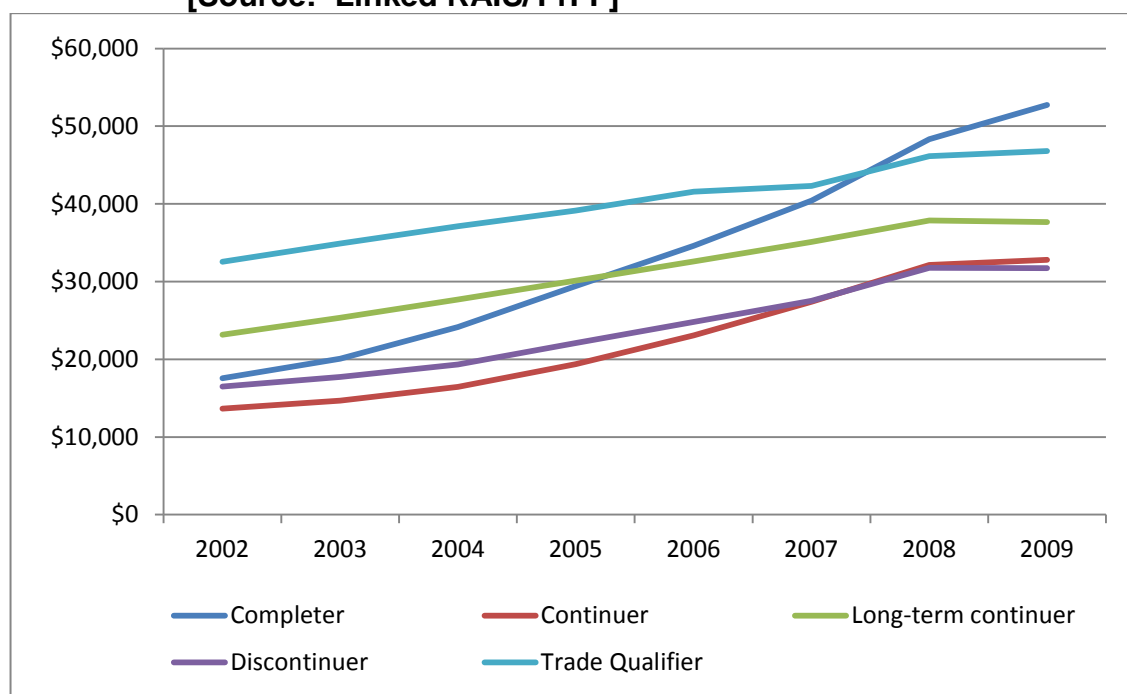


The trajectories for continuers and discontinuers are almost identical in the earlier years. Continuers slightly out-earned discontinuers after about 2005. Obviously some of the 2004 continuers would have become completers in these later years. However, we are unable to separate these later completers from the remaining continuers.

Chart 3.11 gives the same results looking backward from RAIS 2008 (forward for 2009 income).²⁰ In the early years, trade qualifiers had higher income than any of the other groups, as might be expected since this group would have had to be working in their trade for some years before challenging the exam. During that period, their earnings were obviously higher than the earnings of any of the apprentice groups. The key turning point is obviously 2008-2009, when earnings of completers surpassed those of trade qualifiers. This immediately shows that apprenticeship completion conveys an income premium additional to that enjoyed by those with considerable work experience prior to becoming certified as trade qualifiers.

²⁰ Not all 2008 registrants reported employment income for all of these years. However, approximately two-thirds did report income as far back as 2002, which indicates that at least this proportion have been in the labour force for the full period. More than 90% reported income in 2008 and 2009.

Chart 3.11 Median Employment Income 2002-2009 by 2008 RAIS Status
[Source: Linked RAIS/T1FF]



The earnings pattern for long-term continuers parallels that for trade qualifiers, but at a lower level. Relative to other continuers, the turning point seems to have occurred in 2005, when apprentices on a more regular track to completion overtook in earnings those who were taking longer to complete.

The tracks for continuers and discontinuers are almost identical. This is expected because those who discontinued in 2008 would have mainly been continuers in previous years. What is interesting is that discontinuers continued to earn about the same as continuers in the year following their departure from the program.

Finally, it is worth noting that income for all groups except completers remained almost the same between 2008 and 2009, while that for completers continued an upward trend. Specifically, apprenticeship completion conveyed an immediate advantage of about \$5,000 over certification through trade qualification in a recession year, when the income for all other groups remained static.

3.3.3 Employment Income by Trade and Jurisdiction

This section expands on the previous results by looking at employment income differences across trades and jurisdictions. To simplify the presentation and to allow all jurisdictions to be compared, the results are given only for RAIS 2008 status groups, using their 2009 income.

Chart 3.12 shows median 2009 income for the top 10 trades, other Red Seal trades and all other trades for each 2008 status group, compared to completers in each section of the chart. As indicated by the LFS results given earlier, the most striking feature of these graphs is the differences in incomes across trades. For example, for completers, those in the top five trades earn more than three times that of the lowest paying trade (hairstylists/barbers) and more than double that of the next lowest (cooks).

The pattern in which completers enjoy an income premium over all other groups holds for most of the trades. Overall, the largest differences are between completers and both continuers and discontinuers. However, in both these cases, the difference is relatively small for cooks and hairstylists/barbers relative to other trades. Thus, the lowest income trades also show the smallest premium for completion. More specifically, there is almost no premium on completion compared to long-term continuation for these two trades.

The smallest differences are between completers and trade qualifiers, which is consistent with the fact that both of these groups have attained certification. Finally, all Red Seal trades other than those specifically identified enjoy an earnings premium over those in non-Red Seal trades.

Chart 3.12 2009 Median Employment Income by Trade and RAIS 2008 Status: Completers versus Other Groups [Source: Linked RAIS/T1FF]

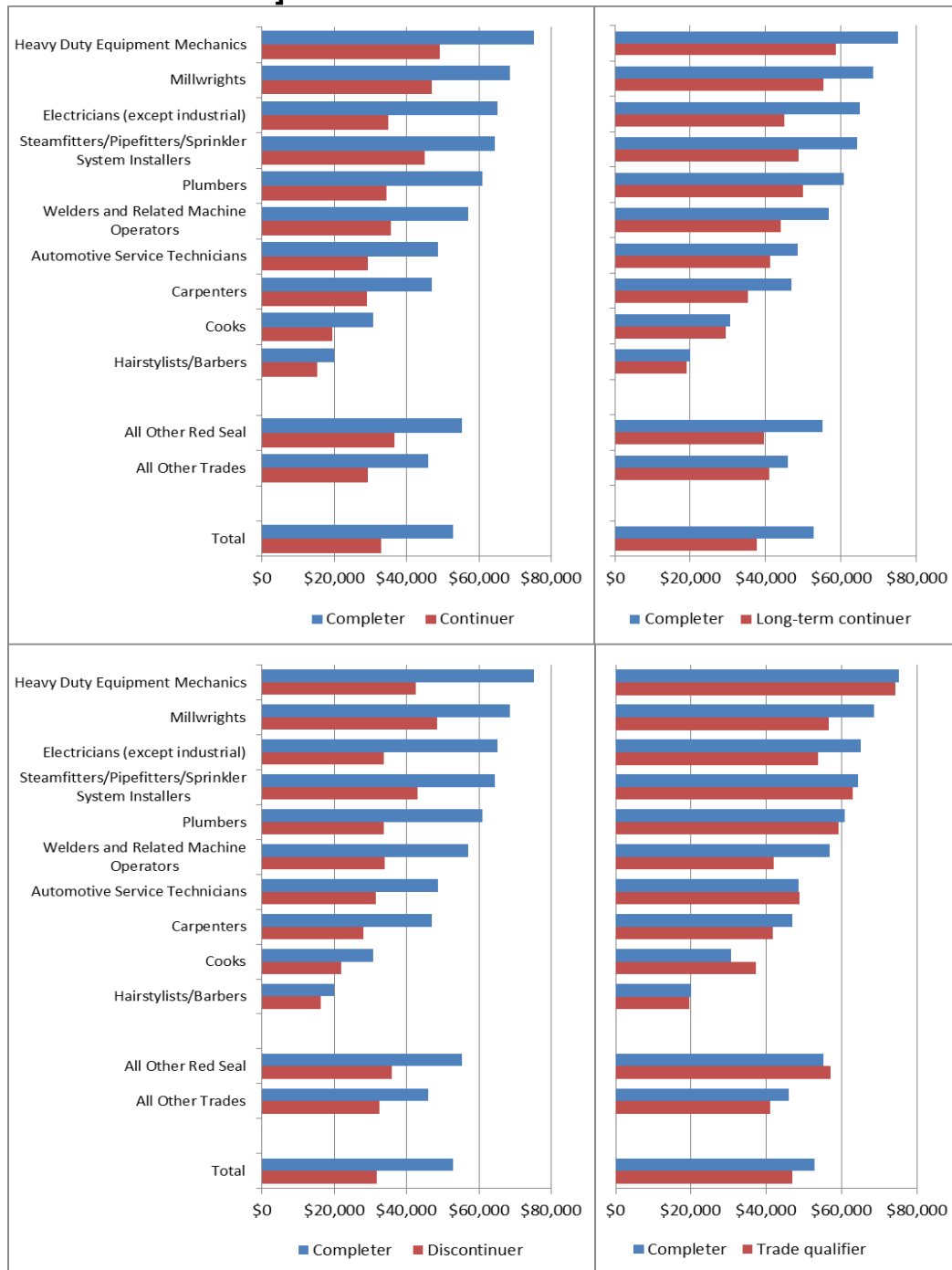
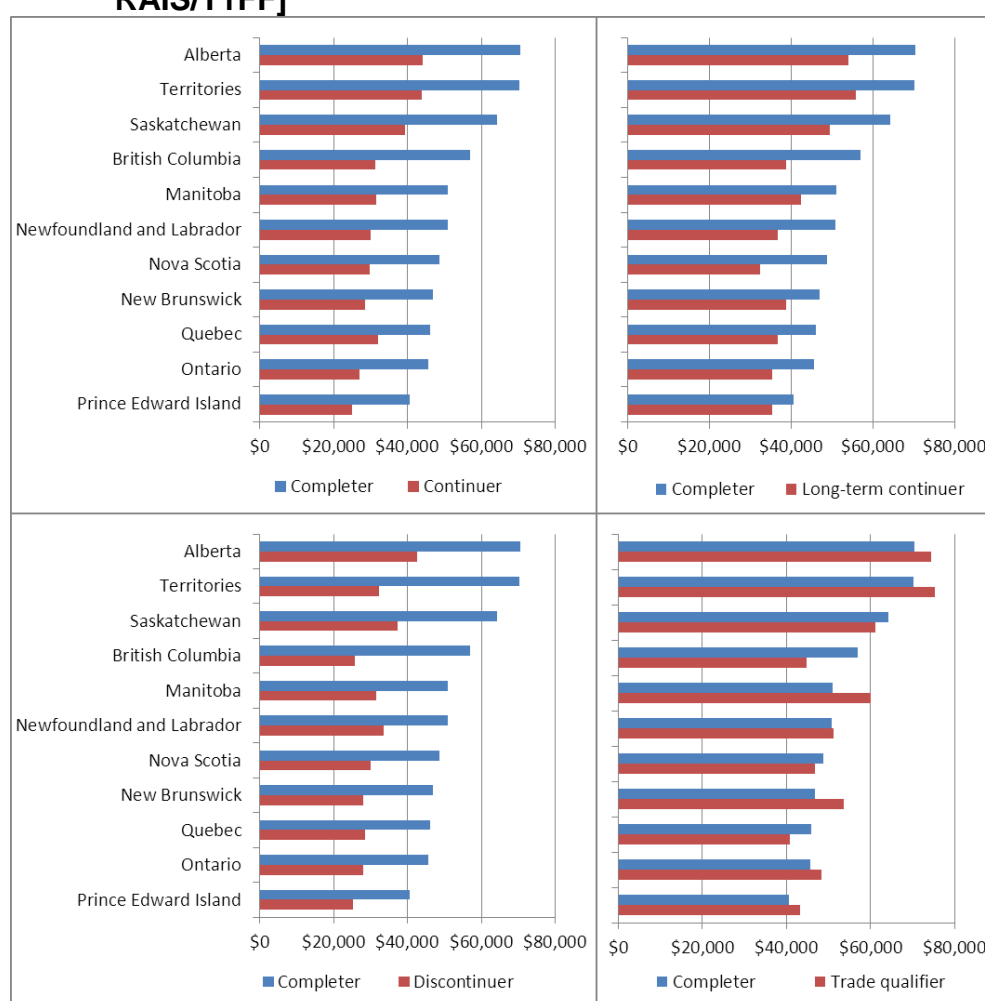


Chart 3.13 presents the same set of comparisons across jurisdictions. The pattern for the status groups is similar to that in Chart 3.10, in that completers generally have the highest median income. However, in several jurisdictions, median income for trade qualifiers is comparable to or slightly higher than those for completers. Overall, the differences across jurisdictions are smaller than those across trades. In particular, jurisdictional differences are quite small for continuers and long-term continuers. This likely reflects their status as apprentices, whose stipends are generally regulated. The highest incomes for all groups are found in Alberta and the Territories. Those in Saskatchewan and British Columbia also tend to have higher incomes than those in other jurisdictions.

**Chart 3.13 2009 Median Employment Income by Jurisdiction and RAIS
2008 Status: Completers versus Other Groups [Source: Linked
RAIS/T1FF]**



3.3.4 Self-Employment

On the surface, it would appear that trade occupations lend themselves to self-employment because much construction and mechanical work consists of small jobs at a household level (e.g. home renovations, mechanical repairs). This should be especially true for apprenticeship completers and trade qualifiers, though perhaps not as much so for apprentices themselves. It is therefore instructive to look at the proportions of tradespersons self-employed in 2009 and the income derived from self-employment.

Chart 3.14 gives the breakdown by trade of the percentage in each 2008 final status group who were self-employed in 2009, relative to the total in the labour force that year. It is apparent from this graph that self-employment is relatively low overall (less than 10% in most cases, compared to 15% for the labour force as a whole) but varies greatly by both status and trade. Trade qualifiers have the highest rates of self-employment in almost all of the top 10 trades. Self-employment by trade qualifiers is especially prevalent for hairstylists/barbers, carpenters, plumbers and electricians. Self-employment is also fairly high among completers for hairstylists/barbers and carpenters. Self-employment is relatively low (less than 10% for all groups) among millwrights, heavy duty equipment mechanics, cooks and steamfitters/pipefitters/sprinkler system installers. Though not shown on the graph, self-employment is also under 10% for all groups among all other trades.

Chart 3.14 Percent Reporting Self-Employment Earnings in 2009 by Trade and 2008 Status [Source: Linked RAIS/T1FF]

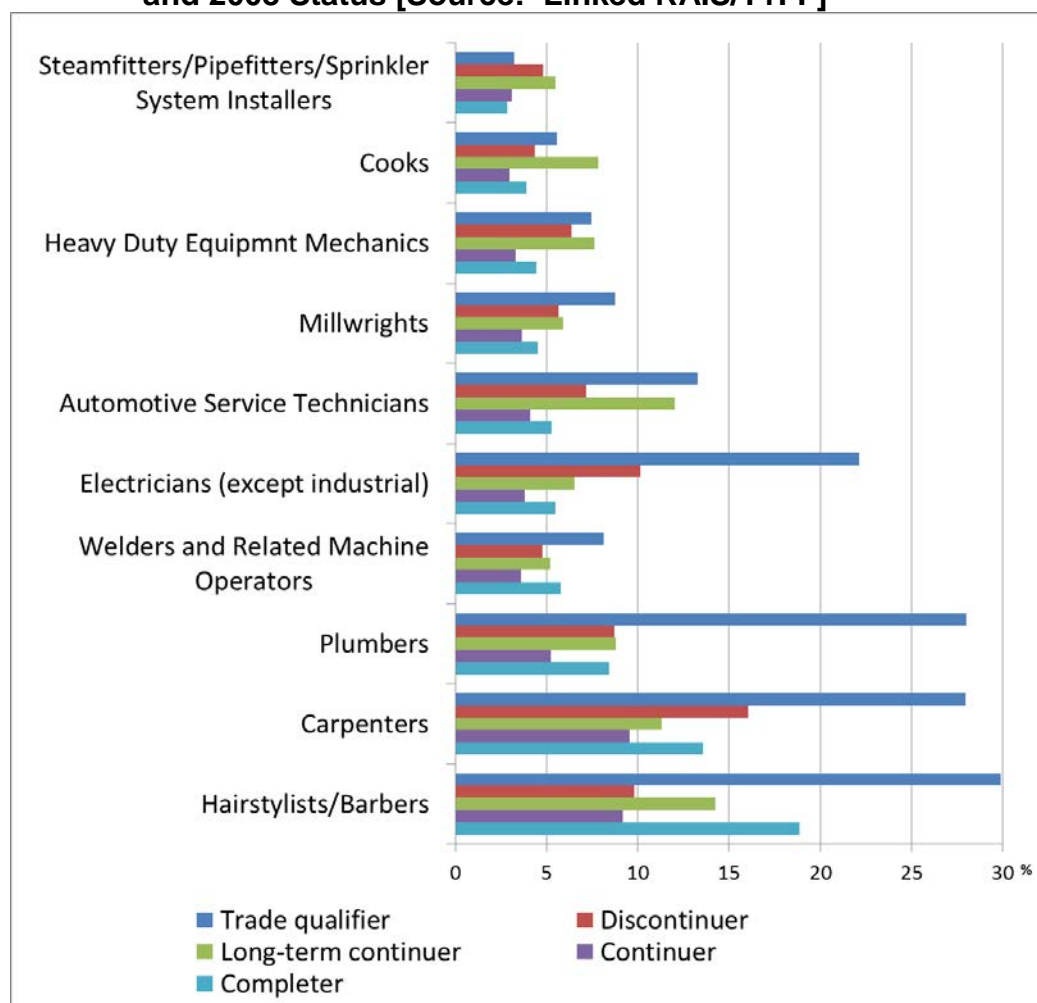


Chart 3.15 gives median 2009 net earnings from self-employment by 2008 status by trade for those with non-zero net self-employment income. As before, each section of the graph compares completers to each of the other status groups. This shows, first, that self-employment income is quite low relative to employment income. For completers, only carpenters and hairstylists/barbers had net income over \$5,000 in 2009. Long-term continuers, discontinuers and trade qualifiers in several other trades also had income at this level. In most cases, carpenters had the highest income from this source. The exception is long-term continuers, where plumbers had slightly higher self-employment income than carpenters.

Chart 3.15 2009 Median Net Self-Employment Income by Trade and 2008 Status: Completers versus Other Groups (Source: Linked RAIS/T1FF)

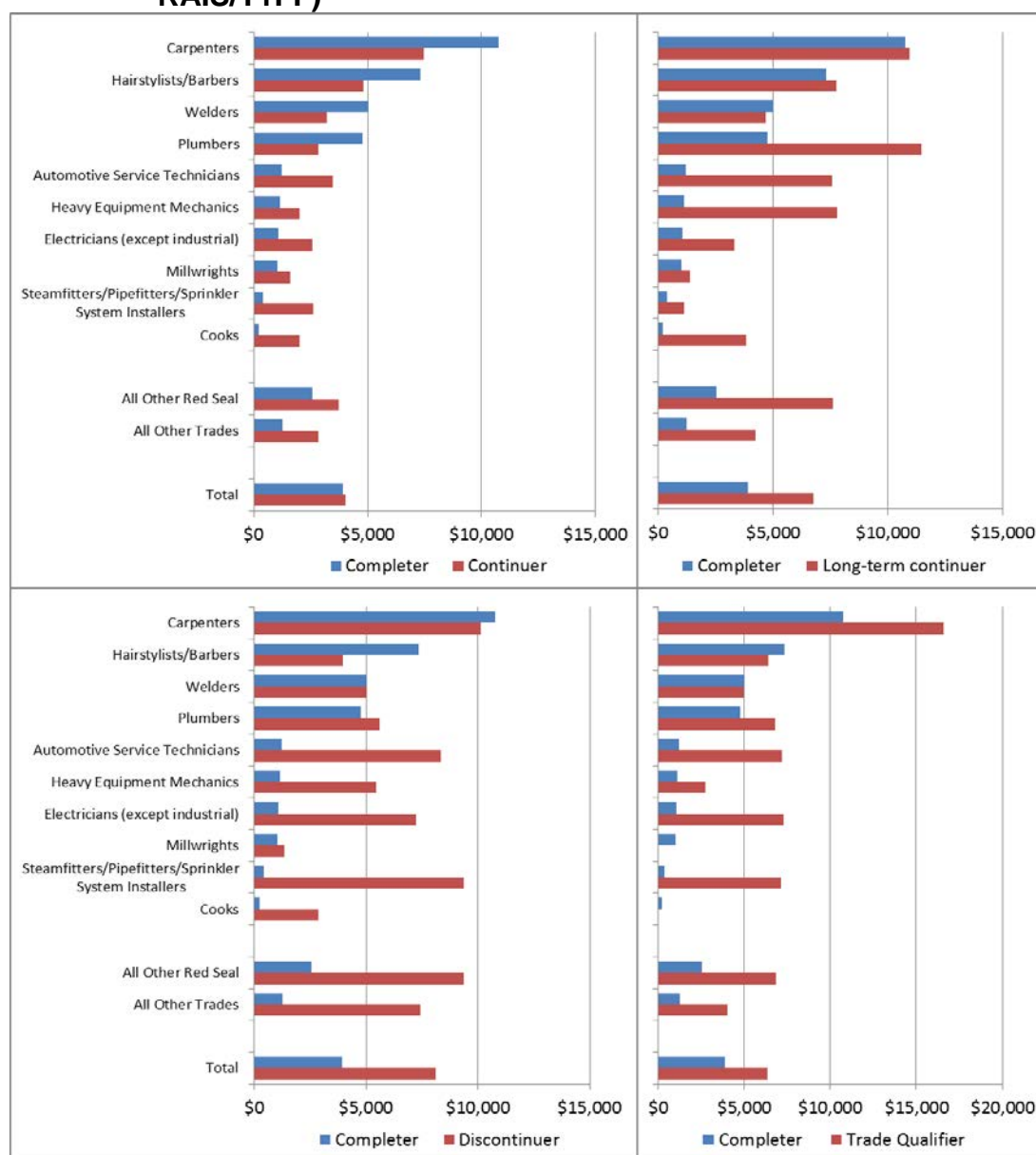


Chart 3.16 provides the same type of information as Chart 3.15, this time broken down by jurisdiction.²¹ This shows fairly wide variations across provinces for all groups other than continuers. Self-employment earnings for long-term continuers,

²¹ There were too few self-employed persons in the Territories to yield stable results.

discontinuers and trade qualifiers are higher than those for completers in most jurisdictions. Self-employment earnings are highest in Saskatchewan for completers, long-term continuers and discontinuers.

On the surface, these results indicate that self-employed trades persons have much lower incomes than those who are employed. Another possibility related to low self-employment earnings, for completers relative to trade qualifiers, is that 2008 completers would have been newly certified in 2009 and hence lacked the experience of trade qualifiers. Tracking self-employment earnings for RAIS 2004 registrants can shed some light on this point.

Chart 3.16 2009 Median Net Self-Employment Income by Jurisdiction and 2008 Status: Completers versus Other Groups (Source: Linked RAIS/T1FF)

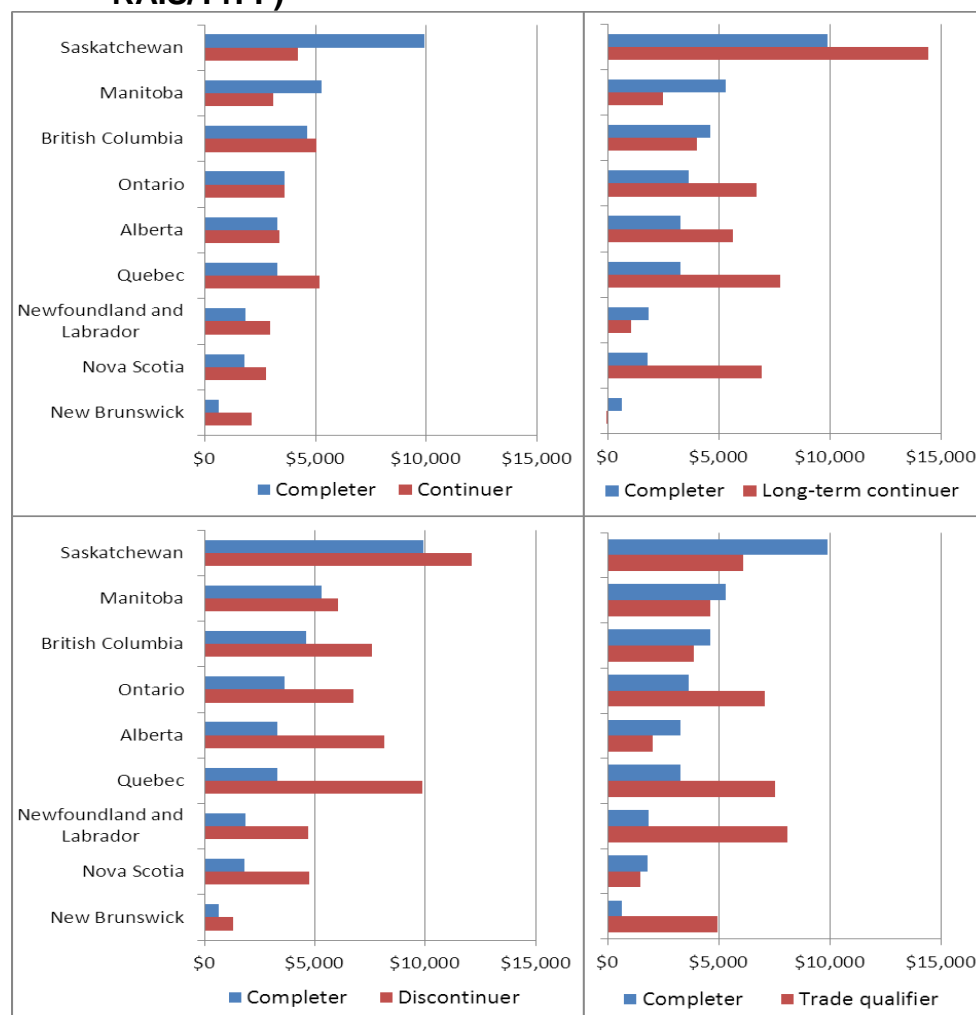


Chart 3.17 shows the overall percentages reporting self-employment earnings from 2002 to 2009 for the RAIS 2004 status groups. This confirms that trade qualifiers have the highest self-employment rates throughout, with substantial increase from 2002 to 2005, the period just before and after their certification, but leveling off after that. Completers show an increase in self-employment over whole period, but also with a slightly steeper rise up to 2005. These results suggest that certification may have some impact on the decision to become self-employed. Discontinuers show higher self-employment rates than completers or continuers over the whole period.

Chart 3.17 Percent Reporting Self-Employment Earnings, 2002-2009, by 2004 RAIS Status [Source: Linked RAIS/T1FF]

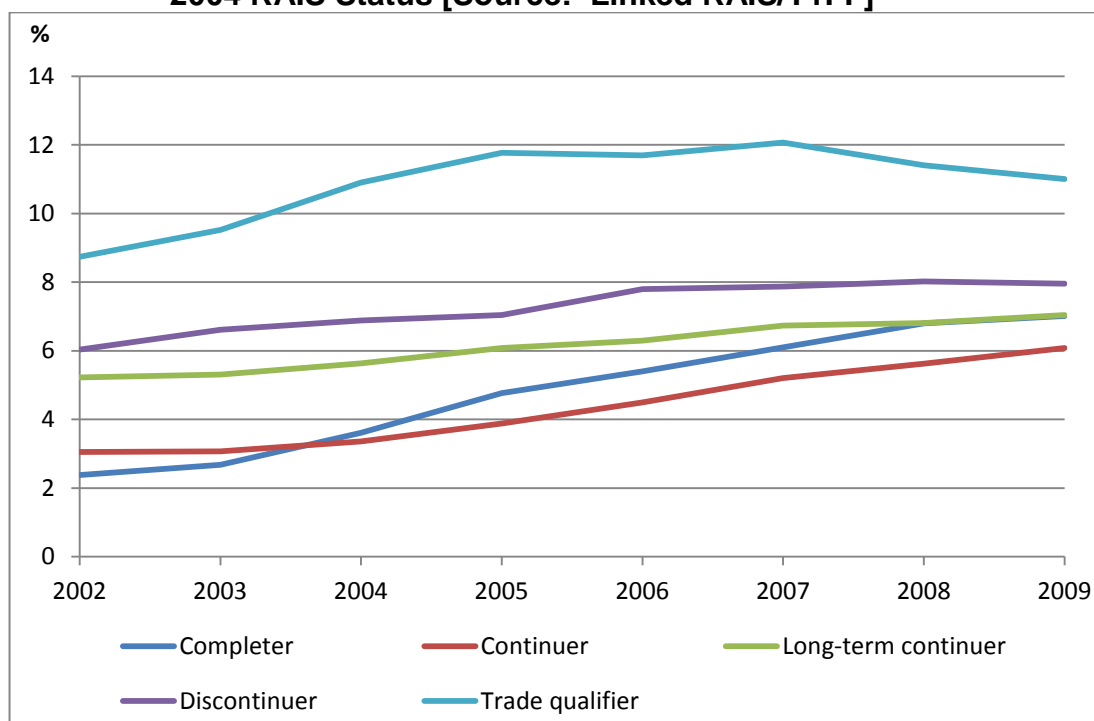


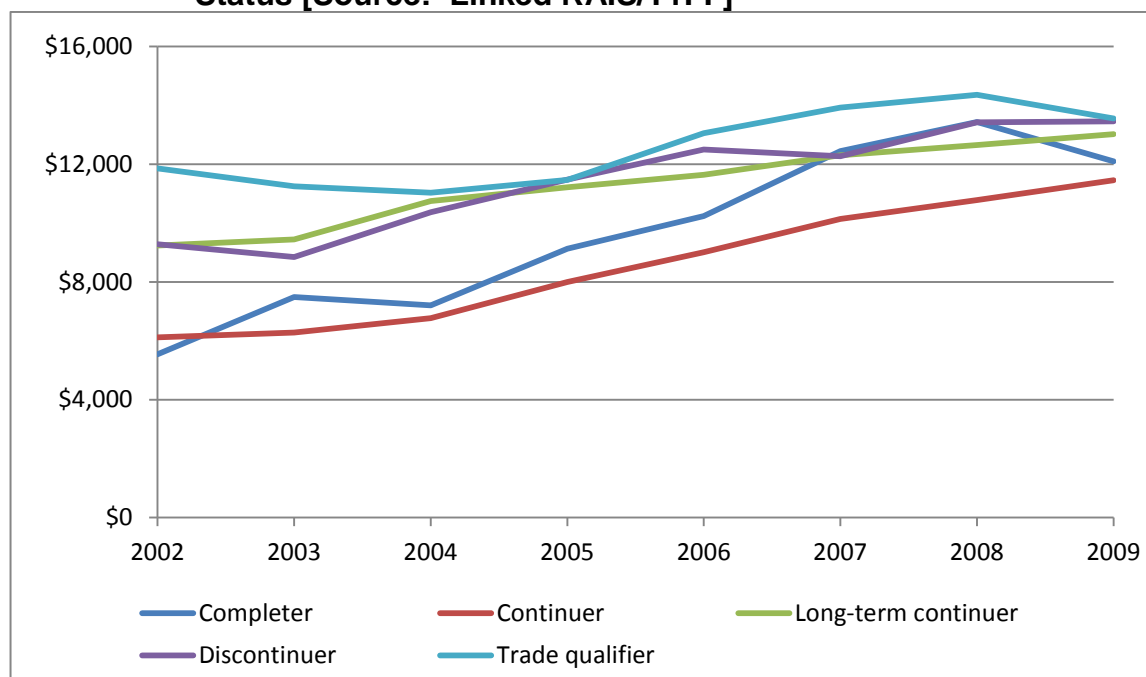
Chart 3.18 shows the trend in self-employment earnings for RAIS 2004 status groups. Trade qualifiers again show the highest income levels over the period. However completers show the greatest rate of increase. For all groups, income levels converge towards the end of the period. A slight decrease was experienced by both trade qualifiers and completers in 2009, likely reflecting the recession.

The 2009 results in Chart 3.18 may be compared with the “totals” for the same year for the RAIS 2008 groups given in Chart 3.15. This shows that self-

employment does increase with experience, with most RAIS 2004 groups earning about double their 2008 counterparts. At the same time, these earnings remain considerably less than earnings for those who are employed.

The possibility must also be considered that self-employment earnings are in some cases supplementary to employment earnings. This possibility was examined by looking at employment income specifically for those who also reported self-employment income. This shows that just over half of those who reported self-employment income also reported employment income. However, the amounts of employment income were quite small in most cases, with median employment income for self-employed individuals being in the \$5,000 to \$10,000 range.

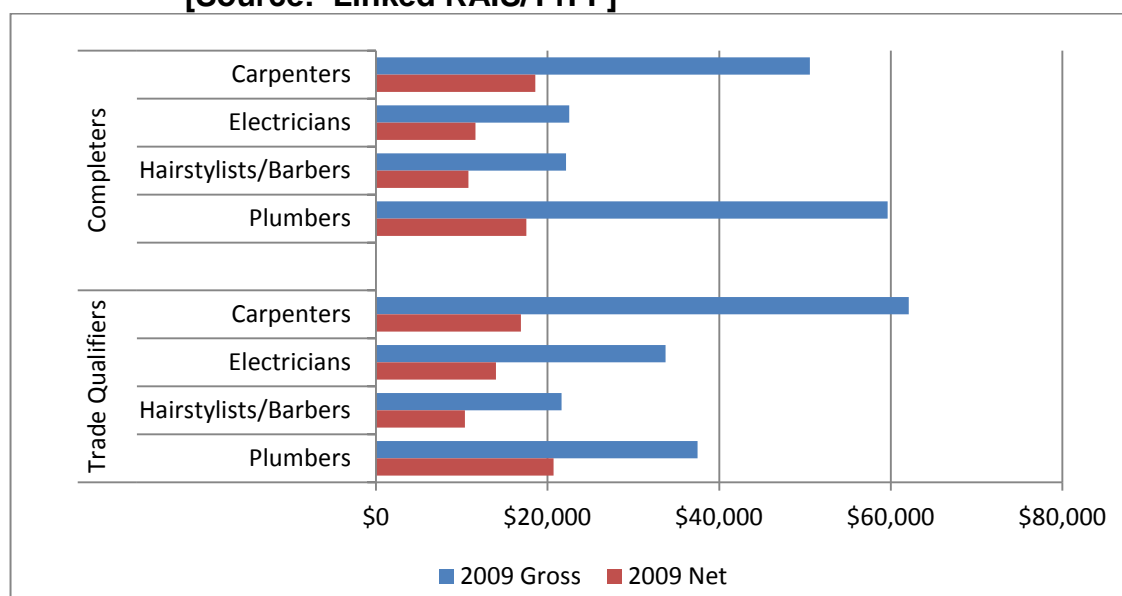
Chart 3.18 Median Net Self-Employment Income 2002-2009 by 2004 RAIS Status [Source: Linked RAIS/T1FF]



Finally, one aspect that distinguishes the employed from the self-employed is that the latter are able to deduct business expenses from their gross income. This raises the possibility of some gap between total (gross) and net self-employment income. While net income is the more appropriate measure relative to employment income, it is possible that expenses absorb a substantial portion of self-employment income.

To examine this possibility, gross 2009 self-employment income for completers and trade qualifiers was computed for four selected trades (carpenters, electricians, hairstylists and plumbers) for which self-employment numbers and earnings are relatively high. Chart 3.19 shows these figures, in comparison to the net earnings already given in Chart 3.15. A large gap between gross and net earnings is apparent from these figures, especially for carpenters and for plumber completers. Gross earnings in most are in a range comparable to employment earnings for those who are employed. This suggests that there may be a maximum gross amount that self-employed trades persons can earn, which is comparable to what can be earned through employment. This may be limited by either hourly rates that can be charged or by the sporadic nature of self-employment. However, after expenses are deducted, net earnings are substantially less.

Chart 3.19 Gross and Net 2009 Self-Employment Income for 2008 Completers and Trade Qualifiers, Selected Trades
[Source: Linked RAIS/T1FF]



3.3.5 Employment Insurance (EI)

Information on the amount of EI benefits received in 2009 by 2008 RAIS status is available from the RAIS/T1FF linked file, because EI income is treated as a separate item for tax purposes. Continuing and long-term continuing apprentices may be eligible for EI regular benefits during periods of unemployment arising from full-time block release training for which they have been referred by the

jurisdiction. They may also be eligible for additional financial assistance from the jurisdiction during these periods of block release training. These benefits are funded by the EI program (Part II) and administered by the jurisdiction under the Labour Market Development Agreements. Continuing and long-term continuing apprentices may also be eligible for EI regular benefits in the year arising from seasonal unemployment or loss of a job arising from the 2009 recession.

The linked T1FF file reports all EI income and therefore cannot distinguish between Part I benefits paid during in-class training, Part I benefits arising from lack of work, Part II benefits paid and administered by the jurisdiction, as well as special benefits available for maternity, parental, and sickness.

In the case of completers, discontinuers, and trade qualifiers, their EI benefits received in 2009 are assumed to be comprised of regular EI benefits (non-training) and possibly special benefits.

EI benefits reported in 2009 may be affected by the significant increase in the unemployment rates across Canadian provinces in 2009 due to the impact of the global financial crisis and associated recession.

Chart 3.20 shows the percentages by 2008 RAIS status and trade who reported receipt of EI income in 2009. Overall, this shows that EI participation is higher among those in the construction trades. EI participation is relatively low for most status groups for cooks, hairstylists/barbers, automotive service technicians and heavy duty equipment mechanics. EI participation is also generally lower for completers than for most other groups. Otherwise, the pattern across the status groups is different depending on the trade. For example, for carpenters and electricians, discontinuers and trade qualifiers have lower EI dependence than any of the other three groups. EI participation is generally higher among continuers than other groups and is also relatively high among long-term continuers for carpenters, steamfitters/ pipefitters/sprinkler system installers and electricians.

It is important to note that EI differences between trades may be largely driven by the training method used by the jurisdiction for that particular trade. Block release training is more prevalent in particular jurisdictions and particular trades, which impacts the amount of EI received by trade and jurisdiction.

Chart 3.20 Percent Reporting EI Income in 2009 by Trade and 2008 Status
[Source: Linked RAIS/T1FF]

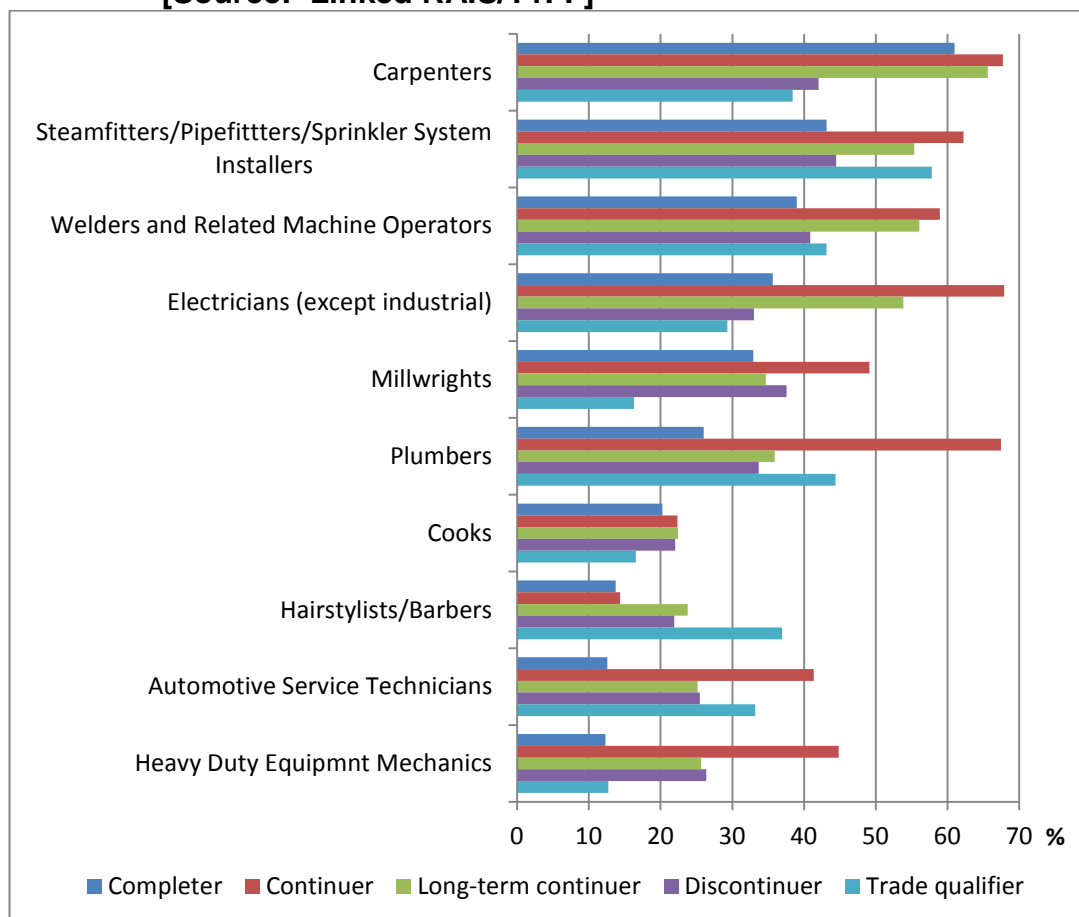


Chart 3.21 gives 2009 median EI income by 2008 RAIS status and trade. This shows that EI amounts are generally not high, averaging about \$5,000 for completers and continuers and \$6,000 for long-term continuers, discontinuers and trade qualifiers. Differences across trades are also relatively small compared to those found for employment and self-employment income. Completers receive the lowest median EI amounts overall. However, there is only a small difference between completers and continuers. In general, the highest EI amounts are found for long-term continuers and trade qualifiers. EI income tends to be lower for the service trades than for the construction trades.

Chart 3.21 2009 Median Employment Insurance Income by Trade and 2008 Status: Completers versus Other Groups [Source: Linked RAIS/T1FF]

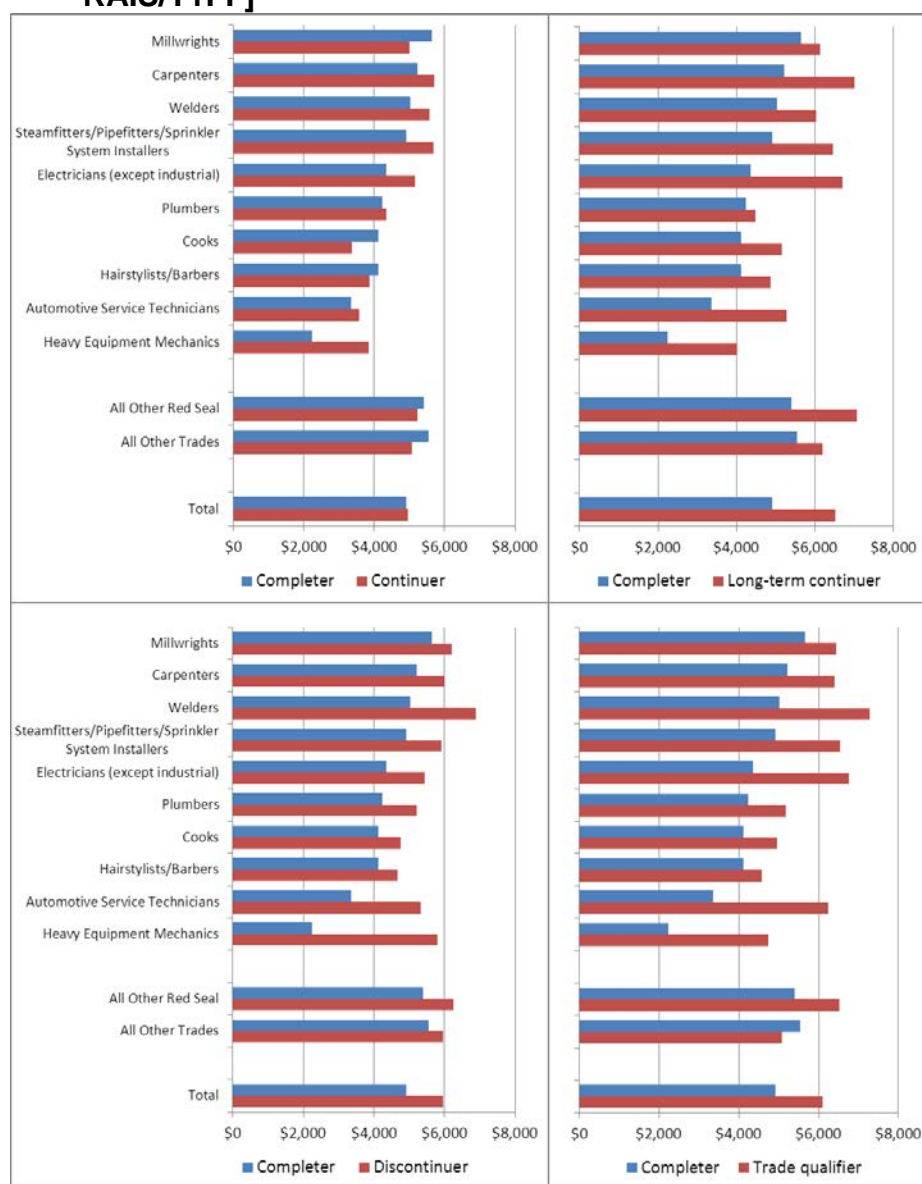


Chart 3.22 shows the percentages of reporting receipt of EI income by jurisdiction and completion status for RAIS 2008. It is important to recall that EI benefits reported in 2009 for 2008 continuing apprentices include benefits received while classroom training as well as all other regular benefits and Part II benefits. Chart 3.22 does not display continuers and long-term continuers in Quebec – this is

because the Quebec apprenticeship system is designed in such a way that classroom training is completed altogether before workplace training, which typically does not result in EI benefits during classroom training. As before, continuers have the highest EI participation rate, with proportions in the 60-70% range in the Atlantic provinces and in the 50% range in all other jurisdictions except Ontario. For all other groups, EI participation is generally higher in the Atlantic provinces than in the remaining jurisdictions. EI participation for completers varies widely, ranging from more than 60% in Quebec to less than 20% in Alberta, Saskatchewan and Manitoba.

Chart 3.22 Percent Reporting EI Income in 2009 by Jurisdiction and 2008 Status [Source: Linked RAIS/T1FF]

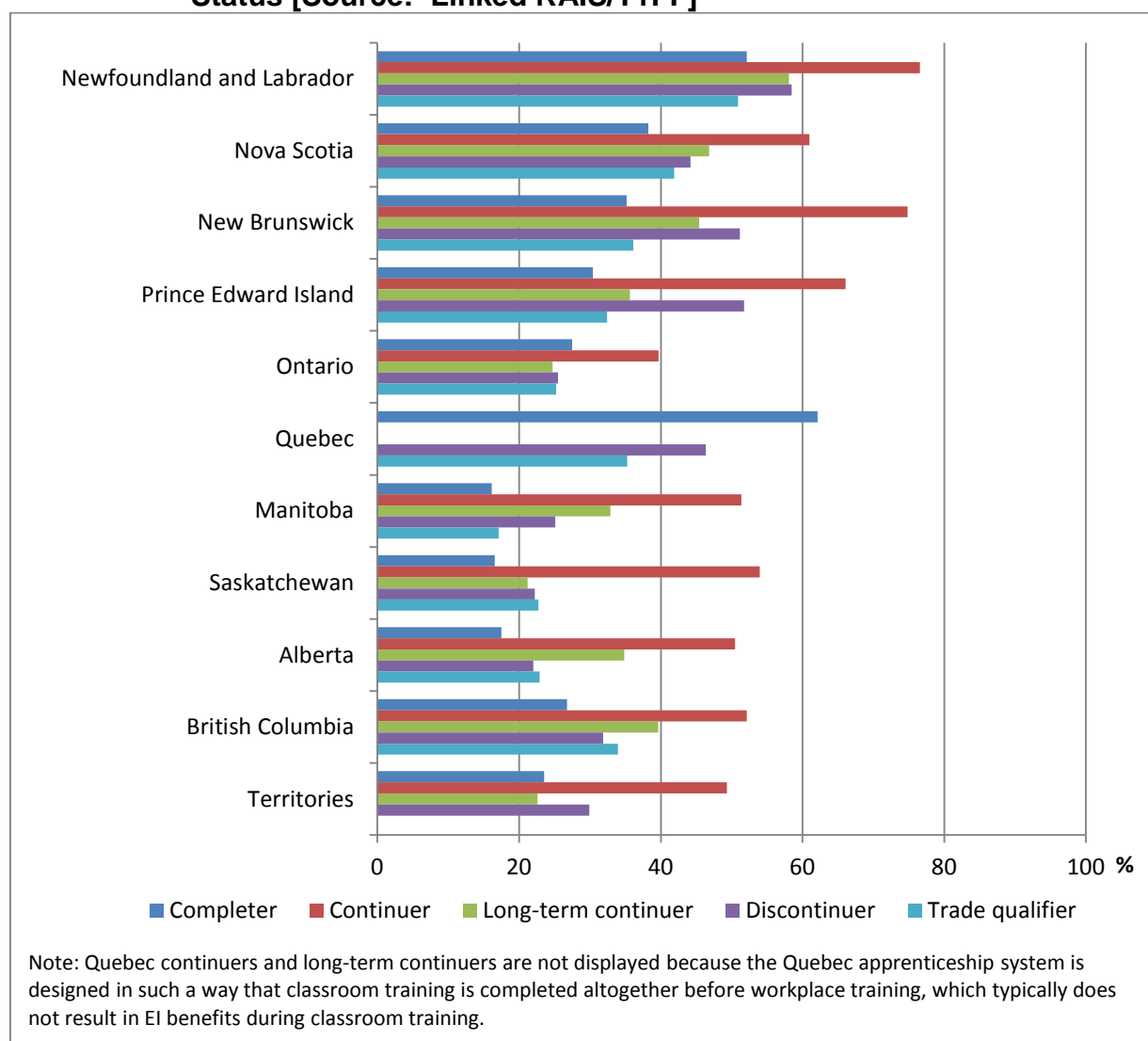
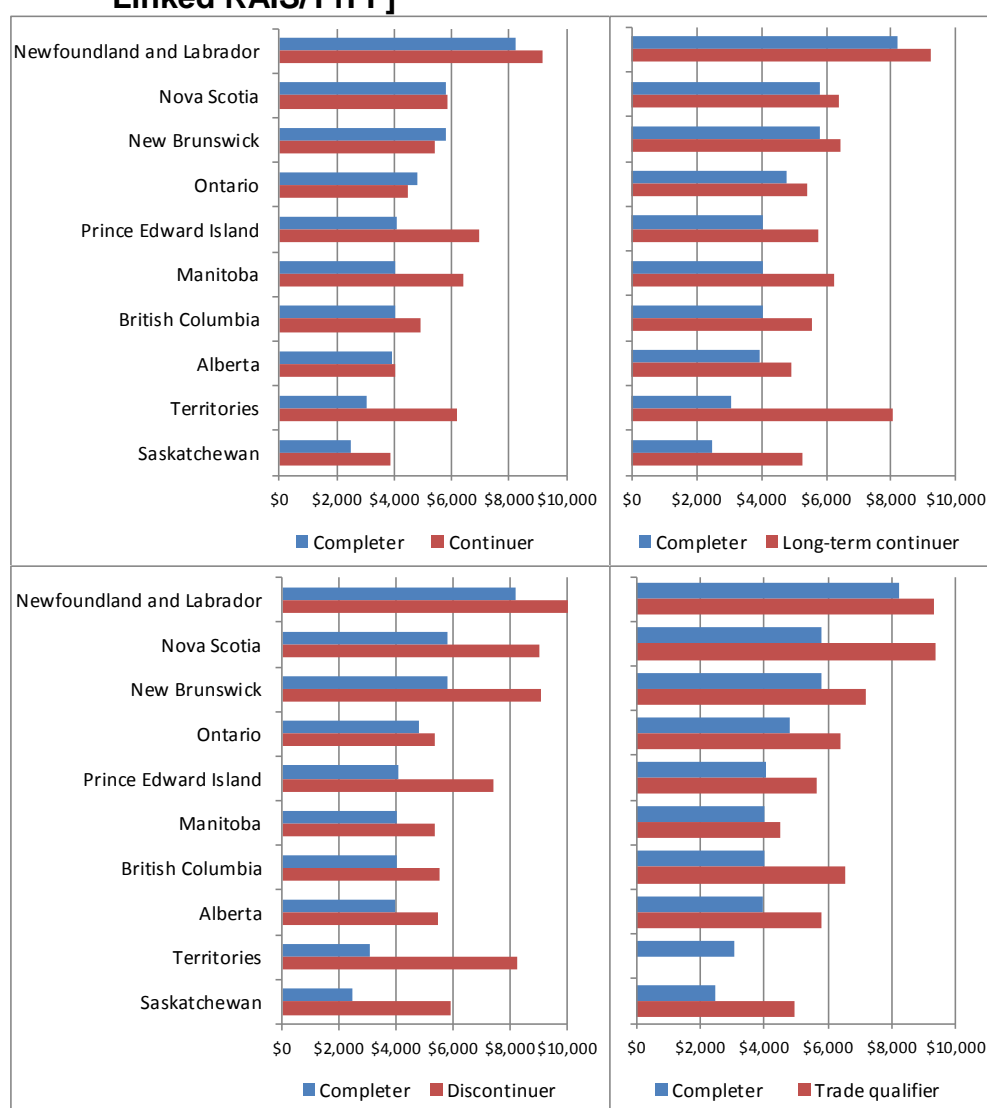


Chart 3.23 shows total EI income in 2009 for the five status groups by jurisdiction. Again there are substantial variations across jurisdictions. Those in Newfoundland and Labrador received the most EI income, regardless of completion status. For most groups, those in Saskatchewan received the least EI income. EI income was generally lower for completers than for other groups. Differences among other groups were generally smaller, and more a function of jurisdiction than of status.

Chart 3.23 2009 Median Employment Insurance Income by Jurisdiction and 2008 Status: Completers versus Other Groups [Source: Linked RAIS/T1FF]



There is a particular challenge in interpreting EI income because overall EI income is a function of both income while employed and number of weeks for which EI is received, as well as jurisdiction and even region within a jurisdiction. Again, it is not possible to separate the various effects. However, the overall picture remains relatively clear. EI is a partial source of income for a large percentage of those working in the trades.

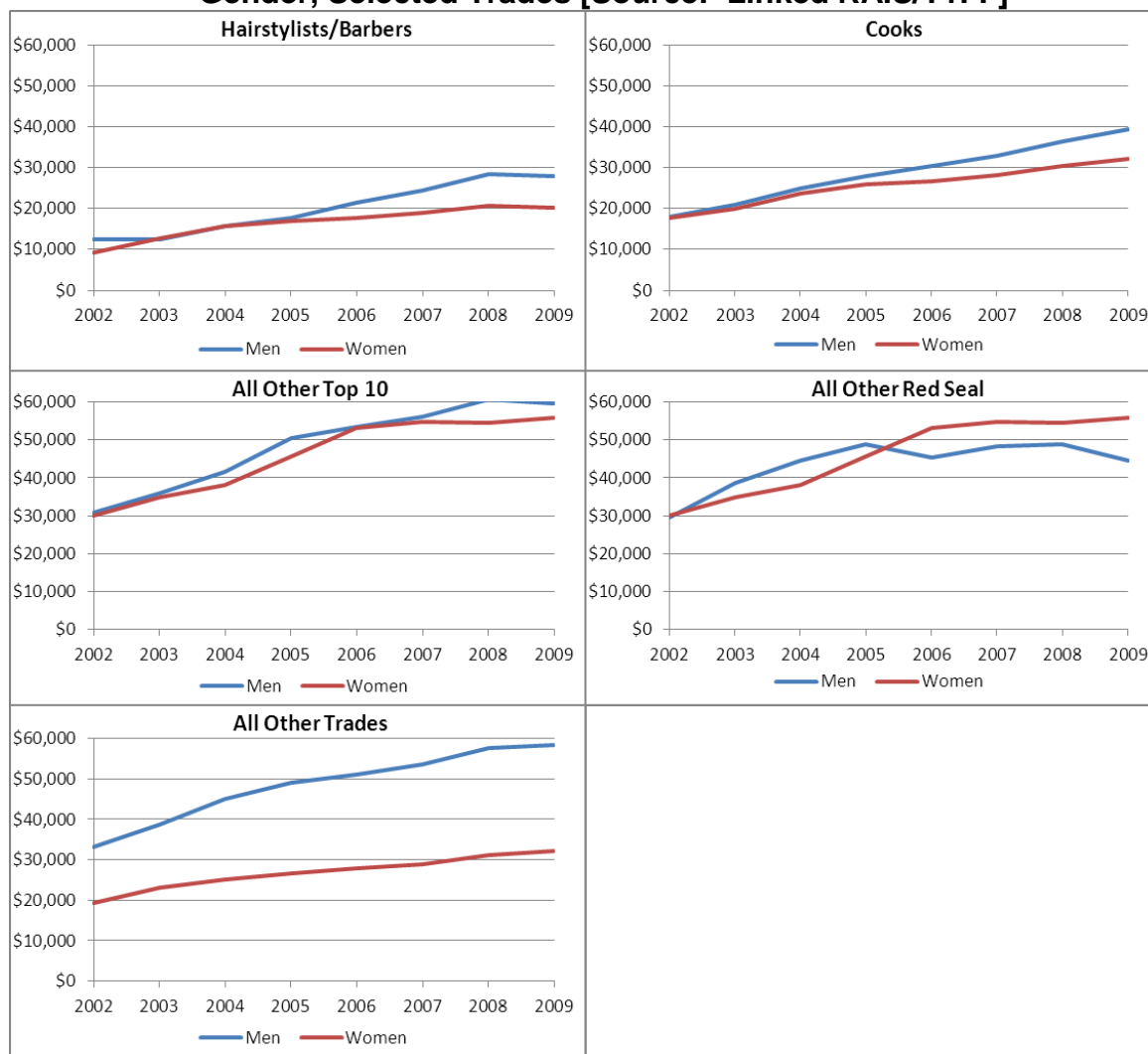
3.3.6 Gender Differences in Income

The gender gap in income has been documented in previous studies (e.g. Ahmed, 2010; Gunderson and Krashinsky, 2012). This is attributable mainly to the concentration of women in a few low paying trades, especially the hairstylist and cook trades. However, there is some indication (Boothby and Drewes, 2010) that the gap is reversed for the few women in traditional male-dominated trades. Again, the linked files allow this point to be pursued using the more precise income data derived from the income tax records.

To simplify the presentation, and because of the small number of women in some categories (especially trade qualifiers), the comparative results for men and women are given for completers only and for broader trade groupings than for the earlier results.

Chart 3.24 gives the time trends in employment income for men and women from 2002 to 2009 for 2004 completers. For hairstylists/barbers and cooks, there are only small differences up to 2004, when both men and women were still apprentices. After that time, the income gap favours men and widens in successive years to more than \$7,000 for both groups. For all other Top 10 trades (with only about 1% women completers), the differences are relatively small throughout the period. For all other Red Seal trades (fewer than 2% women completers) women actually show higher earnings than men after 2005, one year or more after completion. This is consistent with the Boothby and Drewes (2010) findings for this group. However, for all other (non-Red Seal) trades (where the proportions of women completers are in the 20% range), the gap favouring men is larger and widens over time. While these results do not explain why women earn more than men in some male-dominated trades, they do indicate that there are wage advantages for women in entering these trades, relative to the trades in which women are more likely to participate.

Chart 3.24 Median Employment Income 2002-2009 for 2004 Completers by Gender, Selected Trades [Source: Linked RAIS/T1FF]



3.3.7 Mobility

Interprovincial mobility of trade workers is an important outcome because one of the main purposes of the Red Seal program is to facilitate such mobility. Trade work, especially in the construction sector, tends to be episodic, with the location of large-scale projects changing over time. Having a highly mobile trade workforce is thus an important aspect of the ability to match worker supply and demand.

The linked RAIS/T1FF file allows us to identify the jurisdiction in which an individual registered as an apprentice or challenged the exam as a trade qualifier, as well as the jurisdiction of residence at the end of each year from 2002 to 2009. Matching these two variables produces a matrix which identifies origin and destination jurisdictions and thus whether or not an individual was mobile during the period of interest. The mobility variable can then be examined as a function of apprenticeship or certification status.

Chart 3.25 gives a broad picture of the percentage of 2008 RAIS status groups who were located in 2009 in a province other than their province of registration. This shows inter-provincial mobility rates to be lower for completers, continuers and long-term continuers than for trade qualifiers and discontinuers.

Because of the intended function of the Red Seal endorsement in facilitating mobility, it is useful to look at mobility by type of certificate received. Chart 3.26 shows trends from 2004 to 2009 for status groups based on type of certificate and also for those who still had no certificate in 2008. The overall pattern here is for a decline in mobility for all groups in the early years and an increase in the later years of this time period. Again, trade qualifiers are the most mobile group throughout the period. However, the mobility of trade qualifiers who received a Red Seal in 2008 increased from 2007 onward while that for those without a Red Seal certificate decreased slightly. Those with no certificate in 2008 (a group which includes both continuers and discontinuers) were actually more mobile in all years than either Red Seal or no Red Seal apprentice completers. Apprentices with Red Seal endorsement had increasing mobility from 2006 onward at a higher rate than those with no Red Seal endorsement.

Chart 3.25 Percent Resident in a Province Other than the Province of Registration in 2009 by 2008 Registration Status [Source: Linked RAIS/T1FF]

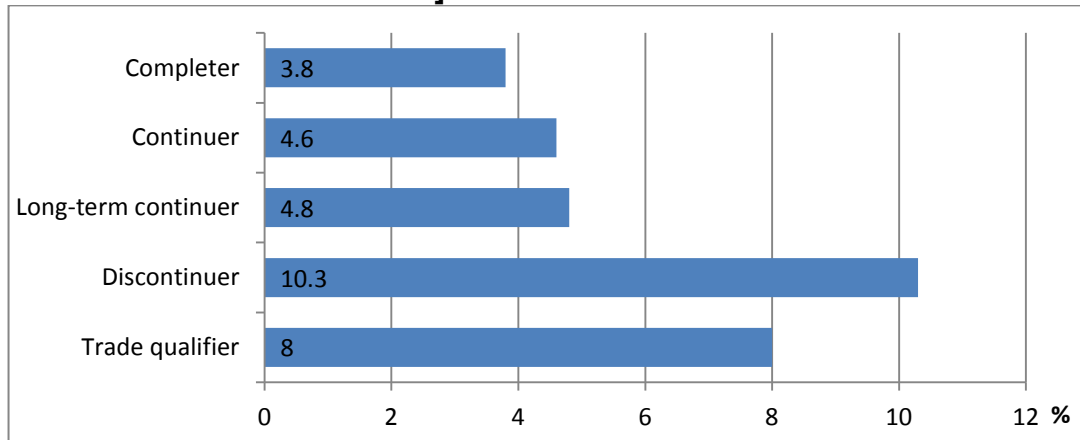


Chart 3.26 2004-2009 Percent Resident in a Province other than the Province of Registration by Type of Certificate Issued in 2008 [Source: Linked RAIS/T1FF]

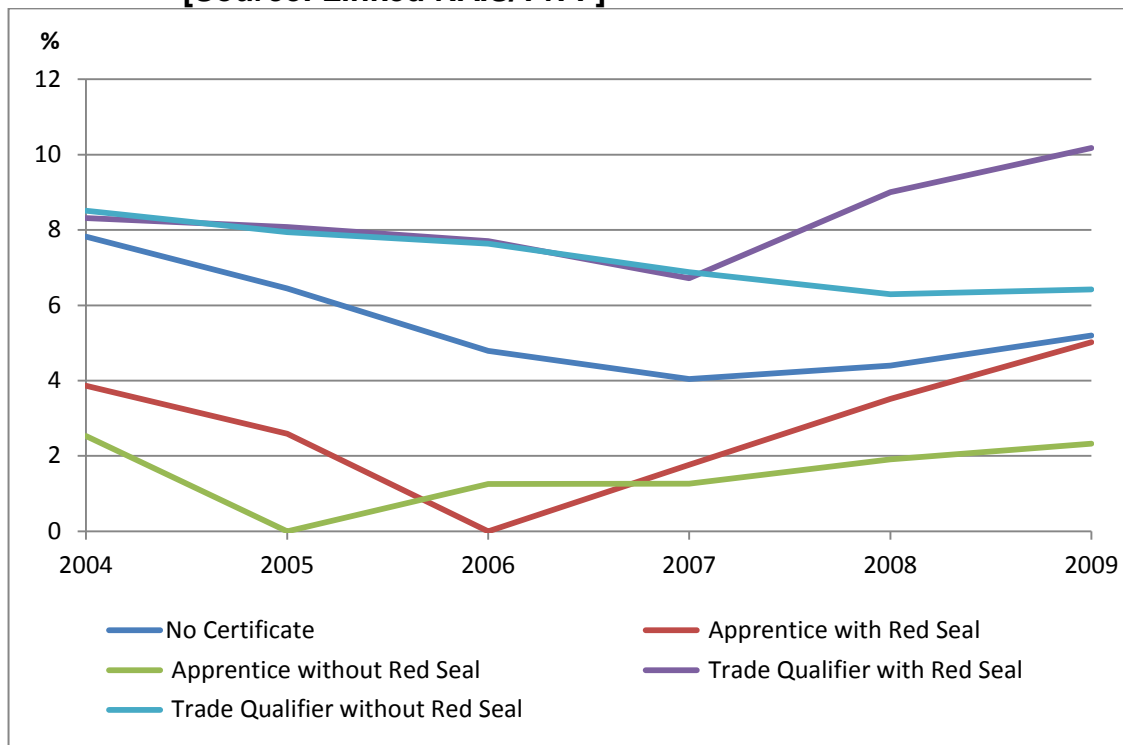


Chart 3.27 gives the percentages resident in 2009 in provinces different from their province of registration, by province of registration, for three specific RAIS 2008 status groups. These percentages are thus measures of out-mobility from the province of registration relative to the total in each group in that province. For Canada as a whole, and for seven of ten provinces, out-mobility rates for Red Seal trade qualifiers are higher than for either apprenticeship completers or those with no certificate. Overall mobility rates for the latter two groups are about the same. Out mobility is generally low for all groups in Saskatchewan and Manitoba and is especially low for those with no certificate and for Red Seal apprentice completers registered in Quebec.

Chart 3.27 Percent Resident in 2009 outside the Province of Registration by Province of Registration and 2008 Certification Status
[Source: Linked RAIS/T1FF]

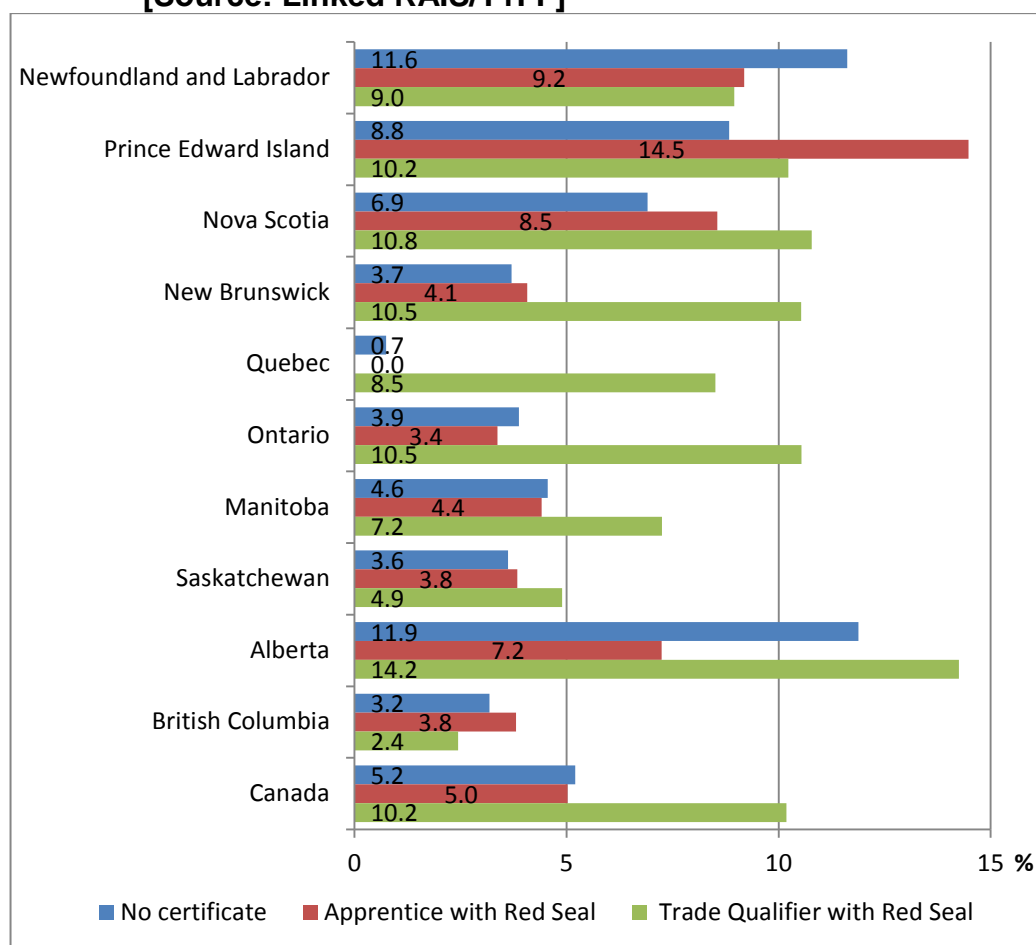
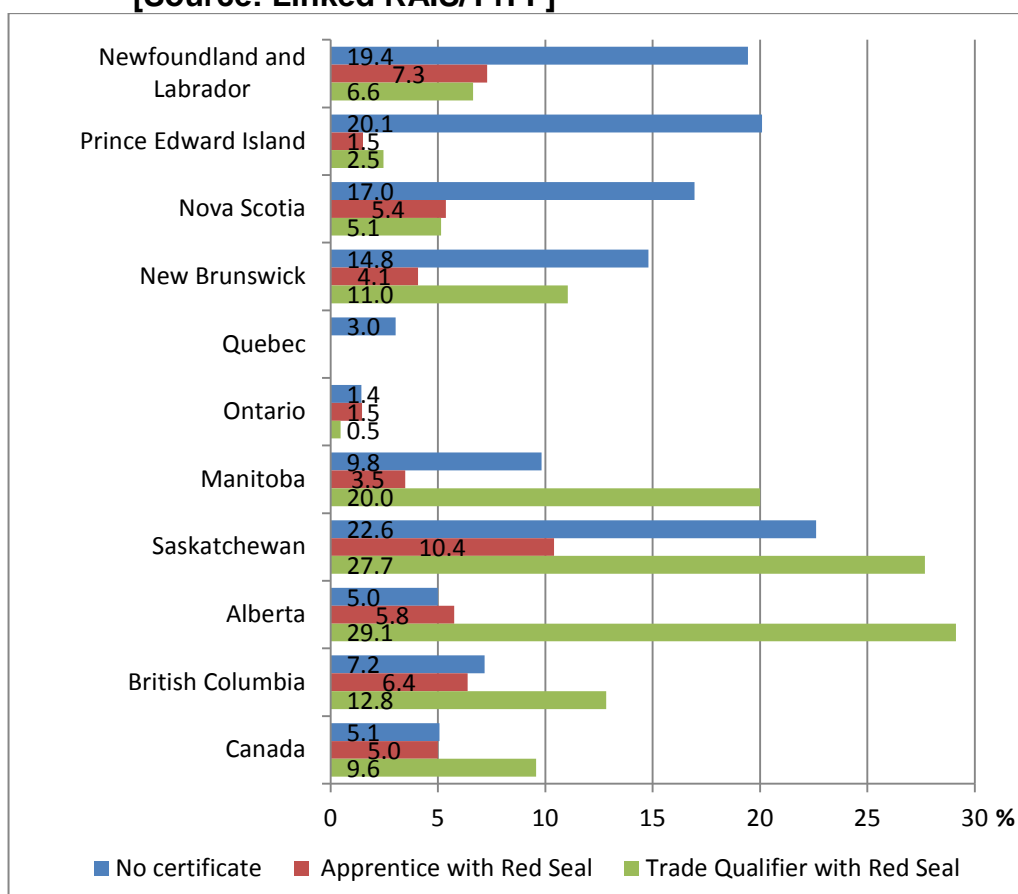


Chart 3.28 is the complement of Chart 3.25, with the province of destination rather than of origin as the focus. The percentages represent the ratio of in-migrants to total registrants in the destination province. Again, Red Seal trade qualifiers are the most mobile group overall. However, the in-migration pattern is different from that for out-migration. Ontario and Quebec have relatively few in-migrants relative to their total registrants. This likely reflects the large number of registrants in these provinces relative to the number available to migrate from other provinces. The three Prairie Provinces are the largest relative recipients of Red Seal trade qualifiers while the Atlantic Provinces and Saskatchewan are the largest relative recipients of Red Seal apprentice completers.

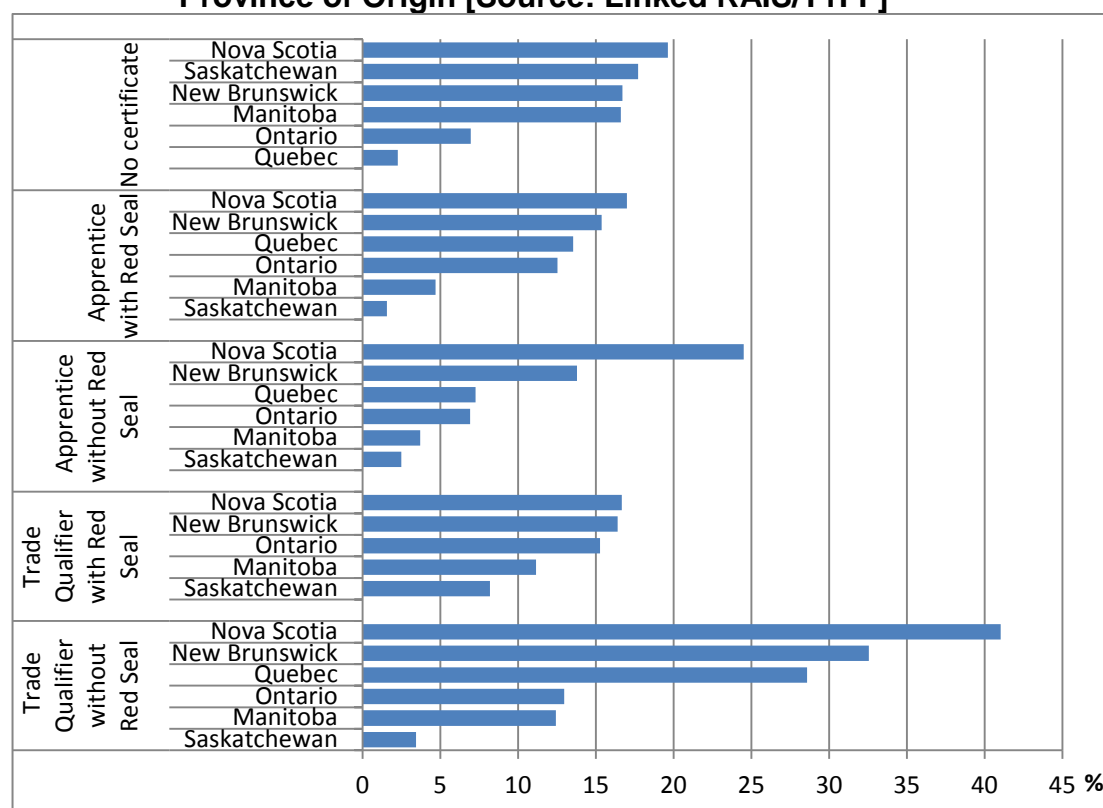
Chart 3.28 2009 Destination Provinces for 2008 Status Groups as a Percent of Each Group within the Destination Province
[Source: Linked RAIS/T1FF]



Mobility can be examined over a longer term by looking at those in RAIS 2004 who were mobile at any point from 2004 to 2009. Chart 3.29 gives the out-

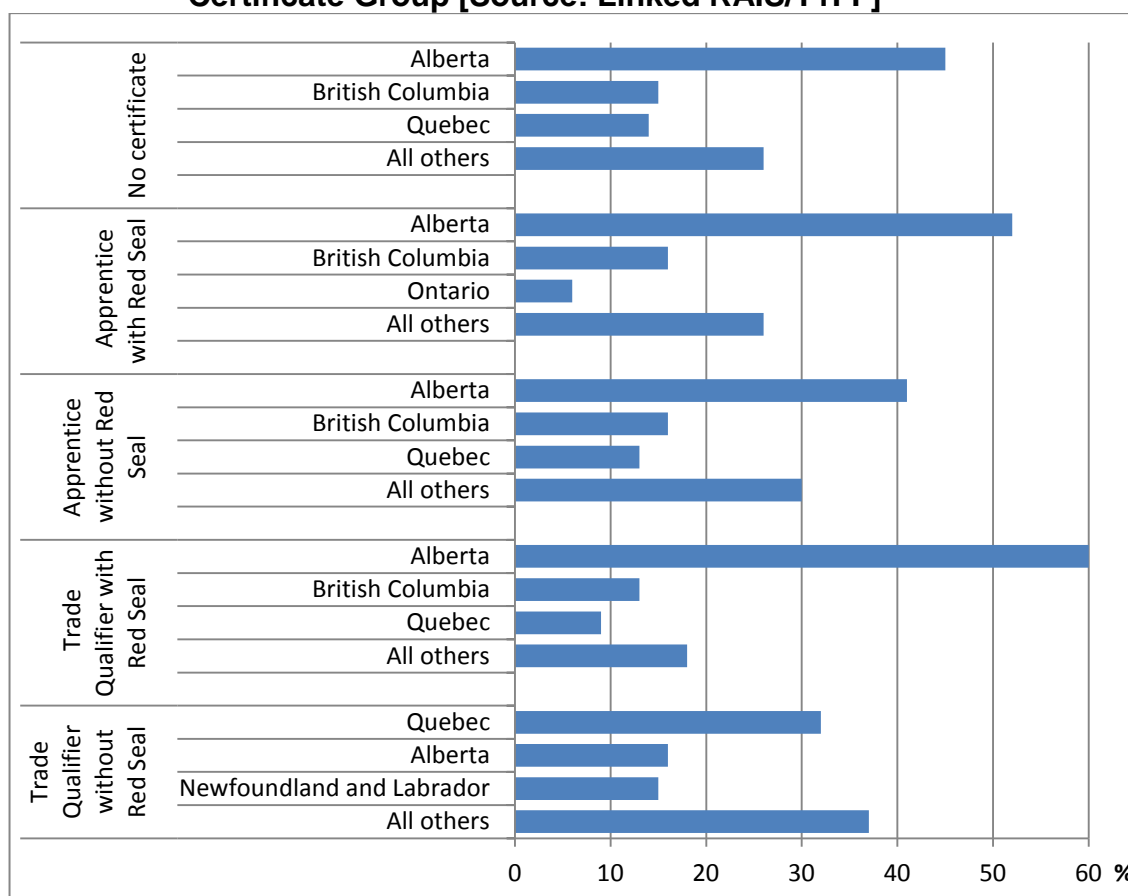
migration results for the six provinces which had individual level data in 2004, as a percentage of all of those who are mobile. Mobility rates vary considerably by both type of certificate and province. Overall, the highest out-mobility rates are found for Nova Scotia and New Brunswick. For those with no certificate, out-mobility is also higher for Saskatchewan and Manitoba than for Ontario and Quebec. The relative position of provinces is the same for Red Seal and no Red Seal apprentices, though out-migration is relatively higher for Nova Scotia among no Red Seal than among Red Seal apprentices. The highest out-migration rates overall, and the greatest variation across provinces, are found for no Red Seal trade qualifiers. For Nova Scotia, New Brunswick and Quebec, out-migration of no Red Seal trade qualifiers is considerably higher than for Red Seal trade qualifiers.

Chart 3.29 Percent Mobile 2004-2009 by 2004 Certificate Type and Province of Origin [Source: Linked RAIS/T1FF]



Again, Chart 3.30 is the in-migration counterpart to Chart 3.29. In this case, the three top destinations are given, with all others combined. The percentages here sum to 100 because all provinces are identifiable as destinations. However, it is reiterated that the 100% represents those who left any of the six identifiable provinces of origin. The pattern here is clear, with Alberta being the primary destination for all groups except no Red Seal trade qualifiers. Indeed, Alberta is the destination of 40% to 60% of the migrants in four of the five groups. British Columbia is the next most common destination. However, the percentages for British Columbia are much smaller than those for Alberta. While Quebec is not a major destination for most groups, that province does attract a higher percentage than the other two top destinations of no Red Seal trade qualifiers.

Chart 3.30 Destination Provinces for those Mobile 2004-2009 by 2004 Certificate Group [Source: Linked RAIS/T1FF]



3.4 Modeling Labour Market Outcomes

3.4.1 Regression Modeling

Labour market outcomes are determined by a large number of variables other than occupation and jurisdiction. For example, it is generally the case that women earn less than men in many occupations. Similarly, earnings can be a function of age and experience and, crucially for our work, of type of credential. All of these factors tend to interact with each other, making it difficult to identify the unique effect of any one factor.

The analytical approach most often used to address these complex patterns is multiple regression analysis. In this section we present regression models for 2008 and 2004 status groups, with employment income as the labour market outcome indicator and occupational and demographic variables, as predictors. Specifically, the main predictor of interest is RAIS status, in either 2004 or 2008, defined by a set of five dichotomous variables representing the five status groups. The variables controlled are sex, age, trade and jurisdiction (all also coded as a series of dichotomous variable. It was not possible to include highest education level, disability or Aboriginal status in the model because of data quality issues for these variables in the RAIS files.

The coefficients in these models essentially represent dollar differences in employment income for each status group with the above predictors controlled. The results thus differ from those presented in previous sections because the effects of the non-status variables have effectively been removed from the model. The reported effects are thus additional to any effects contributed by sex, age, trade and jurisdiction. The effects of the latter variables are shown in the full set of model coefficients given in Appendix A Table A3.1 and A3.2

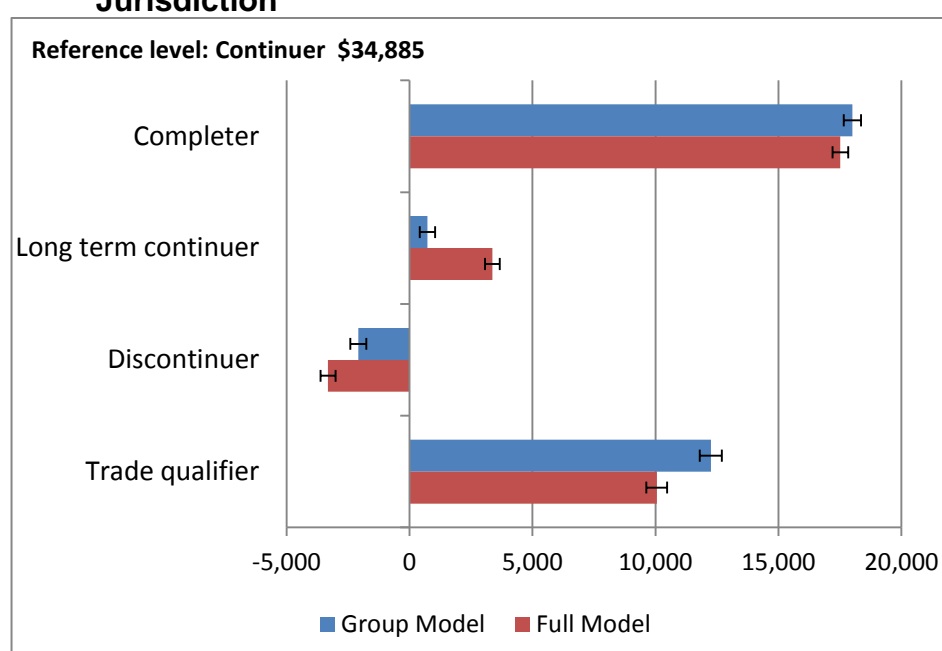
3.4.2 RAIS 2008 Model

Chart 3.31 shows regression coefficients for 2009 employment income by 2008 status group. The coefficients are expressed as incremental dollar changes from the average income (\$34,885) for continuers.²² The “group model” is a model in which the status variables are entered into the model as a group, but with no

²² This incremental approach is required because the status variables are mutually exclusive and dummy coded. Regression models cannot be computed when all individuals are included in a set of dummy coded categories. This problem is solved by using one of the categories as a reference and comparing all others to that reference.

controls for other models. This is effectively the same as computing the average employment income for each group separately. The “full model” is a model in which age, sex, jurisdiction and trade (top 10 and all others) are controlled.²³ The change in coefficient from the group model to the full model is a measure of the effect of controlling for other variables on the variables (status groups) of main interest.

Chart 3.31 Regression Coefficients for 2009 Employment Income by 2008 Status Groups Controlling for Age, Gender, Trade and Jurisdiction



These results show, as expected, that completers enjoy the largest income premium, close to \$18,000 relative to continuers. This is essentially the same as the overall premium reported in Chart 3.12. This premium changes only slightly²⁴ when other variables are controlled. The next highest premium is for trade qualifiers, at approximately \$12,000 with no controls. This premium decreases significantly, to about \$10,000 when other variables are controlled. This may be mainly due to the age factor, as trade qualifiers likely benefit from being older on average than the other groups, where age can be treated as a proxy for experience.

²³ Coefficients for all variables in the full model are presented in Appendix A.

²⁴ The lines at the end of each bar are referred to as “error bars.” These give the margin of error, at the .95 confidence level, for each coefficient. Differences between coefficients are considered to be statistically significant if the error bars do not overlap.

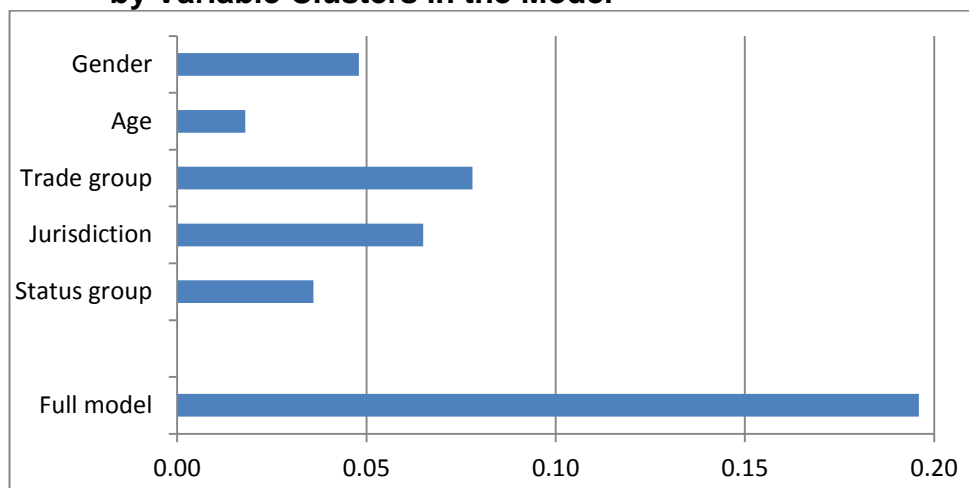
Long-term continuers have only a slight premium (about \$700) over other continuers in the group model. This increases significantly (to approximately \$3,400) when other variables are controlled. However, the premium on long-term continuation is obviously nowhere near that for completion.

The employment income of discontinuers is discounted by approximately \$2,000 relative to continuers and by much more than this relative to completers. The discount relative to continuers increases to about \$3,300 when other variables are controlled. The results for discontinuers relative to long-term continuers are interesting because they suggest that it is better to remain as an apprentice in the longer term than it is to discontinue.

Although these models give a reasonably clear picture of the differences in income across status groups, it is important to point out that none of the variables included in the model account for much of the total variation in incomes. This can be shown by examining the “predictive power” of the model as given a statistic called the squared multiple correlation (R^2). The values of R^2 vary from zero if the model has no predictive power (for example if the predictors were all random numbers) to one if the variables can perfectly predict the outcome. R^2 is interpreted as the “proportion of variance” accounted for by the variables in the model.

Chart 3.32 gives the value of R^2 for each group of variables in the model, entered separately rather than cumulatively. This shows that each cluster, taken alone, accounts for a very small proportion of the total variance. In particular, status group accounts for less variance than gender, trade or jurisdiction. The full model has somewhat greater predictive power, indicating that the variable clusters act cumulatively to a large degree. The implication of this is that employment income is influenced by a constellation of factors, but more by trade and jurisdiction than by status group, age and gender.

Chart 3.32 Proportions of Variance in Employment Income Accounted for by Variable Clusters in the Model



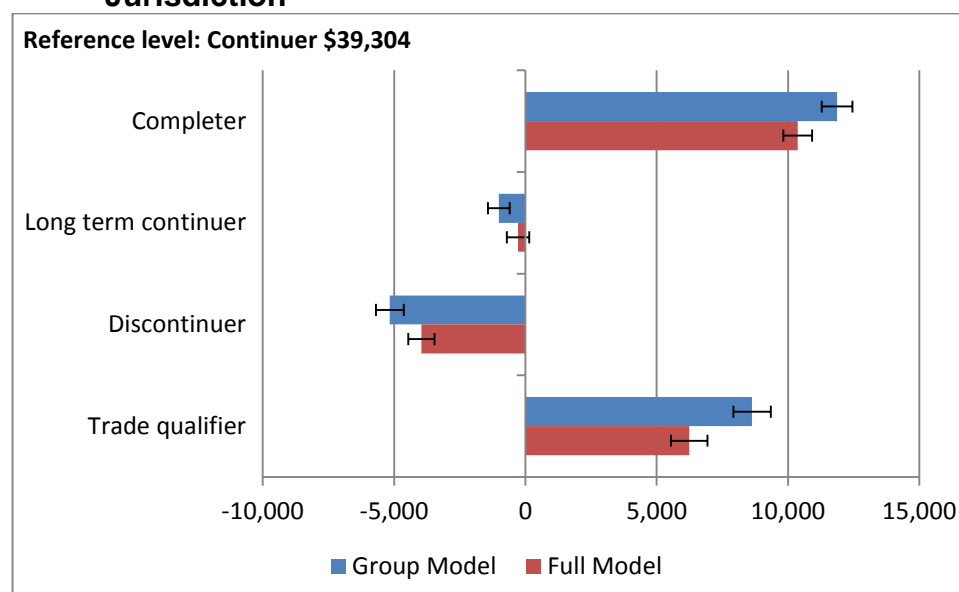
3.4.3 RAIS 2004 Model

Chart 3.33 shows regression coefficients for 2009 employment income, five years after completion, for RAIS 2004 status groups. These results show a somewhat smaller premium, of about \$12,000, than the previous model for completers relative to continuers in the group model, with a reduction to just over \$10,000 when other variables are controlled. Again, trade qualifiers have a slightly lower premium, at just over \$8,500 with no controls reducing to about \$6,200 with other variables controlled.

In this case, long-term continuers have slightly lower income than continuers in the group model, with no statistically significant difference in the full model. The employment income of discontinuers is discounted by approximately \$5,000 relative to continuers and by more than \$15,000 relative to completers in the group model, with only a small change in the full model. This is consistent with the previous model in indicating that, from an employment income perspective, it is better to remain as an apprentice than to discontinue.

The predictive power of this model and the effects of the other predictor variables are about the same as for the previous model, so the predictive power chart is not repeated.

Chart 3.33 Regression Coefficients for 2009 Employment Income by 2004 Status Groups Controlling for Age, Gender, Trade and Jurisdiction



3.5 Socio/Demographic Outcomes

Compared to other sections, the ability to examine socio/demographic outcomes is limited by the relative lack of data in this area in the available databases. The analysis thus limited to a few results on attitudes and satisfaction found in the NAS 2007 studies and to some results on participation of females and immigrants. The latter are treated as outcomes because increased participation of these groups is sometimes viewed as a way of increasing overall participation in trades and apprenticeship and thus increasing labour market supply.

3.5.1 Attitudes and Satisfaction

One of the NAS 2007 reports (CCDA, 2010) was specifically devoted to the perceptions of respondents about the quality of apprenticeship training. This report yielded a number of results related to attitudes to the program and to satisfaction with its quality. These are summarized briefly here.

- Overall, more than 85% of apprentices in each of the three program groups (completers, long-term continuers and discontinuers) reported “no difficulty” with either the on-the-job or technical training.

- Respondents who indicated “no difficulty” with the training also responded favourably about other aspects of their apprenticeship experience, including the pace at which they were instructed, and their ability to understanding new work duties or in-school lessons.
- Only minor differences were found in perceptions of the quality of either on-the job or technical training based on the socio-demographic characteristics of apprentices.
- There was no difference in perceptions of difficulty with the on-the-job training when analyzed by age at registration. However, apprentices under age 25 at registration were less likely to report difficulty with the technical training than apprentices aged 25 and older at registration.
- The higher the education level at registration, the less likely apprentices were to report having difficulties with the technical training.
- Apprentices who had work experience in their trade prior to registration had slightly more favourable perceptions of their apprenticeship experience than apprentices without prior work experience related to their trade.
- The smaller the workplace, the more likely apprentices were to report that the on-the-job training had provided a variety of tasks to prepare them for the certification exam.
- A larger proportion of apprentices who took their technical training through a private delivery agent or through a union/company training centre reported no technical training difficulties, compared with apprentices who took their training at a trade school, vocational centre or community college.
- More differences were observed between completers, long-term continuers and discontinuers for technical training than for on-the-job training. For example, completers responded more favourably that the pace of technical training was appropriate, followed by discontinuers and long-term continuers.
- Long-term continuers were more likely than completers and discontinuers to report difficulties understanding in-class or online written material.
- Apprentices who had found employment following completion were more likely to report “no difficulty” with their on-the-job training than those who reported being unemployed following completion.

All of these results point to generally positive attitudes and a high level of satisfaction with apprenticeship programs.

3.5.2 Participation of Target Groups

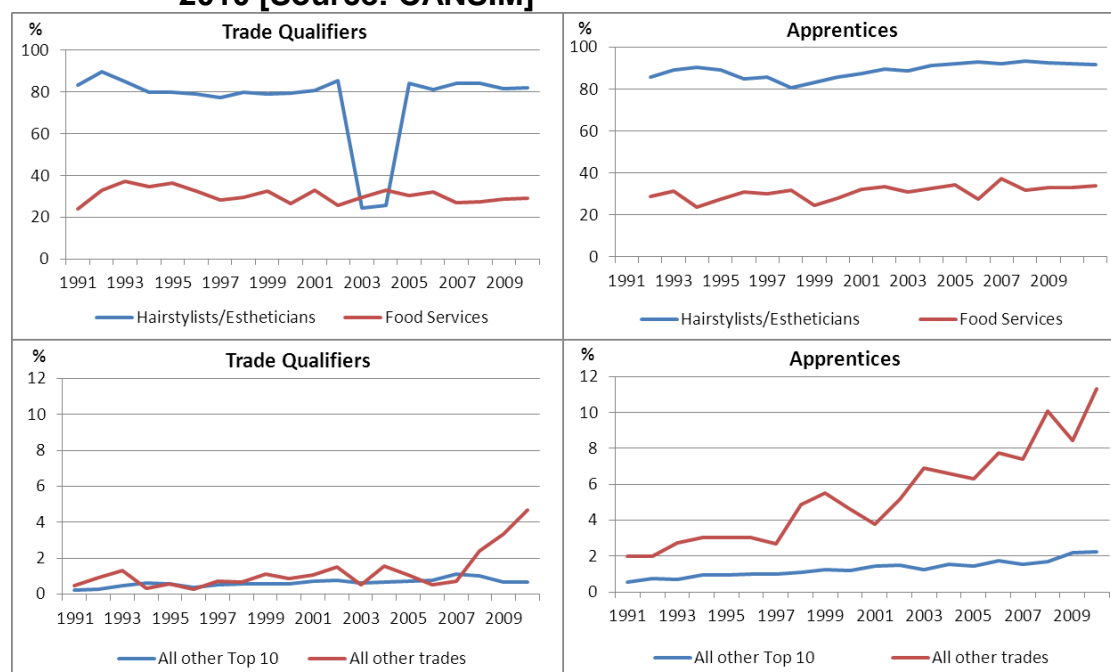
One of the NAS 2007 studies (Laryea and Medu, 2010) was also devoted to the issue of participation rates for specific target groups; women, aboriginals and immigrants. That report will not be summarized in detail here. Suffice it to say that women were found to be the most under-represented group, at only about 10% of NAS respondents being women (compared to close to 50% women in the labour force as a whole) with significant proportions of women being found within only two trades, hairstylists and cooks. Immigrants were also under-represented, with only about half the level of participation that would be expected from their overall population numbers. On the other hand those of Aboriginal origin were found to be represented in numbers comparable to expectations from their population proportion.

The linked RAIS/T1FF/IMDB file allows us to extend these findings slightly to the broader population of apprenticeship participants for women and immigrants. Time series data on the participation of women by trade are also available from Statistics Canada through CANSIM. Unfortunately, for Aboriginal identity there is a large amount of missing data in RAIS, leading us to judge that any results would be too unreliable to report.

One of the most significant issues around the participation of women is whether the proportion of women in the trades has been increasing, as has been the case for most other occupations. Chart 3.34 shows the percentage of women among those certified through apprenticeship and trade qualification from 1991 to 2010. Hairstylists/Estheticians and Food Services²⁵ have been plotted separately because these are the only two trades with significant female participation. All other Top 10 and all other trades have been examined as groups because, even with small proportions, an interesting time trend is revealed.

²⁵ These two trade areas are labeled slightly differently in CANSIM than in RAIS. However, this does not affect the overall results.

Chart 3.34 Percentage of Female Apprentices and Trade Qualifiers, 2001-2010 [Source: CANSIM]



These graphs show that women make up about 80% of trade qualifiers and 90% of apprentices among Hairstylists/Estheticians. The percentage of female apprentices grew slightly from about 1997 to 2005 before again declining slightly. The large drop in the proportion of female trade qualifiers in 2003-2004 occurred because of a large increase in the number of males becoming certified through this route in these years, with only a small change in the number of females. The reason for this is not clear from the CANSIM tables from which these data are drawn.

For food services, the percentage of women in both groups has fluctuated slightly from year to year but with no clear trend over time. The overall percentage has averaged around 30% over the whole period.

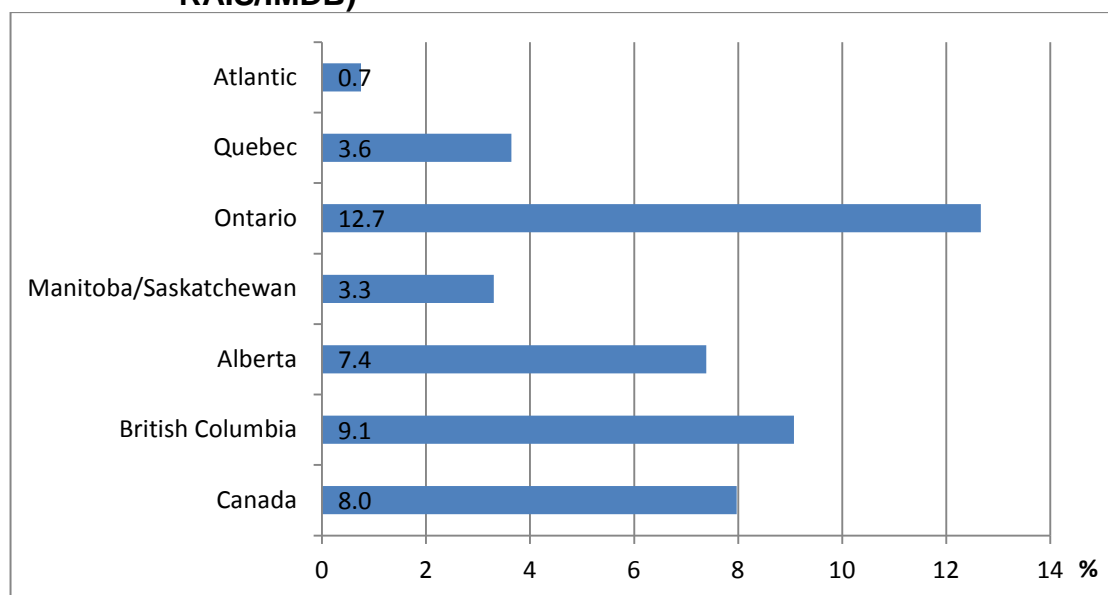
The proportion of female trade qualifiers in all other Top 10 and all other trades has been consistently very low, at less than 1% over most of the period. The exception is a substantial increase among all other trades since 2007. Although this yields only about 5% women in 2010, it will be interesting to see if this is the start of a longer-term trend.

The trend for apprentices among all other Top 10 trades has been fairly consistently upward. Despite this, the level has reached only about 2% in the most recent years. A more pronounced trend is apparent for all other trades, where a clear upward trend from about 3% in the early 1990s to 11% in 2010 is apparent, overriding some year to year fluctuations.

CANSIM does not give comparable data for immigrants. However, some information is available from the linked file because immigration status is identifiable from variables derived from the IMDB that are included in that file. Because of small numbers (and consequent data suppression by Statistics Canada), detailed trade and jurisdictional breakdowns are not given here. However, because immigration tends to be more prevalent in some jurisdictions than others, a regional breakdown can be given. This is shown in Chart 3.35.

This shows the overall proportion of immigrants in apprenticeship programs to be about 8%, well short of the approximately 20% immigrants among the Census population. Immigration participation is unevenly distributed regionally, with Ontario having more than the Canadian average. Alberta and British Columbia close to the Canadian average and the Atlantic region, Quebec and Manitoba/Saskatchewan having much lower immigrant participation. These results are reasonably consistent with regional patterns of immigration.

Chart 3.35 Percent of Immigrants, 2008 RAIS by Region (Source: Linked RAIS/IMDB)



3.6 Summary and Conclusions

This chapter identifies three types of outcomes of apprenticeship and trade training; education and training outcomes, labour market outcomes and social/demographic outcomes. The available data sources provide a wealth of information on the first two types but relatively little on the third.

The main findings of this chapter may be summarized as follows:

3.6.1 Completion and Certification Outcomes

- For the labour force as a whole, the proportion holding any form of trade certificate²⁶ has remained stable at about 12%, for more than twenty years.
- For those working in trades occupations in 2005 (2006 Census figures), approximately 17% held registered apprenticeship certificates and a similar proportion had some other form of trade certification as their highest level of education. Electricians and plumbers had the highest percentages of registered apprenticeship certificates (in the 36% range) with cooks having the lowest (4%).
- Consistent with the upward trend in apprenticeship registrations, but with a lag due to the time required to complete, there has been a substantial increase in apprenticeship completions, from just under 20,000 for most of the last decade to 36,000 in 2010.
- Completion rates a decade after registration tended to be in the 50% range for cohorts beginning in the 1990s. Results suggest that completion rates may have declined to about 40% for cohorts beginning in the early 2000s.
- Relatively few apprentices complete after six years. After that time, most others have discontinued their programs. The percentage continuing for ten or more years has not changed much over time, averaging about nine percent.

²⁶ The LFS does not distinguish those holding registered apprenticeship certificates and those with other forms of trade certificates. Over most of the period, there was little growth in the number of apprenticeship completions. This has changed in recent years.

3.6.2 Labour Market Outcomes

- Unemployment rates have historically been slightly higher in the trades than in other occupations, especially in the construction trades.
- According to the 2006 Census, for all levels of education below the bachelor's degree, median annual incomes in trade occupations were higher than in all other occupations. Indeed, those with registered apprenticeship certificates and working in a trade had higher incomes than those with bachelor's degrees, whether or not working in a trade. Nevertheless, there are wide differences in income levels across the trades.
- Over the period 2002 to 2009, 2004 apprenticeship completers and trade qualifiers show substantially higher employment income than continuers, long-term continuers or discontinuers. The income premium is highly variable across trades (less so across jurisdictions), with almost no premium for those in service trades and premiums of \$20,000 or more for some mechanical trades.
- Trade qualifiers certified in 2008 enjoyed higher income than other groups over the previous seven years. 2008 completers reached the same level as trade qualifiers in 2008 and slightly exceeded that group in 2009.
- The employment income differences among the status groups hold, with minor shifts, when a series of other variables (sex, age, trade and jurisdiction) are controlled.
- Self-employment in the trades is relatively low overall, but is more common among trade qualifiers than other groups. Among trade qualifiers, self-employment is highest (in the 20-30% range) for hairstylists/barbers, carpenters, plumbers and electricians. Net income from self-employment is much lower generally than that for employment. While many of those who are self-employed also reported employment income, the combined income for that group is also much lower than for those who were not self-employed.
- Regression models for 2009 income for both 2004 and 2008 RAIS status groups show that the premiums for apprenticeship completers and trade qualifiers are reduced but remain substantial when other factors contributing to income are controlled. Specifically, the premium for apprenticeship completers over continuers is approximately \$18,000 for 2008 completers and \$10,000 for 2004 completers (some of whom would

have been completers by 2009). The premium for trade qualifiers over continuers is close to \$10,000 for those certified in 2008 and \$6,000 for those certified in 2004.

- Interprovincial mobility in 2009 was lowest for completers and highest for discontinuers and trade qualifiers. Trade qualifiers and certified apprentices with a Red Seal are more mobile than those without a Red Seal.
- Overall, the highest out-mobility rates at any time from 2002 to 2009 were found for Nova Scotia and New Brunswick. Alberta was by far the most common destination province for all groups except trade qualifiers without Red Seal. British Columbia was the next most common destination, though the proportions there were much lower than for Alberta.

3.6.3 Social/Demographic Outcomes

- Generally, NAS 2007 respondents held positive views of apprenticeship and only small numbers experienced difficulty with either technical or on-the-job training. Those with higher education levels and with prior work experience tended to have more favourable attitudes.
- Women apprentices are concentrated in a small number of trades, particularly and hairstylists and cooks. There has been slow growth in the number of women in the trades. Nevertheless, even in the most recent years, women make up only about two percent of the largest trades (other than cooks and hairstylists) and about 11% of all other trades. There are also very few female trade qualifiers in any area.
- Immigrants are also under-represented in the trades at about 8% compared to 20% in the population as a whole. The proportion of immigrant apprentices varies considerably across regions, with Ontario having more than the Canadian average, Alberta and British Columbia close to the Canadian average and the Atlantic region, Quebec and Manitoba/ Saskatchewan having much lower immigrant participation.

Again, it is noted that the ability to examine socio-demographic outcomes was limited by a lack of data. For example, it was not possible to pursue the issue of Aboriginal participation because the data sources do not adequately identify those of Aboriginal origin.

3.6.4 Conclusions

Those with trade or apprenticeship certificates represent only about one-third of the total trades labour force. In an overall labour force with generally increasing levels of education, the proportion holding such certificates have held an almost constant proportion for more than 20 years. Assuming that certification is a desirable attribute for those working in trades occupations, this suggests that there is substantial room for growth in certification in the trades. The growth in apprenticeship registrations and, with a time lag, the growth in completions, indicates that there is some prospect that this growth can actually occur over the next few years.

The growth in registrations in the early 2000s seems to have been accompanied by some decline in apprenticeship completion rates, as measured by the tracking of cohorts up to 2003 forward to 2009. This is perhaps not unexpected since there may be some lag between industry capacity to accept new apprentices and capacity to see these new recruits through to completion. Given the inevitable lag in tracking, it would be useful to bring the available figures up to date with the most recent RAIS files.

Trade qualifiers remain an important source of newly certified personnel, even though the proportion being certified through this route is declining relative to the proportion certified through apprenticeship. There are reasons to support trade qualification as a continuing route, especially since the trades labour force obviously includes a large number of experienced persons who have not become certified.

The main conclusion from the many results presented on income is that there is a substantial premium on certification in most trades. This supports in the strongest possible way the conclusion that certification is a valued outcome. It seems not to matter a great deal in terms of income if certification is achieved by apprenticeship or trade qualification. However, on average, certification is achieved at a much younger age for apprentices, giving time to offset the opportunity costs to apprenticeship. However, the income premium varies considerably across trades, which shows that certification is of much greater value in some trades than in others. Any policy response designed to support certification should thus take account of these differences.

Results for the gender gap are very interesting because they reinforce the idea that this gap is mainly due to the concentration of women in a couple of low

paying trades. The very few women who do find themselves in traditionally male-dominated trades do as well as and, in some trades, better than men.

Contrary to the results for income, certification appears not to be a main factor in mobility. The fact that completers are less mobile than others indicates that completion may be a factor in increasing job stability and thus reducing the need for mobility. At the same time, trade qualifiers are more highly mobile than others, whether or not they hold the Red Seal. Mobility may, indeed, be a reason for trade qualifiers to become certified.

Chapter 3 References

Ahmed, N. 2010. *National Apprenticeship Survey 2007: Influences of Labour Market and Economic Conditions on Completion and Long-Term Continuation of Apprenticeship Programs in Canada*. Ottawa: CCDA/HRSDC.

Boothby, D. and Drewes, T. (2006). *Postsecondary Education in Canada: Returns to university, college and trades education*. Canadian Public Policy. 32,1,1-22.

Canadian Council of Directors of Apprenticeship (2010). *Perceptions of the Quality of Training*. Ottawa: Author

Desjardins, L. and Paquin, N. *Registered Apprentices: The Cohorts of 1994 and 1995, One Decade Later*. Ottawa: Statistics Canada. Retrieved February 2, 2012 from <http://www.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=81-595-m&lang=eng>.

Gunderson, M. and Krashinsky, H. (2004). *Rates of Return to Apprenticeship and Post-Secondary Education in Canada*. Ontario Ministry of Training Colleges and Universities.

Gunderson, M. and Krashinsky, H. (2012). *Returns to Apprenticeship: Analysis Based on the 2006 Census*. Working Paper #99. Canadian Labour Market and Skills Researcher Network.

Laryea, S. and K. Medu. 2010. *National Apprenticeship Survey 2007: Apprenticeship in Canada: Participation of Women, Immigrants and Aboriginal People in Apprenticeship Programs*. Ottawa: CCDA/HRSDC.

Morissette, D. (2008) *Registered Apprentices: The Cohort of 1993, a Decade Later*. Ottawa: Statistics Canada.

Prasil, S. (2005) *Registered Apprentices: The Class of 1992, a Decade Later*. Ottawa: Statistics Canada.

4.0 Comparison of Outcomes of Apprenticeship and other Training Sources

4.1 Purpose and Background

4.1.1 Purpose

This chapter examines differences in outcomes for those who have entered trade occupations through apprenticeship versus other pathways. In particular, the report focuses on a group known as “trade qualifiers.” These are individuals who become certified by documenting their work experience in the trade and then challenging and passing the certification examination. In Canada, trade qualification is the only route, other than apprenticeship, to certification in the trades. However, it is not the only alternative route to work in the trades. To the extent allowed by the available data, outcomes are examined for those working in the trades who have different types of educational credentials and who have pursued different routes throughout their apprenticeship program.

4.1.2 Background

Apprenticeship is usually thought of as the primary pathway into the trades. However, it is not the only pathway. Indeed, only a small fraction of the trades work force is supplied through apprenticeship. For example, the 1996 Census shows that only 17% of those defining themselves as being in trade occupations had completed a registered apprenticeship program, with a further 17% having other forms of trade certificate. A large proportion of the trade labour force remains uncertified, many with high school or less as their highest education level. This is possible because, unlike some other regulated occupational areas, certification is not required to work in most trades (this also varies by jurisdiction). On the other hand, there is also Census evidence that large numbers of individuals with apprenticeship training are working in occupations other than the trades. This raises the broader question, not fully addressed in this report, of the possible value of apprenticeship training as a route to other occupations.

In reality, the trades labour force may be thought of as comprising two categories of persons; those certified (known as journeypersons) and those not. The non-journeyperson group exists because certification is not compulsory for work in most trades. The designation of trades as compulsory or non-compulsory is part

of the provincial/territorial regulatory environment for the trades. The number of compulsory trades varies considerably across jurisdictions. Licensing by agencies other than the jurisdictional apprenticeship authorities is also used in some jurisdictions and trades. However, certification is always a prerequisite to licensing.

In Canada, individuals can become certified by only two routes, apprenticeship completion or trade qualification. The latter group comprises those who challenge and successfully pass the certification exams, after acquiring appropriate work experience, as defined by jurisdictions, without having completed or even started an apprenticeship.

Although trade qualification is the most obvious alternative to apprenticeship, there remains the question of individuals who have come to the trades from other pathways but who do not become certified. Specifically, it is possible for individuals to learn trade skills in a variety of ways, including pre-apprenticeship or college programs, vocational training programs in high schools or vocational schools or forms of workplace training other than apprenticeship (e.g. employer, vendor, or manufacturer training). Unfortunately, these groups are not identifiable in any clear way from the available data sources unless they eventually attempt certification through the trade qualifier route. What is important is that, in Canada, unlike in some other countries, the only routes to certification are apprenticeship or trades qualification. Provisions do exist for recognizing prior learning, including vocational training, vendor or workplace training. These can yield credit towards the technical or work experience component of apprenticeship. Such training may be valuable to potential trade qualifiers. However, in Canada, these are not alternative routes to certification.

4.1.3 Research Questions

This aspect of the research examines the following specific research questions?

1. From what pathways other than apprenticeship are jobs in skilled trades being filled?
2. What are the characteristics and labour market outcomes of those who enter the trades from apprenticeship and non-apprenticeship pathways?
3. What are the trends over time in certification for those following an apprenticeship versus a trade qualifier pathway?
4. What is the distribution by jurisdiction and trade of journeypersons who have obtained certificates of qualification through apprenticeship and trade

- qualification?
5. Are there differences in labour market outcomes between those certified through apprenticeship or through trade qualification?
 6. Are there differences in labour market outcomes between those completing apprenticeship and those who have entered the trades through other pathways?
 7. Are differences in outcomes by entry pathway related to trade, jurisdiction or other socio-demographic factors?

4.1.4 Data Sources and Methodology

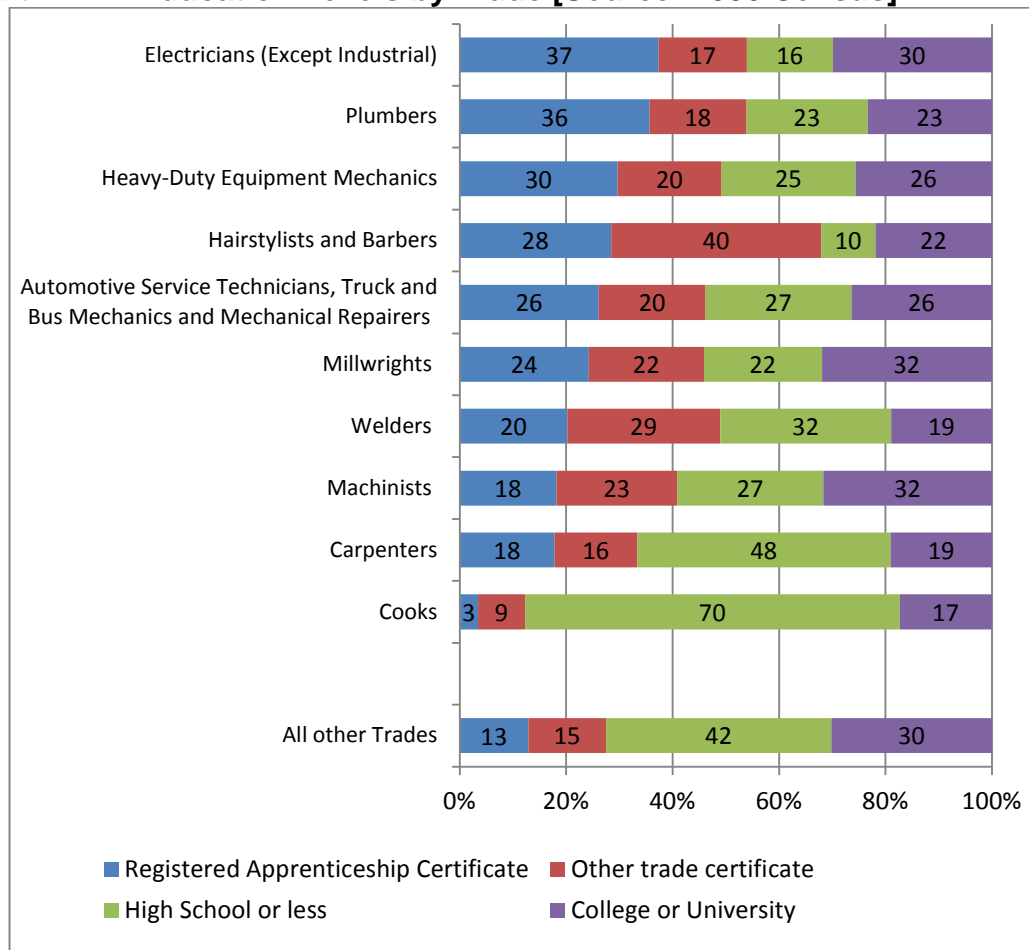
Most of the data sources described in the first chapter of this report have been used in this section. In particular, the RAIS data base has been used to track trade qualifiers and to examine their characteristics. The linked RAIS/T1FF/IMDB files have been used to examine labour market outcomes for trade qualifiers and completers. One additional source, not used in the other components, was the database on Red Seal examination results maintained by HRSDC. This allows the success rates of apprentices and trade qualifiers to be compared. Since, in most jurisdictions, the Red Seal exams also serve as the certification exams, this encompasses most of those who become certified in any year.

4.2. Pathways to Certification

4.2.1 Educational Credentials of the Trade Labour Force

A rough measure of the occurrence of different educational pathways to entry to the trades is the total number of those in trade occupations who hold different levels of educational credentials. This information is available from the 2006 Census. Results for the top 10 trades, along with all others, are shown in Chart 4.1. The limitation of these results is that the category “other trade certificate” is quite broad and does not allow any more refined differentiation of pathways to the trades. For example, trade qualifiers are included in the category. However, the category also likely includes some who have certificates from trade or vocational schools, who would not qualify as journeypersons.

Chart 4.1 Education Levels by Trade [Source: 2006 Census]



In none of the trades is the proportion holding registered apprenticeship certificates higher than just over one-third. Electricians and plumbers have the highest proportions of registered apprenticeship certificates. However, if other trades certificates are included, the highest proportion of certificates overall (68%) is held by hairstylists and barbers. This group is also notable for having the smallest proportion with high school or less as their highest education level. This suggests that many in this trade have taken school-based programs and have then started work without having registered as apprentices.

What we cannot determine from this chart is how many within this group are actually certified as journeypersons. Cooks have relatively small proportions holding apprenticeship or trades certificates. It is also notable that cooks and carpenters also have a large proportion with high school or lower levels of education.

For some trades, the proportion holding credentials classified in the Census as “higher” than trades and apprenticeship is also fairly large (more than 25% for electricians, heavy duty equipment mechanics, automotive service technicians, millwrights and machinists). This may reflect aspects of these trades that may require some workers to take advanced studies.

These results also point to a couple of significant limitations of the Census classification of education levels. First, this classification is based essentially on years of formal schooling. Work experience as an apprentice is not counted as years of schooling. Second, the hierarchical nature of the classification means that some of those included in the “college or university” category almost certainly also hold trades or apprenticeship certificates. Unfortunately, there is no way to separate this group from other holders of college or university credentials. The extent to which college or university graduation represents an alternative pathway to the trades or a credential acquired in addition to the trades credential thus remains unknown, nor is it known how many of those with college or university credentials are certified in their trade.

4.3 Certification of Apprentices and Trade Qualifiers

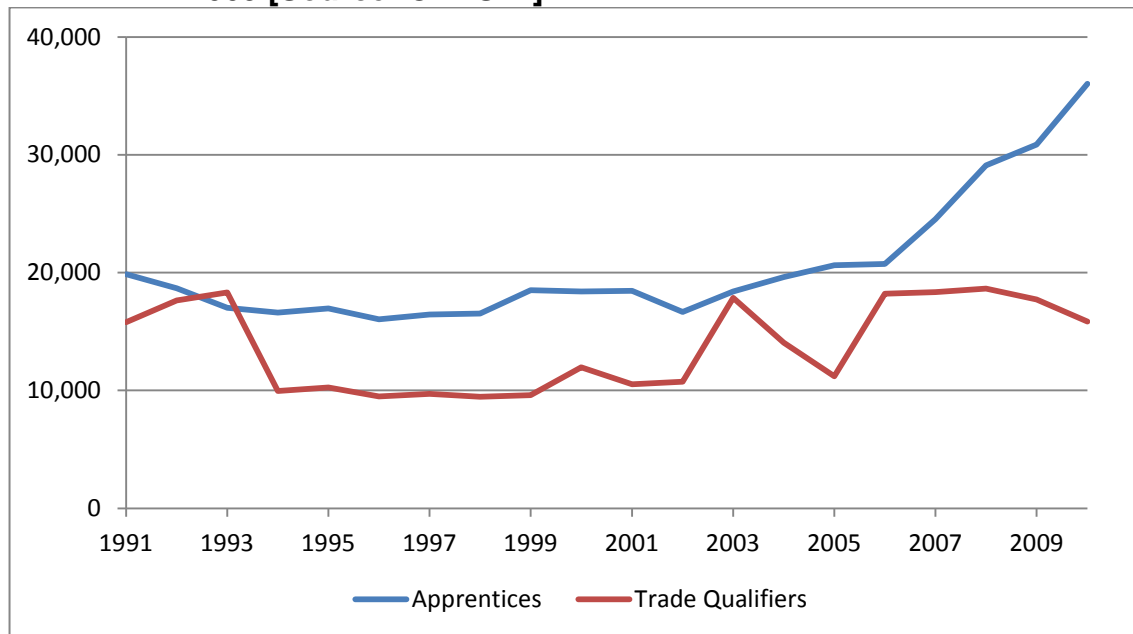
4.3.1 Overall Certification Trends

The previous chapter gave detailed information on apprenticeship registration and certification. This section gives more detailed information on trade qualifier certification relative to certification of apprentices.

Chart 4.2 gives the certification trend over time for both of these groups. The data show that trade qualifiers have made up a substantial proportion (41% on average) of all of those certified over the years. The numbers for both apprentices and trade qualifiers were quite stable from about 1994 to 2002. The number of certificates issued to both groups has tended to increase since 2002. A spike in trade qualifiers is evident in 2003. This is followed by a drop in 2004.

Since 2006, the number of trade qualifiers has declined slightly, while the number of apprentice certificates has increased at a more rapid pace than in any earlier period. The proportion of certificates issued to trade qualifiers has thus declined from 47% in 2006 to 31% in 2010. The trend in apprentice certifications is expected to continue as the large increases in apprenticeship registrations of the past few years work their way through the system. It is not clear if this is related to the decline in trade qualifier certifications because trade qualifiers typically enter the work force through routes other than apprenticeship.

Chart 4.2 Certificates Issued to Apprentices and Trade Qualifiers, 1991-2009 [Source: CANSIM]



4.3.2 Trends by Jurisdiction

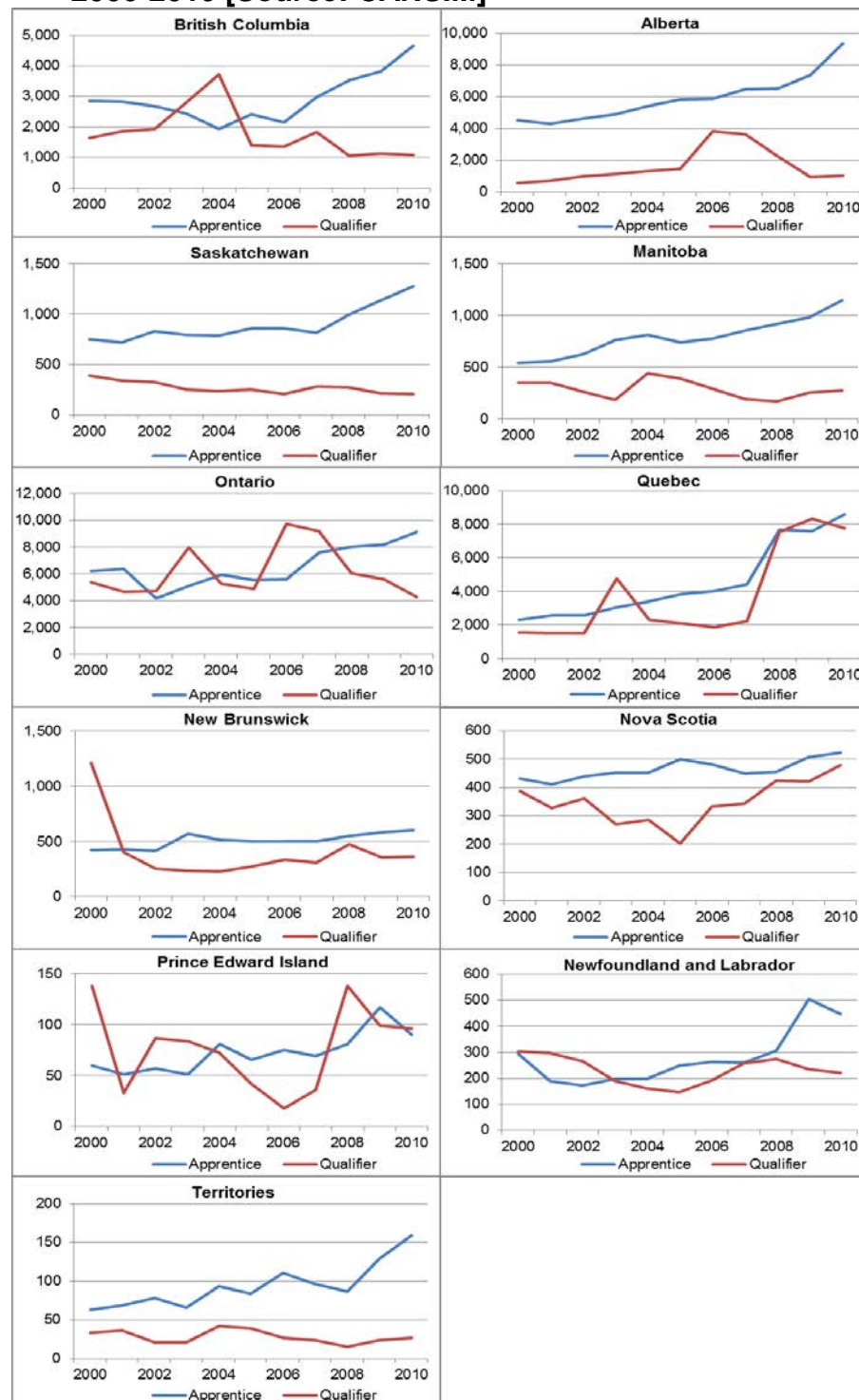
Chart 4.3 shows the breakdown of apprentice and trade qualifier certificates by jurisdiction. The following is a summary of these results:

- For Alberta, Saskatchewan, Manitoba and the territories, the numbers of certificates issued to trade qualifiers are consistently lower than those for apprentices. Except for a spike in the number of trade qualifiers in 2003, the same pattern is found for British Columbia. The two groups have been diverging in recent years, with the number of trade qualifiers declining and the number of apprentices increasing.
- For Ontario and Quebec, the numbers have been similar for both groups. In Ontario, the number of trade qualifiers seems to be more variable, with peaks in one year followed by troughs in the next year. Quebec experienced a large increase in both groups in 2008 but this leveled off in 2009.
- New Brunswick and Nova Scotia also generally show smaller numbers of trade qualifiers relative to apprentice certificates. However, in both of these jurisdictions, the number of trade qualifiers and the proportion of trade

qualifier to apprentice certificates have been increasing in recent years, with the exception of 2009.

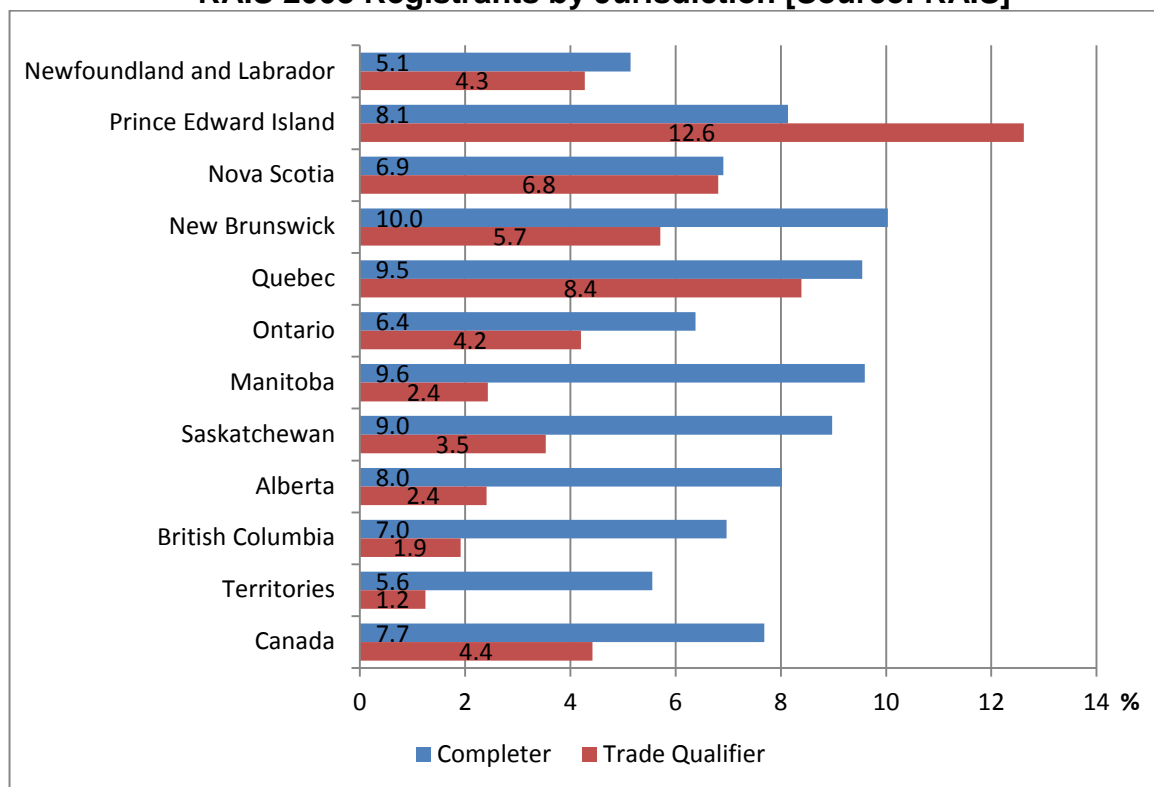
- In Prince Edward Island, the number of trade qualifiers has fluctuated widely over the years, likely because of small numbers. Overall, the whole period, each group has contributed close to half the certificates.
- In Newfoundland and Labrador, the proportions in each group have also been similar. However, a strong divergence is evident in 2009, with a large increase in the number of apprentice certificates and a decline in the number of trade qualifier certificates.
- The 2003 trade qualifier spike seen in Chart 4.2 is mirrored in the three largest provinces, British Columbia, Ontario and Quebec which together account for a large proportion of the total certificates issued.

Chart 4.3 **Apprentice and Trade Qualifier Certificates by Jurisdiction, 2000-2010 [Source: CANSIM]**



Another way of looking at differences across jurisdictions is to compute the proportions of all of those in RAIS in any one year who are completers and trade qualifiers. These results are given in Chart 4.4. This shows that completers make up a much higher percentage than trade qualifiers in New Brunswick, the Western provinces and the Territories. The percentages for the two groups are similar in Quebec, Nova Scotia and Newfoundland and Labrador. Trade qualifiers exceed completers as a percentage only in Prince Edward Island.

Chart 4.4 Percentage of Completers and Trade Qualifiers Relative to all RAIS 2008 Registrants by Jurisdiction [Source: RAIS]

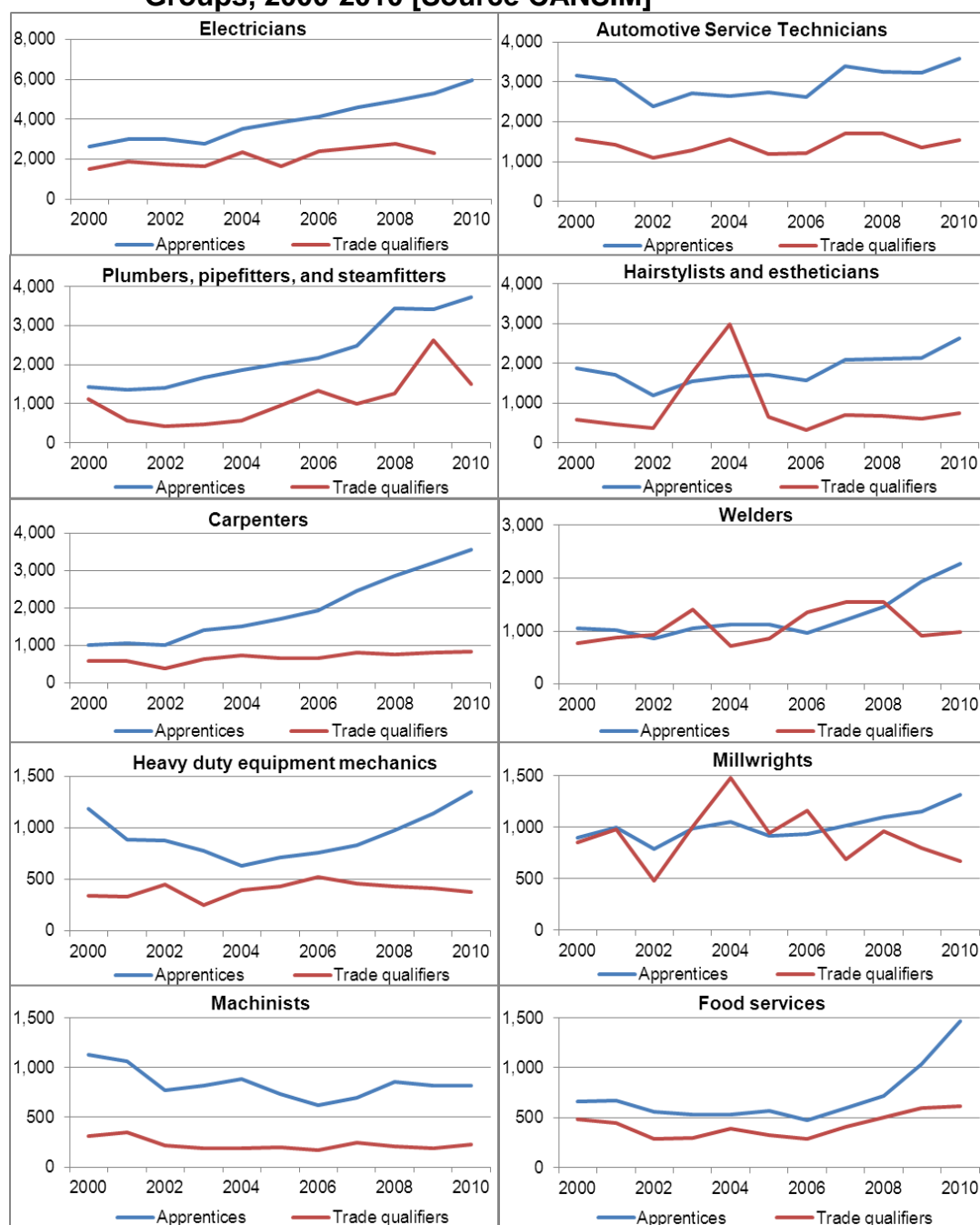


4.3.3 Trends by Trade

Chart 4.5 gives a similar breakdown for the largest trades. Some of the highlights of these results are:

- Electricians and carpenters have seen a substantial growth in the number of apprentice certificates and relative stability in the number of trade qualifier certificates over the period.
- For automotive services, both the number of certificates and the proportion of apprentices to trade qualifiers have remained relatively stable, with the number of apprentice certificates being close to double the number of trade qualifier certificates.
- Plumbers/pipefitters/steamfitters and heavy equipment and crane operators have seen growth in both types of certificates in recent years.
- Welders and millwrights show little growth and similar proportions for both types of certificate. The number of trade qualifier millwrights has tended to decline in recent years after a sharp increase in 2004,
- Hairstylists/estheticians show a distinct spike for trade qualifiers in 2004 and interior finishers a similar spike for trade qualifiers in 2002 and 2003.
- Machinist is the only trade showing a general pattern of slight decline in both groups over the period.

Chart 4.5 Apprentice and Trade Qualifier Certificates by Top 10 Trade Groups, 2000-2010 [Source CANSIM]²⁷



²⁷ Again, the trade groupings here are slightly different from those in other parts of the report because the CANSIM categories are different from those used in the Labour Force Survey.

4.4 Apprentice and Trade Qualifier Success in Red Seal Exams

The most immediate outcome of trades training is certification as a journeyperson. Under the current system, certification can occur only through apprenticeship or trade qualification. Those entering the trades by any path other than apprenticeship are considered to be trade qualifiers for certification purposes. Independent of any school-based training they may have had, trade qualifiers must meet job experience criteria established by the jurisdictions before becoming eligible to write the certification exams.

All other factors aside, those who pursue the apprenticeship route are more likely to pass the exams than those taking the trade qualifier route. While this measure is available only for those in Red Seal designated trades, the latter encompass most of the largest trades, accounting for more than 80% of all trades workers. Red Seal results are thus a good indicator of overall certification success.

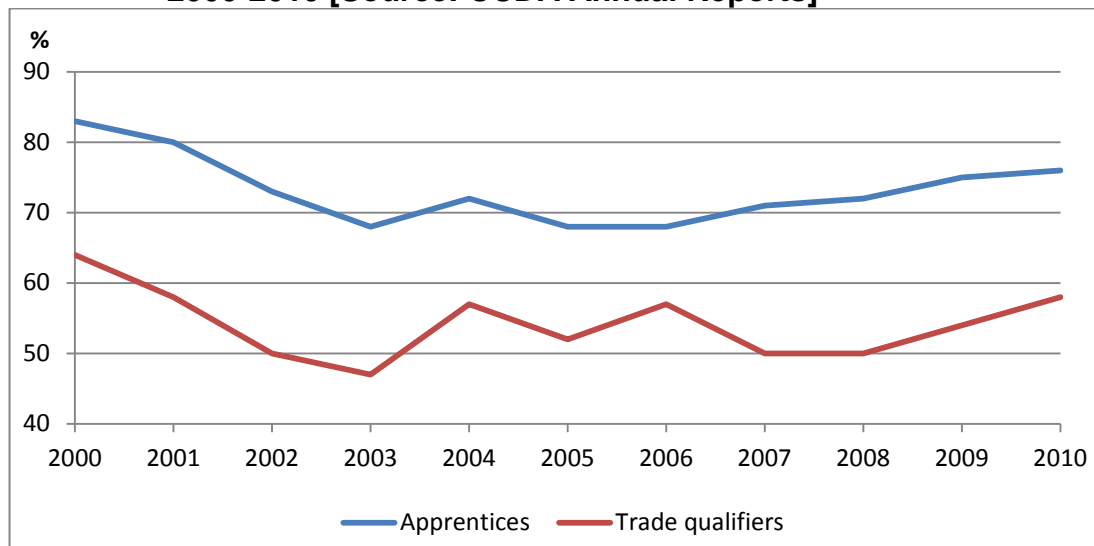
4.4.1 Overall Success Rates

Chart 4.6 shows success rates for apprentices and trade qualifiers in all Red Seal exams from 2000 to 2010.²⁸ Two significant patterns are apparent here. First, success rates declined in the early part of the decade and increased in the later part. The increase in success rates for apprentices is particularly remarkable because it has occurred at a time of significant increases in the number writing the exams. The higher number of certificates being issued to apprentices is thus driven by two separate factors, increased registrations and improved success rates.

More important for this discussion, the success rate for apprentices is consistently higher than that for trade qualifiers. The two rates converged slightly from 2004 to 2007, as a result of increases in trade qualifier success rates, but have diverged again in more recent years to about 20 percentage points favouring apprentices. Considering the relatively large numbers in each group, this difference would seem to attest to the efficacy of apprenticeship rather than trade qualification as a route to certification.

²⁸ Candidates may attempt the exam more than once. Success refers to candidates who passed the exam on the last attempt. Statistics are not available on the number of attempts before passing.

Chart 4.6 Red Seal Success Rates for Apprentices and Trade Qualifiers: 2000-2010 [Source: CCDA Annual Reports]



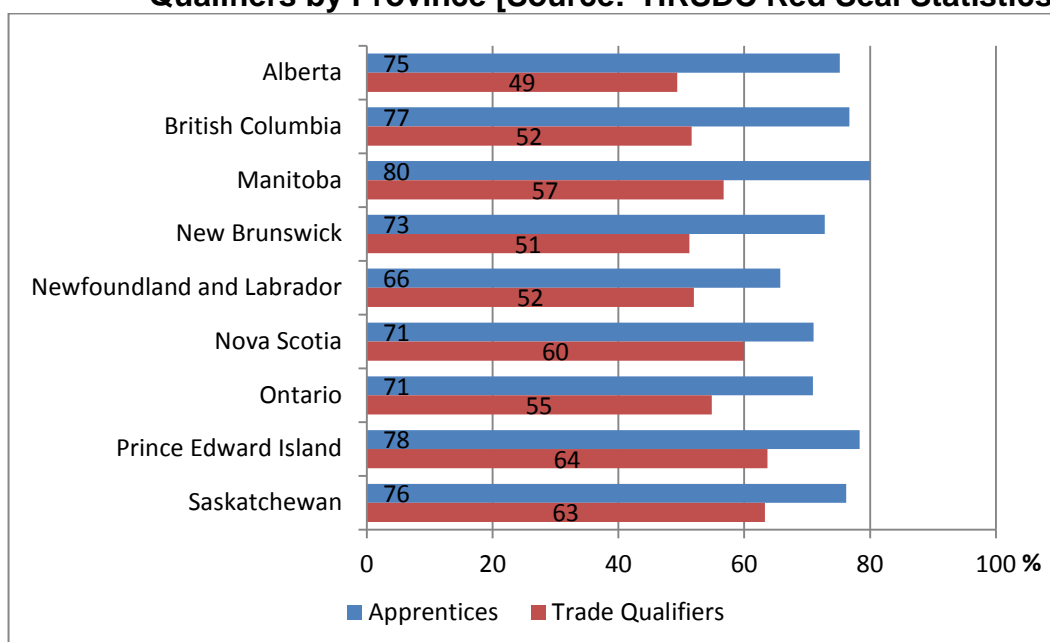
One interesting implication of the above results for trade qualifiers is that the number of potential trade qualifiers, including those unsuccessful, is quite large. Based on an average success rate of just over 50%, this means that close to double the number of those who become certified actually wrote the examination in any year. Unsuccessful challengers are not recorded in RAIS, so the RAIS trade qualifier numbers significantly underestimate the size of the potential trade qualifier pool.

4.4.2 Success Rates by Jurisdiction²⁹

Chart 4.7 shows average success rates for apprentices and trade qualifiers over the decade from 2000 to 2010 for the nine jurisdictions for which sufficient data are available. The gap between the two groups shown in Chart 4.6 holds for all jurisdictions. However, it is somewhat smaller in some than others. Generally, the gap is largest in Alberta, British Columbia and Manitoba, provinces in which the apprentice success rates are particularly high and trade qualifier success rates relatively low. On the other hand, Saskatchewan and Prince Edward Island show a smaller gap with relatively high success rates for both groups.

²⁹ Figures for the territories are omitted because of small numbers. No figures for trade qualifiers are available for Quebec.

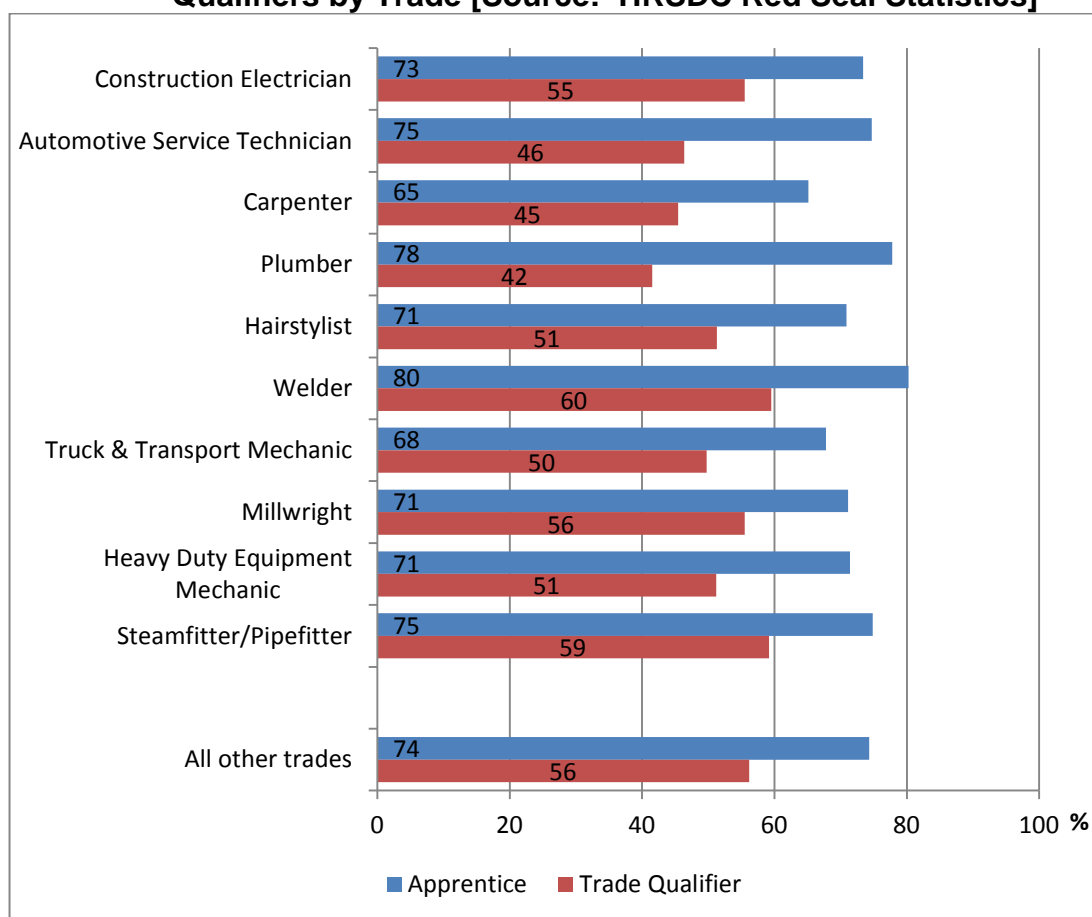
Chart 4.7 Average Success Rates 2000-2010 for Apprentices and Trade Qualifiers by Province [Source: HRSDC Red Seal Statistics]



4.4.3 Success Rates by Trade

Chart 4.8 shows average Red Seal success rates for the Top 10 trades and all other trades between 2000 and 2010. Compared to the previous figures for province, success rates for both groups have been remarkably stable across trades over the decade. This leads to the question of whether the averages are masking year to year fluctuations. This is an especially interesting question because of the view expressed by some respondents in an earlier review of Red Seal exams that success rates rise and fall as new versions of exams are introduced and used over time. For this reason, the more detailed time series results are given in Chart 4.9.

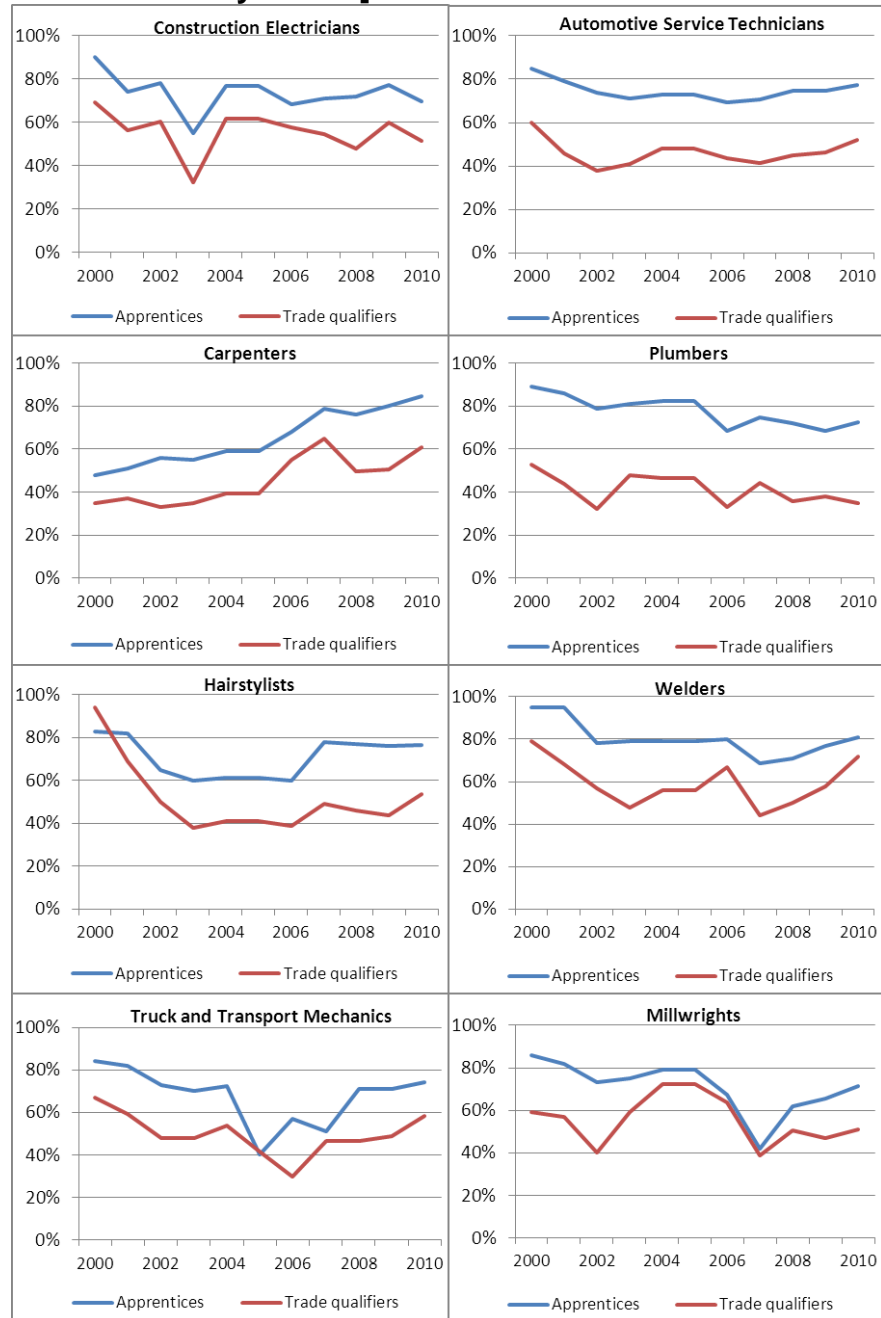
Chart 4.8 Average Success Rates 2000-2010 for Apprentices and Trade Qualifiers by Trade [Source: HRSDC Red Seal Statistics]



The following are some of the highlights of the results in Charts 4.8 and 4.9:

- The general pattern of lower success rates for trade qualifiers than for apprentices holds for all trades.
- The decline in success rates in the middle part of the decade followed by an increase in the later years also tends to hold for most trades.
- The notable exception is Carpenters, for which both apprentices and trade qualifiers have shown a fairly steady increase in success over the period.
- There are a number of instances of drops in success rates in one year followed by a recovery the next year. Some of these changes (e.g. construction electricians in 2003, millwrights in 2007 and steamfitters/pipefitters in 2007) are quite large (20% or more). This pattern tends to hold for both groups, suggesting that the drop is more likely related to a change in the exam than in the population writing.

Chart 4.9 Trend in Success Rates 2000-2010 for Apprentices and Trade Qualifiers by Trade [Source: HRSDC Red Seal Statistics]



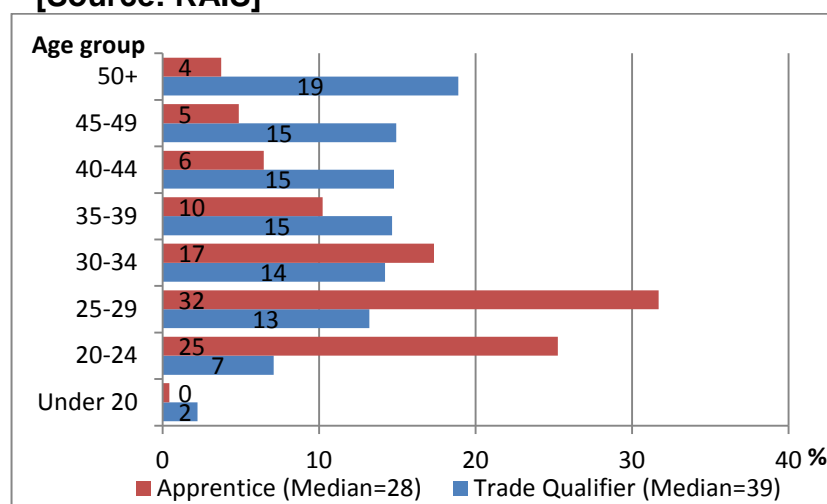
4.5 Selected Characteristics of Apprentices and Trade Qualifiers

The above differences in Red Seal success rates leads to the question of whether these are linked to measurable characteristics of these two groups. While a great deal is known about the characteristics of apprentices³⁰ this is not true for trade qualifiers. This is because the latter are not identifiable as a distinct group from the Census or other data sources. Data for trade qualifiers are available only for age and gender.

4.5.1 Age

Chart 4.10 gives the age distribution for apprentices and trade qualifiers certified in 2009. This shows that trade qualifiers are generally considerably older, with a median age of 39 years compared to 28 years for apprentices. The distribution for apprentices is strongly concentrated in the younger age groups, 20-24 and 25-29 whereas trade qualifiers are spread much more evenly across the age groupings, with the largest single age group being 50 years or more. The latter is particularly intriguing because it is not at all obvious why such a large number of individuals would seek certification at such an age, or had not done so before. It is also interesting to note that analysis for other years reveals that there has been little change in the age distribution of either group over the past decade.

Chart 4.10 Age Distribution of Apprentices and Trade Qualifiers, 2009
[Source: RAIS]



³⁰ Detailed information about the demographic characteristics of apprentices and their educational, work and family circumstances is given in several of the NAS 2007 research reports. This will not be repeated here because no comparative data are available for trade qualifiers.

4.5.2 Gender

Because of wide variations in the distributions, it is difficult to present the percentages graphically in this case. Table 4.1 clearly shows that women are concentrated in two trades: cooks and hairstylists/barbers. In both of these trades, the percentage of women is smaller for trade qualifiers than for apprentices. Beyond these two trades, among the top 10, Welding is the only trade in which women exceed 5% of the total, again with fewer trades qualifiers than apprentices. In most other remaining top 10 trades, the percentage of trade qualifiers is too small to report. On the other hand, for all other (non-Red Seal) trades, the percentage of women apprentices (26.4%) is substantially larger than in most other cases. However, the percentage of women trade qualifiers in this group remains small.

Table 4.1 Percentage of Female Apprentices and Trade Qualifiers by Trade, 2008 [SOURCE: RAIS]

	Apprentice	Trade qualifier
Hairstylists/Barbers	89.4	83.8
Cooks	34.1	26.3
Welders	5.8	2.2
Electricians (except industrial)	3.2	0.6
Automotive Service Technicians	2.5	x
Steamfitters/Pipefitters/Sprinkler Installers	2.2	x
Carpenters	2	x
Plumbers	1.9	x
Heavy Duty Equipment Mechanics	1.5	0
Millwrights	x	x
All other Red Seal	5.0	1.4
All other trades	26.4	3.2
Overall	11.7	5.7
x Suppressed because of small numbers		

4.5.2 Other Demographic Characteristics

The RAIS data base includes variables for Aboriginal status, disability and highest education level achieved prior to registration. However, data are missing for these variables for more than 50% of respondents in most of the final status categories. In particular very few trade qualifiers have their status on these variables recorded. For this reason, RAIS results are not reported here. Some information on these variables is available from the NAS reports. However, trade qualifiers were not included in the NAS sample so there is no basis for comparing the results for that group with the remaining status groups.

4.6 Labour Market Outcomes

Chapter 3 gave a comprehensive overview of labour market outcomes in the trades. This section is therefore limited to some of the main time trend results, specifically comparing income for completers and trade qualifiers. The more detailed results by jurisdiction and trade are also summarized briefly.

4.6.1 Employment Income

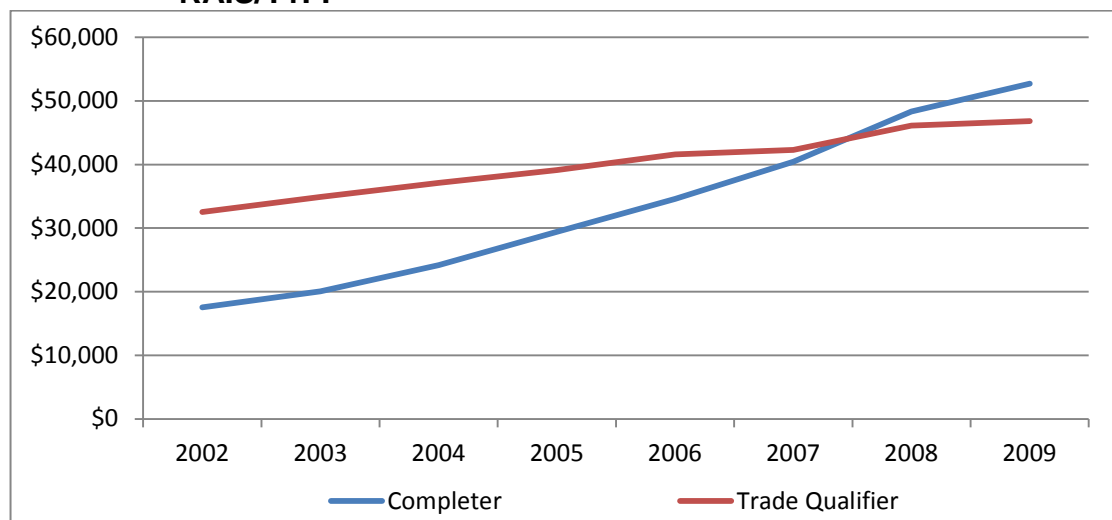
Chart 4.11 gives median employment income from 2002 to 2009, as reported on income tax returns for completers and trade qualifiers certified in 2008. In the early years, trade qualifiers had higher income than completers. This is to be expected because this group would have had to be working in their trade for some years before challenging the exam.³¹ During that period, their earnings were obviously higher than the earnings of any of the apprentice groups, whose stipends are typically regulated.

³¹ It is not possible to determine from the data sources the number of years a trade qualifier had worked in the trade before being certified. However, at least several years work would be required to acquire sufficient experience to be permitted to write the certification exam.

The key turning point is 2008-2009, when earnings of completers surpassed those of trade qualifiers. This immediately shows that apprenticeship completion conveys an income premium additional to that enjoyed by those with considerable work experience prior to becoming certified as trade qualifiers. Specifically, apprenticeship completion conveys an immediate advantage of about \$5,000 over certification through the alternative route of trade qualification. Nevertheless, the overall trend points to the issue of whether the income premium for apprenticeship completion is sufficient to offset the opportunity cost associated with several years of lower income prior to becoming certified.

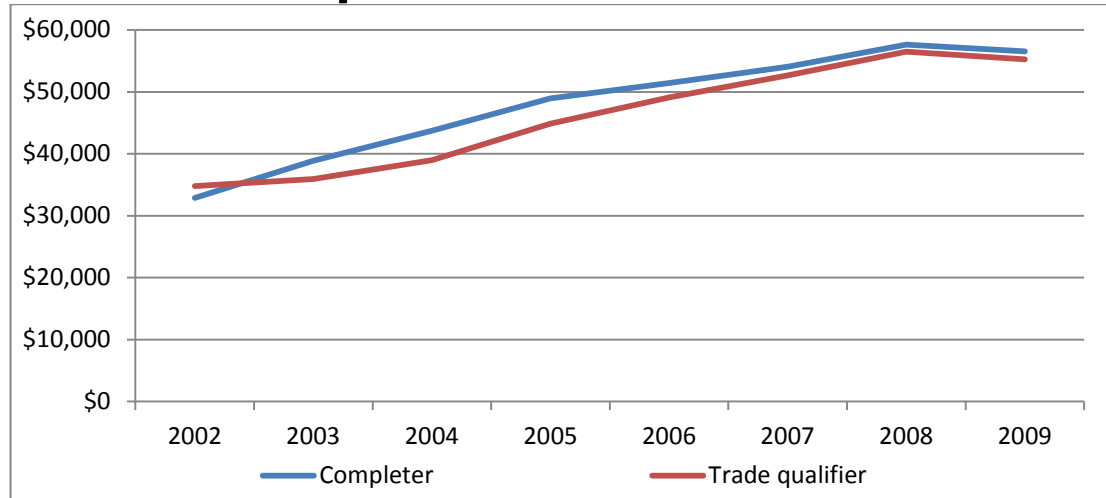
Chart 4.12 gives the same picture, projecting forward to 2009, for those in RAIS 2002.³² First, this chart shows a slight decline in income from 2008 to 2009, likely reflecting the recession. In this case, both completers and trade qualifiers had become certified in that year. The income trajectories for the two groups are closely parallel, with completers having a slight advantage over trade qualifiers over most of the period.

Chart 4.11 Median Employment Income 2002-2009 for Apprenticeship Completers and Trade Qualifiers, RAIS 2008 [Source: Linked RAIS/T1FF



³² Because only six provinces (Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan) are included, these results cannot be compared directly to those for 2008.

Chart 4.12 Median Employment Income 2002-2009 for Apprenticeship Completers and Trade Qualifiers, RAIS 2004 [Source: Linked RAIS/T1FF]



Chapter 3, Charts 3.12 (page 66) and 3.13 (page 67) give detailed comparisons for all status groups by trade and jurisdiction. The following is a brief summary of these results, with specific reference to completers and trade qualifiers.

- There is little difference in 2009 employment income between 2008 completers and trade qualifiers. However there are some trade-specific differences, as shown in Chart 3.12 (page 66).
- Differences in 2009 income for the two groups certified in 2008 are also generally small, slightly favouring completers. Chart 3.13 (page 67) shows exceptions in British Columbia, where completers show a premium of about \$12,000 over trade qualifiers, and Manitoba, where trade qualifiers show a premium of about \$9,000.

-

4.6.3 Self-Employment Participation and Income

Details on self-employment participation and income were presented in Chapter 3, Section 3.3.4. The time trend results are repeated here specifically for completers and trade qualifiers.

Chart 4.13 gives the percentage of 2004 completers and trade qualifiers reporting non-zero self-employment earnings from 2002 to 2009. This clearly shows that

self-employment is much more prevalent for trade qualifiers than for completers. However, there is some convergence in the later years, with self-employment for trade qualifiers diminishing slightly and that for completers increasing over the period. It is noted that self-employment for neither group is as high as it is in the labour force as a whole, where about 15% are self-employed.

The pattern for net self-employment income is shown in Chart 4.14. Income for both groups increased over the period. Trade qualifiers had higher income than completers overall, with completers tending to catch up in the later years. The slight drop in income in 2009 again likely represents the recession effect. It is important to reiterate that net self-employment earnings are much lower than employment earnings. However, as shown in Chart 3.19 (page 74), this reflects a large gap between gross and net income.

Chart 4.13 Percent Reporting Self-Employment Earnings 2002-2009 for 2004 Completers and Trade Qualifiers (Source: Linked RAIS/T1FF)

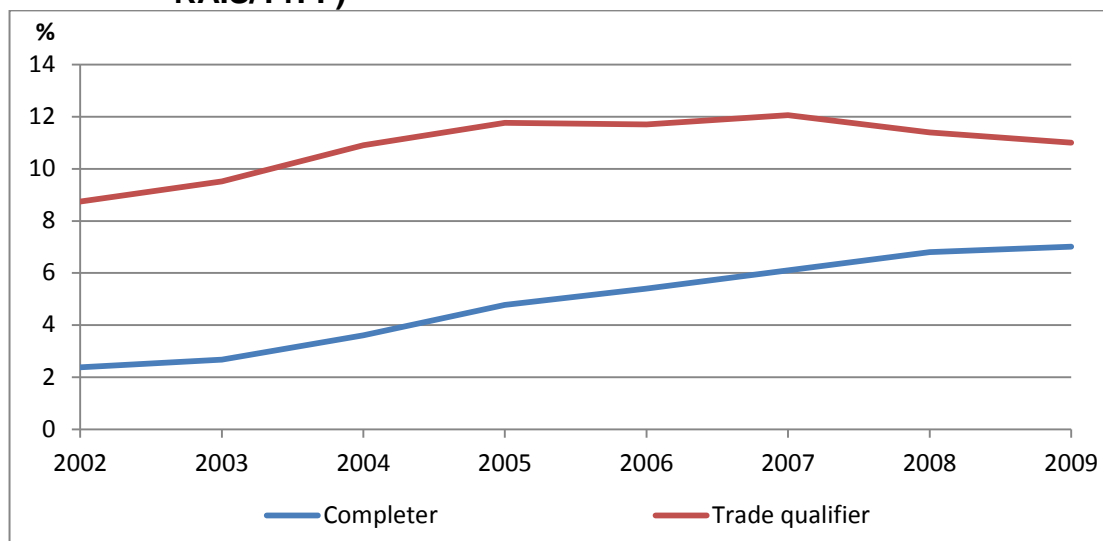
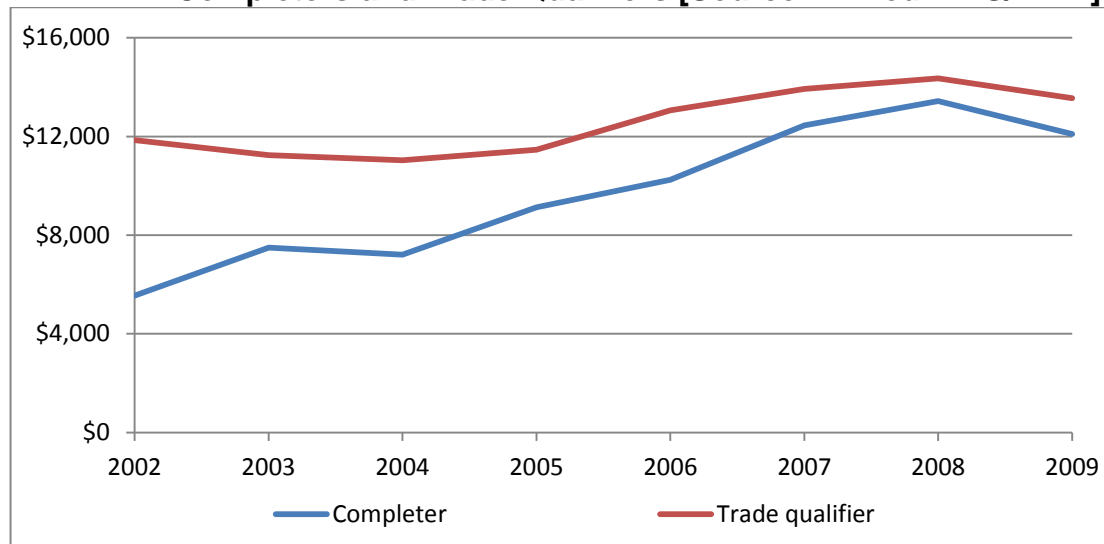


Chart 4.14 Median Net Self-Employment Income 2002-2009 for 2004 Completers and Trade Qualifiers [Source: Linked RAIS/T1FF]



Breakdowns of self-employment income by jurisdiction and trade are also given in Section 3.3.4. These may be summarized as follows:

- Trade qualifiers have the highest rates of self-employment in almost all of the top 10 trades. Self-employment by trade qualifiers is especially prevalent for hairstylists/barbers, carpenters, plumbers and electricians. Self-employment is also fairly high among completers for hairstylists/barbers and carpenters.
- Self-employment income is considerably higher among trade qualifiers than completers in almost all trades and especially so for carpenters, automotive service technicians, electricians and steamfitters/pipefitters/sprinkler system installers. Although self-employment rates are relatively high for hairstylists/barbers, there is almost no difference in self-employment income for the two groups in this trade.
- Trade qualifiers have higher self-employment income than completers in Ontario, Quebec, Newfoundland and Labrador and New Brunswick. The opposite is true in Saskatchewan. There is little difference in other jurisdictions.

4.6.4 Employment Insurance

Section 3.3.5 gives the detailed results for EI participation and income for all status groups. The linked T1FF file reports all EI income and therefore cannot distinguish between Part I benefits paid during in-class training, Part I benefits arising from lack of work, Part II benefits paid and administered by the jurisdiction, as well as special benefits available for maternity, parental, and sickness. In the case of completers and trade qualifiers, their EI benefits received in 2009 are assumed to be comprised of regular EI benefits (non-training) and possibly special benefits.

Chart 3.20 (page 76) shows EI participation to be substantially higher among trade qualifiers than completers for steamfitters/pipefitters/sprinkler system installers, plumbers, hairstylists/barbers and automotive service technicians. The opposite is true in two trades, carpenters and millwrights, while there is little difference in the remaining trades.

The jurisdictional results shown in Chart 3.22 (page 78) indicate that the difference in EI participation rates for completers and trade qualifiers is related to jurisdiction. In Quebec, Newfoundland and Labrador, New Brunswick, Manitoba and Prince Edward Island, completers have higher participation rates than trade qualifiers. There is little difference between the two groups in other jurisdictions.

The 2009 results for the two groups certified in 2008 (Chart 3.21, page 77) shows trade qualifiers to have higher EI income than completers for all of the top 10 trades. Chart 4.15 shows the time trend for median EI income for the two groups for those certified in 2004. Overall EI amounts are relatively small, and tend towards slight increase for both groups. However, trade qualifiers consistently have higher EI income levels than completers. As shown in Chart 3.21 (page 77), this difference is quite consistent across the trades. EI benefits reported in 2009 may be affected by the significant increase in the unemployment rates across Canadian provinces in 2009 due to the impact of the global financial crisis and associated recession.

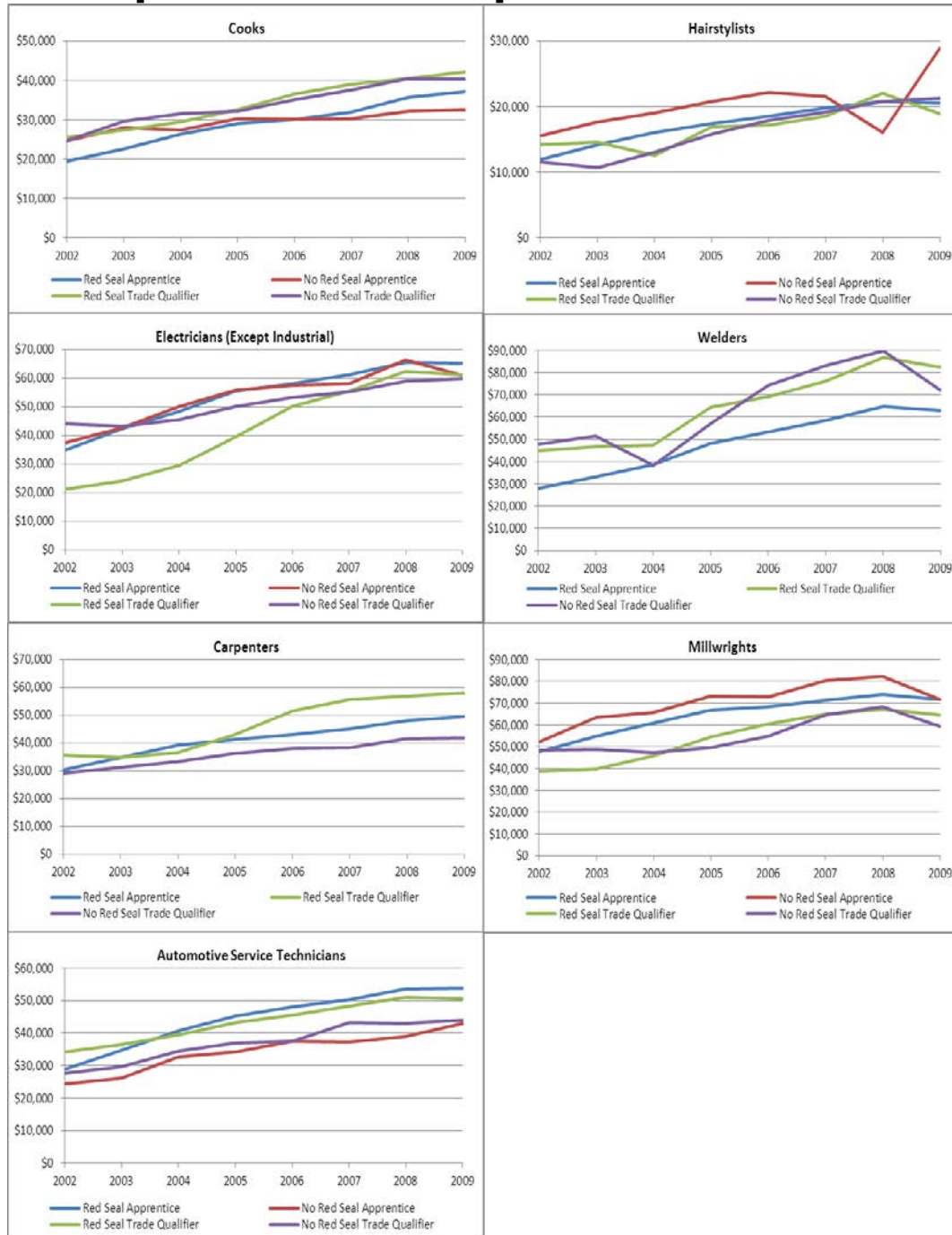
Chart 4.15 Median Net EI Income 2002-2009 for 2004 Completers and Trade Qualifiers [Source: Linked RAIS/T1FF]



4.6.5 Value of the Red Seal for Apprentices and Trade Qualifiers

This section looks at employment income as it relates to the Red Seal for apprenticeship completers and trade qualifiers. Chart 4.16 gives median employment from 2002 to 2009 for apprentice completers and trade qualifiers with and without the Red Seal endorsement, in the nine Top 10 trades for which data are available. The trends from about 2005 onward are of most interest because this follows the year of certification for both groups. These results should be treated with caution because the number of available cases for many of the non-Red Seal categories is quite small. This is because the jurisdictional final exam is the same as the Red Seal exam in most jurisdictions. Most of these who pass the certification exam are therefore awarded the Red Seal. Nevertheless, the patterns are generally consistent over time, suggesting that these results are fairly stable despite small numbers. The following is a summary of the observed patterns.

Chart 4.16 Median Employment Income 2002-2009 for 2004 RAIS Completers and Trade Qualifiers with or without Red Seal
[Source Linked RAIS/T1FF]



- For cooks, apprentices with Red Seal have higher income than those with no

Red Seal. There is little difference for the two groups of trade qualifiers, though both of these groups have higher income than either of the apprentice groups.

- There is little difference among any of the groups for hairstylists/barbers. The large shift in the line for no Red Seal apprentices is a consequence of small numbers in this group.
- For electricians, both apprentice groups have a small income advantage over the trade qualifier groups. However, the difference between Red Seal and no Red Seal are small in both cases.
- Welders had too few cases of no Red Seal trade qualifiers to report. However, trade qualifiers (with or without Red Seal) tend to have higher incomes than Red Seal apprentices.
- The opposite is true for millwrights, where both apprentice groups have higher incomes than either trade qualifier group.
- For carpenters, Red Seal trade qualifiers do best, followed by Red Seal trade qualifiers.
- For automotive service technicians, the advantage is for both Red Seal groups over the two non-Red Seal groups.

Overall, these results indicate that the patterns are mixed across trades, source of certificate and Red Seal. The Red Seal conveys an income advantage, whether acquired through apprenticeship or trade qualification, only for automotive service technicians. Otherwise, any income premium found is as much a function of the source of certificate as of having the Red Seal.

4.6.6 Interprovincial Mobility

The results for interprovincial mobility for all of the status groups were also given in Chapter 3, Section 3.3.7. Rather than repeating these results in detail, only the summary from that chapter is given here, with specific reference to the comparison of apprenticeship completers and trade qualifiers, with and without Red Seal endorsements.

- About 8% of 2008 trade qualifiers compared to 3.8% of apprenticeship completers were located in 2009 in a province other than their province of registration. For both groups, Red Seal holders were slightly more mobile in 2009. Mobility rates for both groups were generally lower in the years prior to certification.
- Out-mobility for apprenticeship completers with Red Seal was higher than the Canadian average for those registered in Newfoundland and Labrador, Nova Scotia, Prince Edward Island and Alberta.
- The pattern of higher out mobility for trade qualifiers was true for most

- jurisdictions
- Out-mobility was generally low for both groups registered in Saskatchewan and Manitoba and for Red Seal apprentice completers registered in Quebec.
 - Alberta, Saskatchewan and Manitoba were the top destination provinces for 2008 Red Seal trade qualifiers. Saskatchewan was the only province notably higher than the Canadian average as a destination for Red Seal apprenticeship completers.
 - For the six provinces for which 2004 certification data were available, out-mobility over the whole 2002-2009 period for apprenticeship completers, with or without Red Seal, was lower for Manitoba and Saskatchewan than for the remaining jurisdictions (Nova Scotia, New Brunswick, Ontario and Quebec).
 - Out-mobility for 2004 trade qualifiers without Red Seal, over the 2004-2009 period was highest overall, compared to other groups, and particularly high for Nova Scotia (41%), New Brunswick (32%) and Quebec (29%).
 - Alberta is the primary destination for all groups except no Red Seal trade qualifiers, receiving about 50% of Red Seal apprentice completers and 60% of Red Seal trade qualifiers. British Columbia is the next most common destination but with much smaller percentages than Alberta.

4.7 Summary and Conclusions

4.7.1 Certification and Success Rates

- The proportions of the labour force holding any form of trades certificate, and particularly registered apprenticeship certificates relative to other types of certificates (not uniquely trade qualifiers) varies widely across trades.
- Only about one-third of those holding trades certification are actually working in trades occupations. This proportion is higher (about 46%) for those holding registered apprenticeship certificates.
- Up to the middle of the last decade, more than 40% of all trades certificates were acquired through the trade qualifier route. However, since 2006, the number of trade qualifiers has declined slightly while the number of apprenticeship certificates has increased. By 2010, the proportion of all certificates acquired by trade qualifiers had declined to 31%.
- Jurisdictional and trade comparisons reveal some departures from the general trend. For example Ontario has tended to have more trade qualifier than apprentice certificates. The proportion of trade qualifiers has also tended to be relatively high for welders and millwrights. There are also

some single-year increases and declines that may reflect unique circumstances in a jurisdiction or trade.

- Apprentices generally have higher success rates than trade qualifiers in the Red Seal exams. For both groups, the success rate declined during the middle of the last decade but has recovered somewhat in more recent years.
- The gap in Red Seal pass rates between apprentices and trade qualifiers is found in all jurisdictions, but is smaller in some than in others. However, the gap is about the same across trades.

4.7.2 Characteristics of Apprentices and Trade Qualifiers

- As a group, trade qualifiers are considerably older than apprentices at the time of certification, with a median age of 39 years compared to 28 years for apprentices.
- For the small number of trades with a measurable number of women being certified, the proportions of female trade qualifiers are lower than for apprentices.

4.7.3 Labour Market Outcomes

- For those certified in 2008, trade qualifiers had higher median incomes over the previous eight years than any other group. However, the median income for those certified through apprenticeship exceeded that for trade qualifiers in the year following certification.
- In 2009, the income gap between apprenticeship completers and trade qualifiers was relatively small in all trades and all jurisdictions.
- Self-employment rates were generally fairly low and quite variable across trades. Self-employment rates were substantially higher for trade qualifiers than for apprenticeship completers among hairstylists/barbers, carpenters, plumbers and electricians.
- Median self-employment earnings were also much lower than earnings from employment. Trade qualifiers tended to have higher self-employment earnings than apprenticeship completers.
- Large proportions of those in trade occupations report at least some reliance on Employment Insurance (EI) income. Median EI amounts tend to be relatively small, compared to employment income.
- Differences in income between apprentices and trade qualifiers, with or without the Red Seal are trade-specific. For example, for hairstylists and millwrights, apprenticeship completers without the Red Seal have higher

incomes than their counterparts with the Red Seal, while the opposite is true for automotive service technicians. For welders and cooks, trade qualifiers have higher income than apprenticeship completers.

- Trade qualifiers are more mobile inter-provincially than apprenticeship completers.

4.7.4 Conclusions

Although the proportion of certificates issued to trade qualifiers relative to apprentices has been declining, trade qualifiers continue to represent close to one-third of all of those certified. Given the large number of uncertified workers in the trades, the potential pool from which trade qualifiers become certified is likely much larger than indicated by the number of certificates issued. Overall certification levels could likely be increased substantially by encouraging more persons to use the trade qualifier route and by finding ways to improve their success rates. Alternatively, it might also be appropriate to find ways to encourage uncertified workers who are not apprentices to register as apprentices, with credit for their work experience and possibly for any technical training completed outside the apprenticeship program. This is especially appropriate because the results indicate that the apprenticeship experience is likely to yield a greater probability of success in the certification exams.

The results given here confirm those of previous studies and those in Chapter 3, showing that certification conveys a substantial income advantage, whether acquired through apprenticeship or trade qualification. The apprenticeship route yields an additional income advantage over the trade qualification route.

The existence of such large certification effects supports the view that demand for certified workers is greater than that for uncertified workers. If so, this demand is likely not being adequately filled because the proportion of certified workers in the trades has not been increasing. It remains unclear whether this will change significantly as the large increases in apprenticeship registrations work their way through the system. This point is addressed in more detail in Chapter 6.

5.0 Labour Market Impacts of Apprenticeship Completion by Long-Term Continuers

5.1 Introduction

5.1.1 Purpose

For any given RAIS reporting year, apprentices fall into three main categories, completers, continuers and discontinuers. Continuers may, in turn, be sub-grouped based on the length of time they have been in the program. The particular sub-group of interest in this chapter is referred to as “long-term continuers”. This group was defined in the 2007 NAS as those who were in a particular program more than one and one-half times the nominal program duration (four years for most trades, but with some variation across trades and jurisdictions). Long-term continuers might be considered a focal group with potential for increasing the number who eventually complete and become certified.

The purpose of this chapter is to examine, in more detail than was possible in previous studies, the labour market impact of the group identified as long-term continuers. This research is guided by three broad questions:

1. What contribution to the labour market is made by long-term continuers?
2. What would be the labour market impact of a higher rate of completion by long-term continuers?
3. What would be the labour market impact if the average duration of apprenticeship were to be shortened?

5.1.2 Background

In terms of labour market impact, long-term continuation may be thought of in at least two ways. If the main goal is to increase completion and certification rates, long-term continuation may be seen as undesirable and a distraction from these goals. Under this view, reducing the incidence of long-term continuation, and increasing the proportion of this group who eventually complete, should be a policy goal. On the other hand, to the extent that long-term continuers are actually working in their trade, their status might be likened to that of prospective trade qualifiers; that is as productive workers who have not yet become certified and who, in fact, may be filling a significant demand for workers with some level of skill short of that required for certification.

According to NAS data, nearly one-fifth (19%) of active registered apprentices at the end of 2004 were registered in their programs for at least one and a half times

the prescribed duration (Ménard et. al., 2008). Data from the NAS also indicate that among those long-term continuers in 2004, 36.5% were completers according to their 2007 apprentice status (28.1% with certification and 8.4% without certification) and a small proportion (1.7%) were discontinuers but were certified in 2007, likely via the trade qualifier route (Ménard et. al., 2008).

The most recent cohort study (Desjardins and Paquin, 2010), based on RAIS data, also found similar numbers of long-term continuers, with about one-fifth of the continuers still registered for six years or longer. In addition, their analysis shows that within the 1995 cohort of apprentices, a significant proportion of discontinuers (36%) and completers (38%) were also in their programs for more than one and one-half times the expected duration, implying that of the total 1995 cohort of 29,501 registrants over 50% may have been considered “long-term continuers” at one point.

Although alternative definitions of long-term continuers will be explored in this study, the above figures provide some indication of the magnitude of this issue. By focusing on the completion behaviour of long-term continuers, it is felt that estimates of the associated economic benefits are those that may be considered particularly realistic to achieve. That is, it does not involve large scale change of student actions, such as a shift of university bound youth into apprenticeship programs, or new or more generous government incentives to increase the numbers registering as apprentices.

5.1.3 Research Questions

The broad questions given above require projections into the future and hence cannot be directly answered using existing data. Nevertheless, having greater knowledge of the characteristics of long-term continuers and of trends among this group can help with such projections. The greater part of this paper is therefore devoted to a series of more specific questions.

1. How many long-term continuers are in the apprenticeship system and what is the trend over time in long-term continuation?
2. How are long-term continuers distributed across trades and jurisdictions?
3. How do the socio-demographic characteristics of long-term continuers compare to those for completers?
4. What factors contribute to individuals becoming long-term continuers? In particular, is this related to the availability of work in the trade?
5. How do the labour market outcomes for long-term continuers compare to those for completers and for discontinuers?

6. To what extent do the proportions of long-term continuers in particular trades correlate with labour market demand in these trades?

It is also the case that not all of these questions can be answered by the available data. Those that cannot be answered are included because the data may yield some inferences about these questions and also because the limitations of existing data need to be identified in order to help add to the scope of future data-gathering exercises.

The economic gain associated when long-term continuers complete their apprenticeship training is estimated in terms of the income gains accruing to the journeypersons and the increase in certified labour available to the economy. More specifically, the approach to estimating income gains to the individual will involve asking the following question: holding other productivity-enhancing characteristics constant (e.g., educational attainment, trade, etc.) what is the hypothetical earnings increase when a long-term registered apprentice completes his or her apprenticeship training and becomes certified? The estimation of the gain in certified labour supply also involves answering a hypothetical question: if long-term continuers complete their training by reducing the amount of time they spend training as apprentices, how would that increase the supply of journeypersons across various trades and provinces?

5.2 Terminology, Data Sources and Previous Research

5.2.1 Issues in Defining Long-Term Continuation

For purposes of this chapter, long-term continuers are apprentices who have been registered in their apprenticeship programs for a time period that exceeds the normal or expected length (referred to as the apprenticeship term or nominal duration) by some pre-determined amount. In the NAS survey, long-term continuers were initially defined on the basis of administrative records provided by apprenticeship authorities and, in the survey itself, through self-reported responses. Active apprentices were described as long-term continuers if they had remained in their programs for at least one and a half times the nominal duration. On the basis of the administrative records, long-term continuers were those who were registered in 2002 to 2004 and had been registered apprentices for more than one half the prescribed duration of their apprenticeship program and had not earned their certification. In terms of the self-reported survey responses, respondents were coded as long-term continuers if, in 2007, they stated that they were still registered apprentices in the frame trade (i.e., the trade reported by the jurisdiction).

The NAS population consisted of 105,058 respondents of whom 23,299 were considered long-term continuers according to their apprentice status in 2002, 2003 and 2004. 28,242 of these were considered long-term continuers according to their survey responses in 2007 (Ménard et. al., 2008).³³ This difference reflects changes in status from the initial sampling period to the survey period. Some who were long-term continuers initially had either completed or discontinued by the survey date, while others had become long-term continuers in the interval between initial sampling and the survey.

In the RAIS database, there is no specific variable indicating whether an active apprentice is a long-term continuer. However, since both the start date and the reporting date are available for most cases, one can construct a long-term continuer variable by comparing time registered with nominal duration of program. For example, one could use a similar rule as in the NAS and deem those registered for at least one and half times the expected nominal duration as long-term continuers. Since the most typical duration of programs is four years, in practical terms, this means that those registered for six years or more can be considered long term continuers.

The most recent Statistics Canada “cohort study” (Desjardin and Paquin, 2010) examined the 1994 and 1995 cohorts one decade later. At the end of the 11-year period, registered apprentices were classified into one of three mutually exclusive categories: continuers, discontinuers, or completers. Those continuing after 11 years may be appropriately considered an extreme version of long-term continuers (i.e. “really long-term continuers”), and examining characteristics of this group provides some useful insights for the present study.

Among those who commenced their apprenticeships in 1995, 8% were still continuing after 11 years (Desjardins and Paquin, 2010, p. 22). The study also revealed wide variations in the proportions of continuers across provinces. For example, among the 1995 cohort, there were virtually no long-term continuers in British Columbia while other provinces such as Alberta and New Brunswick reported proportions well below the national average (both reporting 3%). These discrepancies suggest that administrative procedures account for some of the reported differences. For example, different provincial policies for re-classifying an active registered apprentice (and potential long-term continuer) as inactive

³³ This is not meant to suggest that either 22% (23,299/105,058) or 27% (28,242/105,058) of apprentices are long-term continuers (Ménard et. al., 2008, table A.1.1.2.) as the denominator includes those no longer registered apprentices (i.e., completers and discontinuers). Since the NAS did not survey registered apprentices with typical durations, it is not possible to make this claim. However, Ménard et. al. (2008, p. 2) noted that approximately 19% of the 2004 continuers were long term continuers.

(and therefore a potential discontinuer) may be a contributing factor in this discrepancy across provinces.

In order to pursue this point, provinces were contacted and asked to provide details regarding their policies on inactive apprentices. Based on provincial responses, it is clear that policies vary with regards to the timing and process for cancelling an apprenticeship based on inactivity. For example, some provinces have a guideline whereby an apprenticeship contract is cancelled if there has been no activity for 18 months, while other provinces cancel an apprenticeship agreement after 12 months of no activity. One province only cancels an apprenticeship on a case-by-case basis.³⁴ Furthermore, provinces also differ in their policies of reinstating cancelled apprenticeships; most provinces reinstate a cancelled apprenticeship within a calendar year of cancellation, but after a year the apprentice must submit a new registration application. Given that some inactive apprentices are purged from databases, there is bound to be some divergence between the number of active apprentices submitted by the jurisdictions for the RAIS and the number of apprentices who are actually active. This, unfortunately, leads to some ambiguity in the meaning of “active” status as recorded in the RAIS.

To the extent that long-term continuers are inactive, in the sense that they are no longer following apprenticeship programs or are employed in other fields, it would be preferable for analytical purposes to exclude them from the data sample of long-term continuers. For example, it does not seem overly important to assess how the characteristics of these (inactive) long-term continuers differ from completers for the purpose of attempting to model the associated labour market impacts when long-term continuers complete. Instead, it is more relevant to determine how the characteristics of long-term continuers on the cusp of gaining certification differ from completers and, correspondingly, to model the income gains associated with their completion.

5.2.2 Long-Term Continuation versus Completion

For purposes of this chapter, it is important to compare long-term continuers to completers. The definition of completion is fairly straightforward with the RAIS data; individuals who were granted a certificate of qualification (or certification of apprenticeship for some trades) at the end of the apprenticeship program are termed completers (Desjardins and Paquin, 2010). On the other hand, the NAS

³⁴ Activity generally refers to one of the following: technical training, writing an industry exam, scheduling technical training or an exam, submitting a record book, or contacting the apprenticeship office to change employer.

employed more complex terminology with completion and certification being distinct categories. The NAS Canada Overview Report (Ménard et. al., 2008) describes completers as “people who had been registered and had completed their apprenticeship program with or without certification.”

In fact, some respondents reported their status as completed but not certified.³⁵ This distinction needs to be borne in mind when attempting to identify the economic impacts of completion for long-term continuers as one may reasonably expect larger economic advantages for those completing with certification than for those who complete without certification.

This distinction is important when analyzing the economic value of completion. For example, when estimating the earnings gains associated with completion with NAS data, including the non-certified might serve to place a “lower-bound” on estimated gains if one implicitly equates completion with certification. Alternatively stated, when attempting to model the gains from long-term continuers transitioning to journeyperson status (i.e., completing with certification) basing the calculation on the entire NAS sample of completers may result in estimated gains from completion that are too low. On the other hand, when estimating the increased training capacity due to greater completions, including the non-certified would result in an over-estimate of the potential future apprentices that could be supervised (i.e., estimated gains are biased upward).³⁶

5.3 Characteristics of Long-Term Continuers: A Review of the NAS Studies

5.3.1 Overview

While the reasons for long-term continuation are diverse, most factors either relate to challenges or incentives facing apprentices.³⁷ Perhaps the most obvious

³⁵ This is possible in the NAS self-reports of status because some apprentices may have been on the verge of writing the certification exams or had not been successful in initial attempts. However, this distinction does not exist in RAIS because completion is defined in terms of meeting all requirements for certification.

³⁶ To put this issue into perspective, the proportion of NAS apprenticeship completers without certification is relatively small at about 11% (Crocker et. al., 2010).

³⁷ As discussed previously, in addition to these factors there are data issues that results in misclassification of inactive apprentices as active (and hence long-term continuers) as well as differences in provincial policies.

explanation accounting for long-term continuation is simply that challenges or obstacles confronted by apprentices delay timely completion of their programs. Common obstacles may include lack of work and supervision stemming from weak labour market conditions or human resource strategies; difficulties with program requirements, such as challenges with in-class material, tests, and on-the-job components; and personal challenges, including financial difficulties, health and other family issues.

As outlined above, a second broad set of explanations for long-term continuation pertains to the expected costs and benefits faced by apprentices when deciding whether or not to continue in their programs. A third set of factors relates to the unique characteristics of particular trades. For example, a certain trade could have a high rate of long-term continuation if its training requirements are quite onerous or if it is particularly difficult to pass its certification exams. Similarly, an emergent trade may suffer growing pains if plagued by a lack of experienced training capacity.

Unfortunately, the NAS did not directly ask long-term continuers the reasons contributing to their lengthy apprenticeships. Insights into the reasons for long-term continuation can be gleaned, however, from studies comparing the characteristics of the three apprentice groups (long-term continuers, completers and discontinuers) as well as analysis of the determinants of completion duration. It should be pointed out, however, that the relationship between time to completion and likelihood of completion is not entirely straightforward, as concluded by RAIS-based analysis:

There does not appear to be any relationship between completion rates and the fact that apprentices exceeded the nominal duration of program by 50% or more time. For example, almost half of the completers in the hairstylist program exceeded the nominal duration by at least 50%, i.e. they took three years rather than two to complete their program despite having one of the highest completion rates. (Desjardins and Paquin, 2010)

A similar conclusion was reached by Cadieux (2010) who found relatively few robust determinants in common as explanations of both incidence and time to completion. This applies, for example, to results on a provincial basis where there is little connection between time and likelihood to complete.

Another subtle point when examining challenges and obstacles faced by long-term continuers is that a number of the reasons given in the NAS why discontinuers do not complete may not relate to long-term continuation. That is, while there may be overlap between some obstacles that cause someone to

either discontinue or prolong their studies (e.g., lack of work), other reasons for discontinuation (e.g., received better job offer, disliked working conditions, wanted to change job/career) seem to logically shorten one's apprenticeship but not to lengthen its duration.

The major determinants of long-term completion which, for the most part, relate to challenges confronting apprentices will be described in a chronological order, commencing with pre-apprenticeship characteristics and prior-training experiences and then followed by labour market conditions; training attributes; and work and trade features. In addition, key findings related to demographics and other variables are outlined below.

5.3.2 Pre-apprenticeship and Prior Training

The educational attainment level when individuals commence their apprenticeship programs is quite strongly related to their outcomes. For example, while only 12.1% of completers had less than high school education, over one-fifth (21.6%) of long-term continuers had less than high school as their highest level of educational attainment. Similarly, whereas 48.5 % of completers were high school graduates, the same can be said for only 45.1 % of long-term continuers. A similar pattern applies for college completion, with 12.1 % of apprentice completers reporting college completion as their highest level of educational attainment compared to 9.9 % of long-term continuers. Laporte and Mueller (2011) conclude that someone with less than high school is 6.1 percentage points more likely to be a long-term continuer and 8.4 percentage points less likely to have completed, than someone with a high school education. Cadieux (2010) confirms that those with less than high school are less likely to complete and also shows that they have longer completion times. His analysis also concludes that good grades in high-school contribute to shorter completion times.

Laporte and Mueller (2011) find, somewhat counter-intuitively, that being in a youth apprenticeship program decreases the probability of completion (by 4.8 percentage points) and increases the probability of long-term continuation (by 4.9 percentage points). They find that taking part in trade-related or co-op programs during high school has no relationship to program completion behaviour. Cadieux (2010), similarly, concludes that being in a high school program related to apprenticeship leads to longer completion times.

Having prior technical training in the trade is correlated to completion rates and completion time. Summary statistics show that a higher share of completers (48.5%) had prior technical training than long-term continuers (45.4%). Cadieux (2010) found that having technical training in the trade before entering

apprenticeship contributes to shorter completion times (by 0.5 years).

5.3.3 Labour Market Conditions

In NAS-based research, the impact of labour market conditions have been analyzed by supplementing the NAS with unemployment rates from Statistics Canada's monthly Labour Force Survey. Based on this, Ahmed (2010) concluded that there is a significant relationship between provincial unemployment rates and completion rates. For example, Ahmed found that a one percentage point decrease in the provincial unemployment rate decreases the probability of completion by 2% and increases the probability of long-term continuation by more than 1%. However, she also found that the impacts of unemployment rates depend on the specific measure used; while provincial unemployment rates relate negatively to the probability of completion and positively to that of long-term continuation, unemployment rates measured on an occupational basis show the opposite effect (Ahmed, 2010).

Responses to the NAS question regarding difficulties finding an employer willing to take on apprentices is another indicator of labour market conditions. Ahmed (2010) found that difficulty in finding an employer increases the time to complete but not the duration of long-term continuation. However, both Ahmed (2010) and Laporte and Mueller (2011) conclude that difficulty finding an employer is not significantly related to completion rates.

As Laporte and Mueller (2011) suggest, having a large number of employers during one's apprenticeship signals difficulty in finding steady employment, obtaining technical training, working with journeypersons, lack of commitment or the recognition by the apprentice that a different employer represents a superior match. Consistent with this logic, the average time to completion steadily increases with number of employers; from 4.4 years for those with a single employer to 7.8 years for those with six or more employers (Cadieux, 2010). Similarly, a higher proportion of long-term continuers (58.3%) than completers (49.4%) reported switching employers during their apprenticeship program (Menard, et. al., 2008). Multivariate analysis by Laporte and Mueller (2011) found that increasing the number of employers beyond one increases the probability of long-term continuation and decreases the probability of completion. For example, they found that, relative to an apprentice with one employer, having four employers leads to a 5.6 percentage point greater probability of long-term completion and a 5.5 percentage point reduction in the probability of being a completer.

While some apprentices across the three categories indicated that they

encountered challenges during their apprenticeship programs, most obstacles are unrelated to completion status. For example, a higher proportion citing insufficient income and delays in funding were completers (38.4%) as compared to long-term continuers (31.5%) and a higher share citing high costs of tools were also completers (25.7%) as compared to long-term continuers (21.8%). An important exception to this lack of pattern occurs among those who cited inconsistent or lack of work; 29.0 % of long-term continuers cited inconsistent or lack of work as an obstacle compared to only 22.2% of completers.

On the other hand, Cadieux (2010) showed that completion time does vary with various obstacles in a more predictable pattern with those citing lack of work as an obstacle completing in 6.1 years compared to 4.8 for those who did not cite this as an obstacle. Those citing employer(s) not following rules completed in an average time of 5.4 years compared to 5.0 years for those not citing this obstacle. In his multivariate analysis, the statistical significance of these variables were confirmed with the “lack of work” challenge increase completion time by 0.6 years and the “employer not following rules” challenge increasing time to completion by 0.2 years.

5.3.4 Training Attributes

According to the raw data, there are fairly large differences in the average time to completion by type of technical training. Cadieux (2010) showed that the average time to completion varies by type of technical training, ranging from 4.6 years for those in day release programs to 5.8 years for those in self-paced training. For those released in long blocks of time, which is by far the most common form of training, the mean time to completion was 4.6 years. Cadieux (2010) reported that the suitability of day release programs seems to vary strongly across trades and illustrates this with the trades of carpenters and plumbers/pipefitters. In contrast to the average for all trades, in the case of carpenters, day release increases completion times by an extra two years compared to those who took other modes of technical training, while for plumbers-pipefitters, the day release method results in an increase of nearly an extra year. Based on this finding, the impact of type of training was not investigated in his multivariate analysis.

Laporte and Mueller (2011), on the other hand, do include mode of training in their multivariate models and found that, relative to the reference group of taking no technical training, those who took long-block training (three weeks or more) were much more likely to complete (9.1 percentage points) and less likely to be long-term continuers (-0.04 percentage points).

5.3.5 Perceptions of the Quality of Training

Charlton, Hu and Stowe (2010), found that, while long-term continuers did not report greater difficulties with the on-the-job training, they reported significantly more difficulty with the technical training component. Specifically, while 19% of long-term continuers reported difficulty with technical training, difficulties were reported by only 11% of completers and 15 % of discontinuers. This suggests that long-term continuers have more difficulty with technical training than the other two groups but less difficulty with on-the-job training than the other two groups. It appears that long-term continuers also have greater difficulty with written materials than the other two groups because fewer long-term continuers (65%) reported having no difficulty understanding in-class or online written materials than completers (76%) or discontinuers (74%) (p. 13). One possible conclusion from these data is that apprentices become long-term continuers when they have greater difficulty with technical training than on-the-job training, making their time in the apprenticeship program longer due to repeated units.

5.3.6 Work and Trade Features

In her examination of the impacts of compulsory certification, Hurrell (2010) concludes that there is no difference in the probability of completion between voluntary and compulsory trades. On the other hand, she concludes that there are significant differences between apprenticeship status groups in terms of time in program and time to completion of voluntary versus compulsory trades. Specifically, all three groups spent longer when apprenticing in compulsory as compared to voluntary trades, and this was especially true for the long-term continuers. The average amount of time spent in a voluntary trade is 7.5 years for long-term continuers, 4.6 years for completers, and 2.9 for discontinuers. On the other hand, the average amount of time spent in years in a compulsory trade is 10.4 years for long-term continuers, 5.4 years for completers, and 3.5 years for discontinuers. This finding is somewhat surprising since one may reasonably anticipate that larger economic gains from completing required certification which would encourage those in those in compulsory trades to complete more rapidly.

5.3.7 Demographics and Other Variables

Laryea and Medu, 2010 found no significant variance between the percentages of women, immigrant, and Aboriginal long-term continuers compared with completers. While women and immigrants were underrepresented in the trades generally, members of these demographic groups were no more likely to be long-term continuers than their counterparts.

That said, there were a few minor differences perhaps worth noting. For instance, across provinces, the Atlantic Provinces reported having the largest percentage of women who were long-term continuers (12%) compared with female completers (5%) and discontinuers (6%) (Laryea and Medu, 2010). This may be interesting in light of the fact that these provinces, except Newfoundland and Labrador, have a relatively high percentage of completers compared with long-term continuers (see below). Second, it was found that while immigrants were not more likely to be long-term continuers than non-immigrants, significantly fewer immigrant long-term continuers have less than a high school education compared with non-immigrant long-term continuers (Laryea and Medu, 2010). These findings suggest that barriers to completion may be different for representatives of minority groups.

Conversely, examining the shares of long-term continuers and completers at the provincial level indicates substantial jurisdictional differences in the status of registered apprentices. The following provinces had relatively high shares of completers compared to long-term continuers: Prince Edward Island (0.4% completers to 0.1% long-term continuers); Nova Scotia (2.5% versus 2.2%); New Brunswick (2.4% versus 1.7%); Manitoba (3.8% versus 2.2 %); Saskatchewan (4.4% versus 2.4%); Alberta (24.9% versus 13.5%) and British Columbia (10.6% versus 9.4%). In contrast, long-term continuers were relatively over-represented compared to the share of completers in Newfoundland and Labrador (5.8% long-term continuers versus 1.9% completers); Quebec (27.5% versus 17.4%); and Ontario (34.9% versus 31.3%).

Laporte and Mueller (2011) also concluded that there are significant differences between provinces in terms of rates of completion and long-term continuation.³⁸ Specifically, they find that compared to Ontario (the reference category in their regressions), only Newfoundland and Labrador have a higher long-term continuation probability, and all other provinces are lower than Ontario. On the other hand, with the exception of Newfoundland and Labrador, most provinces were found to have a statistically higher completion probability than Ontario. Cadieux (2010) found a fairly similar pattern with regard to provinces' incidences of completion, although he concludes that Prince Edward Island and the Northwest Territories are the two jurisdictions with lower completion rates than Ontario. Interestingly, when viewed in terms of time to completion – rather than incidence – that pattern differs somewhat with a number of provinces exhibiting longer completion times than Ontario (Nova Scotia, New Brunswick, Quebec and Newfoundland and Labrador) but only two provinces have reduced completion times (Alberta and British Columbia).

³⁸ Their data analysis excluded Quebec.

5.3.8 Summary of NAS Findings

In summary, the following overall conclusions may be reached from the research discussed above regarding differences between long-term continuers and completers:

- Long-term continuers are less likely to have finished high school than are apprenticeship completers;
- Long-term continuers are more likely to lack prior technical training than completers;
- Higher provincial unemployment rates are associated with increased probability of long-term continuation;
- Long-term continuers are more likely to have multiple employers throughout their apprenticeship program than completers;
- Long-term continuers are more likely to cite inconsistent or lack of work as an obstacle to completion than completers;
- Long-term continuers are more likely to experience difficulty with the technical training component of their apprenticeship program than completers; and
- Long-term continuers take much longer than completers to complete compulsory trades than voluntary trades.

On the other hand, there is little difference in the share of long-term continuers compared to completers among demographic groups of interest including women, immigrants and Aboriginals. Also of note is the limited consistency between factors increasing time spent in programs and those decreasing the likelihood of completion.

5.4 Long-Term Continuers in the RAIS

5.4.1 Overall Trends

Data from the RAIS were analyzed for trends and patterns of long-term continuation. In the RAIS, the key variables used to complete this analysis were “date of registration” and “status at end of reporting period”. Specifically, those coded as “continuing and still registered” according to their end status were cross tabulated by their registration year in order to determine the duration of their registration. For each reporting year, there were some individuals whose initial year of registration was not coded; given the focus on this analysis, they were removed from the data sample so that only those with valid years of initial

registration were retained.³⁹

Table 5.1 shows the percentage of apprentices remaining in their programs from one to ten years after initial registration, by RAIS report year. These results show that the greatest attrition occurs in years three, four and five. Overall, there appears to be a slight increase in the number remaining for three or more years between 2000 and 2009. To make this pattern clearer, three years were selected (2001, 2005, 2009) that were evenly spaced and span most of the ten year period. In Chart 5.1, the relative position of the three lines indicates changes in continuation patterns for the three years given. Except for a small shift in the pattern for years 6 to 7 for the 2005 group, this chart shows that the pattern of continuation did not change very much over the decade.

³⁹ While these numbers were relatively small in the most recent year (e.g., only 42 of those reporting at the end of 2009 had unknown start years), the numbers were increasingly greater in earlier years (e.g., of those reporting at the end of 2008, 1,044 had unknown starting dates. Of those reporting at the end of 2006 8,493 had unknown starting dates).

Table 5.1 Percent Continuing for 1 to 10 Years by RAIS Report Years 2000-2009 [Source RAIS]

Years in Program	Reporting Year									
	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
10	9.0	8.7	12.0	9.4	8.3	7.4	6.6	6.9	6.7	8.5
9	11.4	10.0	18.7	14.4	11.1	9.4	8.7	7.6	8.0	8.0
8	13.6	12.9	11.9	21.8	17.2	13.2	11.3	10.1	9.1	9.9
7	19.0	16.6	16.0	16.1	25.8	20.2	17.0	14.1	12.4	11.5
6	26.4	24.1	22.0	21.7	22.4	31.5	25.3	22.5	18.4	16.7
5	37.2	37.3	34.3	31.8	32.0	31.4	40.3	34.3	29.2	26.4
4	54.0	53.5	55.4	49.1	48.2	47.4	46.4	56.7	51.1	46.0
3	70.3	68.9	72.0	71.3	65.6	64.2	63.6	63.9	69.9	65.9
2	88.3	87.6	90.5	91.0	92.2	87.0	85.2	84.1	81.2	87.0
1	96.3	94.5	96.6	97.9	97.8	97.9	97.7	97.1	97.0	95.7

Chart 5.1 Percent Continuing from One to Ten Years for RAIS Report Years 2001, 2005 2009 [Source: RAIS]

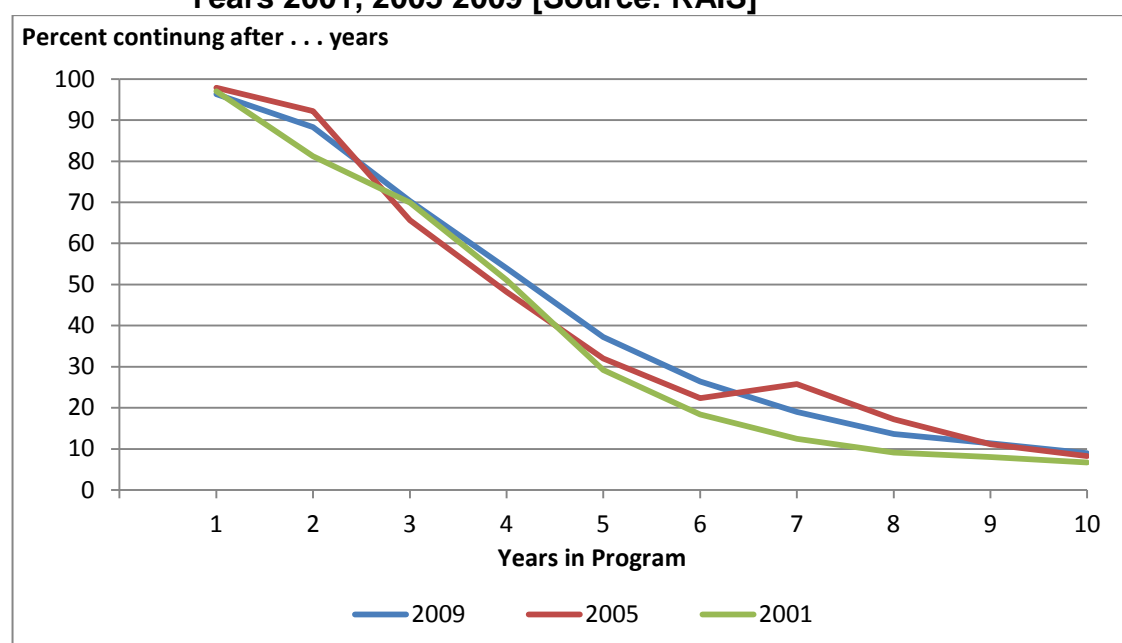
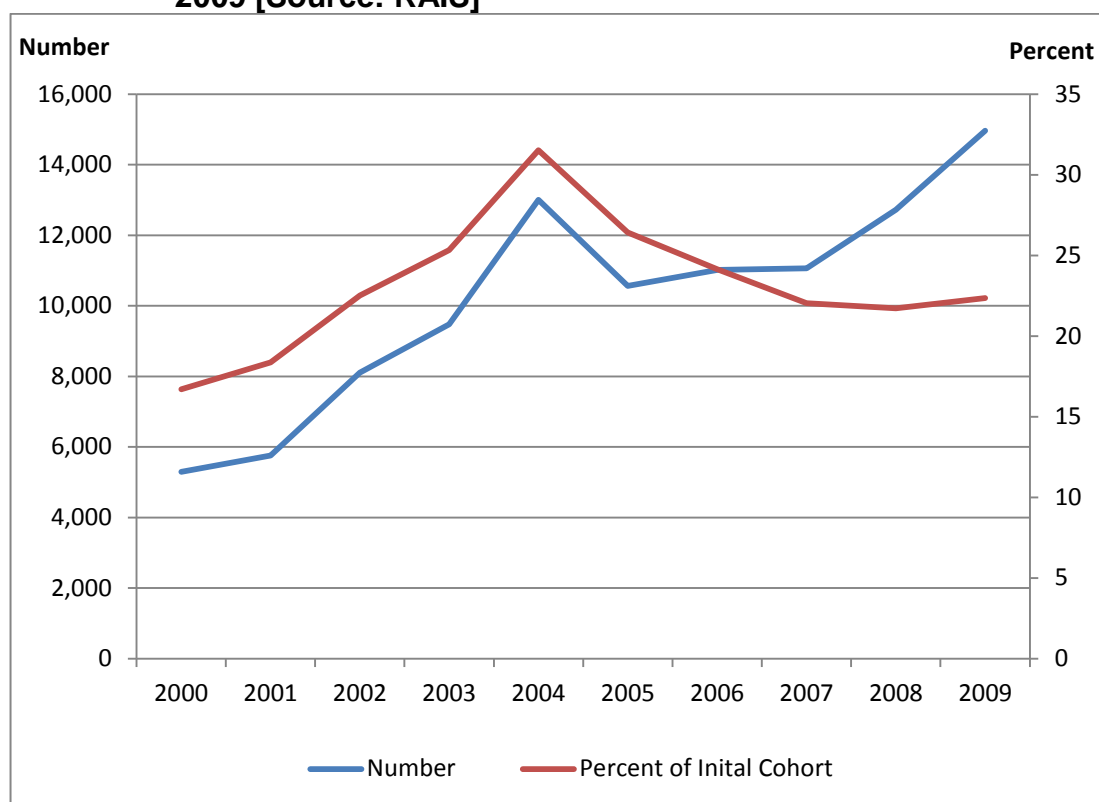


Chart 5.2 provides an alternate depiction, giving the total number and percentage remaining in an apprenticeship program after six years for RAIS report years from 2000 to 2009.⁴⁰ This shows a substantial increase in the total number of long-

⁴⁰ Six years was used instead of the NAS criterion of one and one-half times the program length because of indications that incidence of long-term continuation is not a function of program length.

term continuers over the period, but with a distinct peak in 2004, followed by a downward adjustment in 2005 and then a resumption of the pattern of increase. As a percentage of the initial cohort (six years earlier than the years on the chart), the pattern shows an increase up to 2004 followed by a decrease in 2006 and relative stability from 2007 to 2009. This pattern is consistent with the earlier results on completion rates, where the years of increase in long-term continuation rates correspond to those of decrease in completion rates.

Chart 5.2 Number and Percent Continuing for at Least Six Years, 2000-2009 [Source: RAIS]



5.4.2 Long-Term Continuers by Trade

To examine long-term continuation in more detail, trends in the Top 10 trades were examined for cohorts from 1994 to 2003, at six year after registration, giving end years from 2000 to 2009. Chart 5.3 gives these results.⁴¹ The trends may

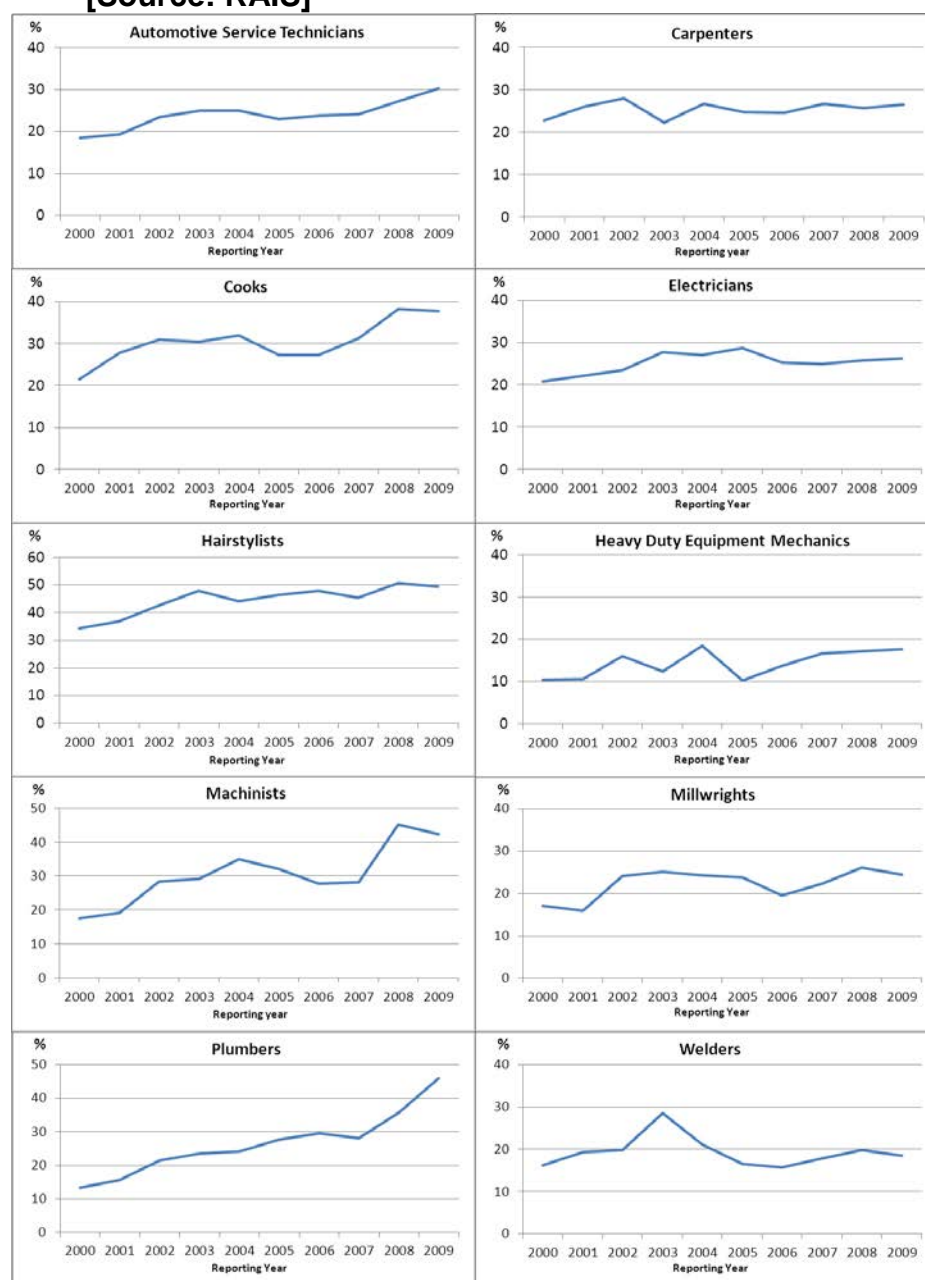
In reality, for most trades six years corresponds to the NAS criterion.

⁴¹ Although ten-year results were also given for completion, the difference between the six and ten year results are relatively small and are thus omitted here for the sake of simplicity.

be summarized as follows:

- With some variations in the details of the trend, the proportion of long-term continuers has increased substantially for automotive service technicians, cooks, hairstylists, machinists and plumbers.
- A slower increase in the trend is found for carpenters, electricians, heavy-duty equipment mechanics and millwrights.
- After a peak in 2003, the trend for welders was downward to 2006 and has been relatively stable since then.

Chart 5.3 Percentage Continuing for at Least Six Years by Top 10 Trades
[Source: RAIS]⁴²



⁴² Most apprenticeship programs are nominally four years in duration. A few are shorter, with variations across jurisdictions. For simplicity, a six-year cut-off was used to define long-term continuation in all trades, since there seems to be no relationship between nominal duration and the incidence of long-term continuation.

5.4.3 Long-term Continuers by Jurisdiction

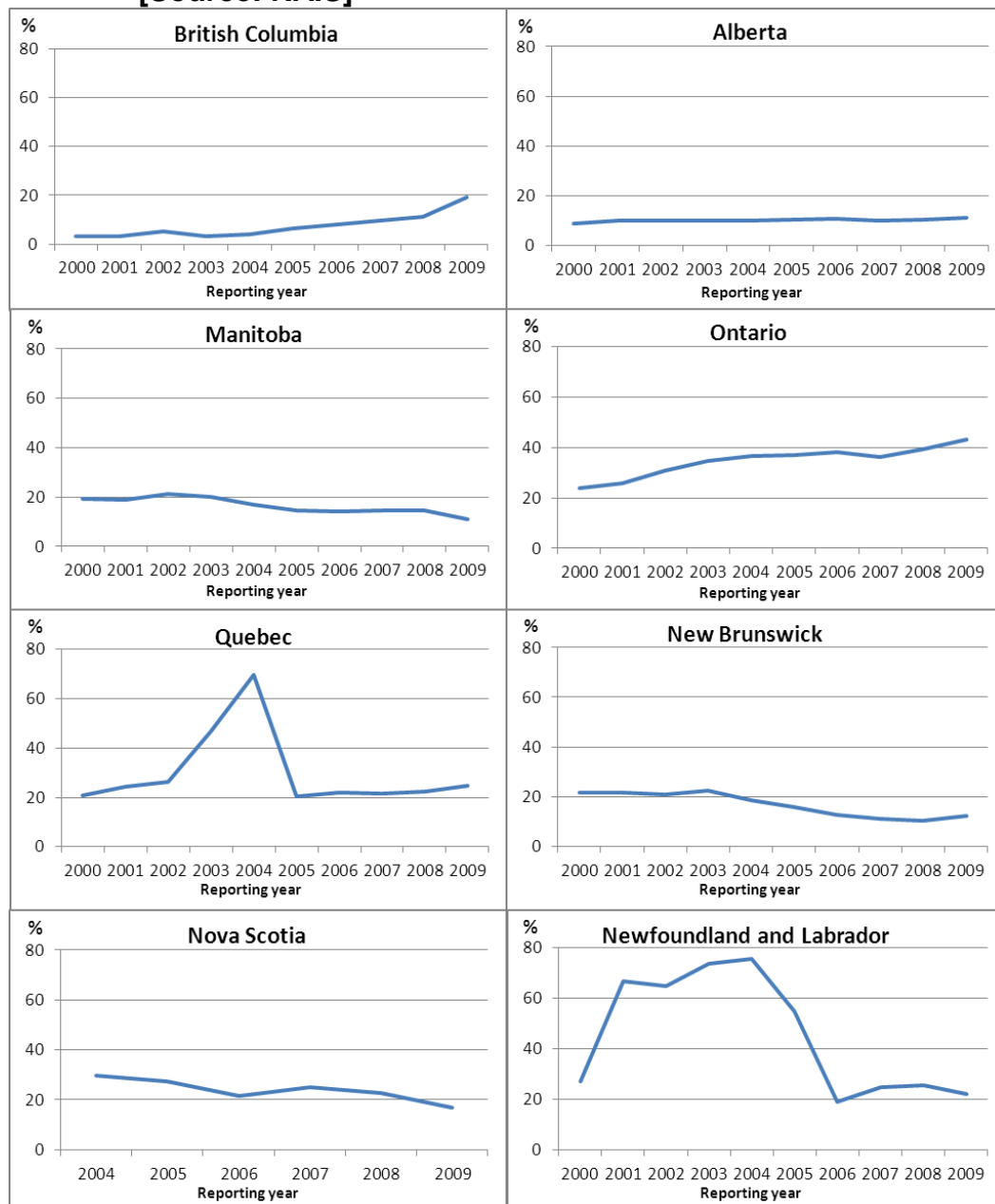
Issues of data quality are more acute for jurisdictions than for trades because the number of apprentices in some jurisdictions is quite small and because start dates were not available for all jurisdictions in the earlier years of the time series. Results for this series are therefore incomplete.

Chart 5.4 depicts the percentage of apprentices continuing in their trades from one to ten years and for at least six years, on a jurisdictional basis. The following are highlights of these results:

- British Columbia shows a stable trend in the early years of the sequence, followed by an increase in more recent years. Ontario shows a steadier rate of increase over the period.
- Long-term continuation rates have been decreasing slowly in Manitoba, New Brunswick and Nova Scotia.
- Quebec and the Territories show spikes in the rate in 2004 and a return to a more stable pattern in more recent years.
- Newfoundland and Labrador shows the most extreme changes, with a large increase in the incidence of long-term continuation in the early 2000s followed by a rapid decrease from 2004 to 2006 and a stable rate since 2006. This is consistent with other results showing substantial increase followed by decrease in apprenticeship registrations over that same period.

It is important to reiterate that the incidence of long-term continuation may be influenced by jurisdictional policies on continuation or termination of apprenticeship programs after periods of inactivity, as noted in Section 5.2.1. The review of these policies was insufficiently detailed to allow a correlation between policies and long-term continuation rate. Individual jurisdictions are encouraged to interpret their results in light of these policies and how the policies are enforced.

Chart 5.4 Percentage Continuing for at Least Six Years by Jurisdiction
[Source: RAIS]



5.5 A Re-Examination of the NAS Data

As discussed earlier, information on two types of completers is contained in the NAS database; those who were certified and those who completed but had not become certified. Similarly, NAS reported two distinct categories of long-term continuers; those with minimum requirements and those without. This distinction likely is a consequence of a time lag between completion and certification that is not recorded in RAIS. Because this distinction was not pursued in any detail in the NAS research studies, some of the NAS results were reanalyzed to determine if the distinction sheds any light on differences between completers and long-term continuers and between those certified and those not.

5.5.1 Obstacles to Completion

Chart 5.5 shows that completers with certification are significantly less likely than all other groups to report inconsistent or lack of work as an obstacle to completion. At the opposite extreme are long-term continuers without minimum requirements. Completers without certification and long-term continuers with minimum requirements are not significantly different from each other.

Chart 5.6 shows the percentage of each group who reported technical training as an obstacle to completion. This chart also shows that certified completers are significantly different from the other groups whereas completers without certification are not significantly different from long-term continuers.

Chart 5.5⁴³ Percentage Citing “Inconsistent or Lack of Work” as an Obstacle Encountered During Apprenticeship by Apprenticeship Status [Source: NAS]

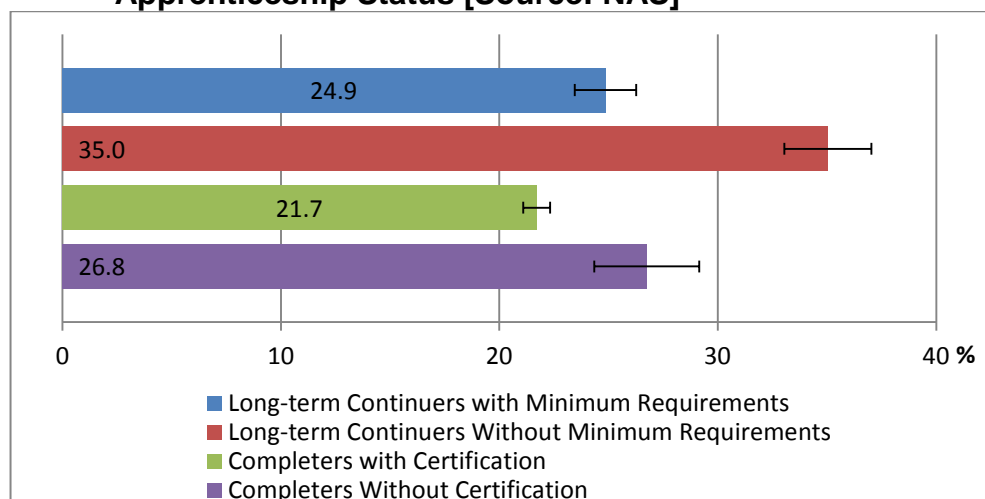
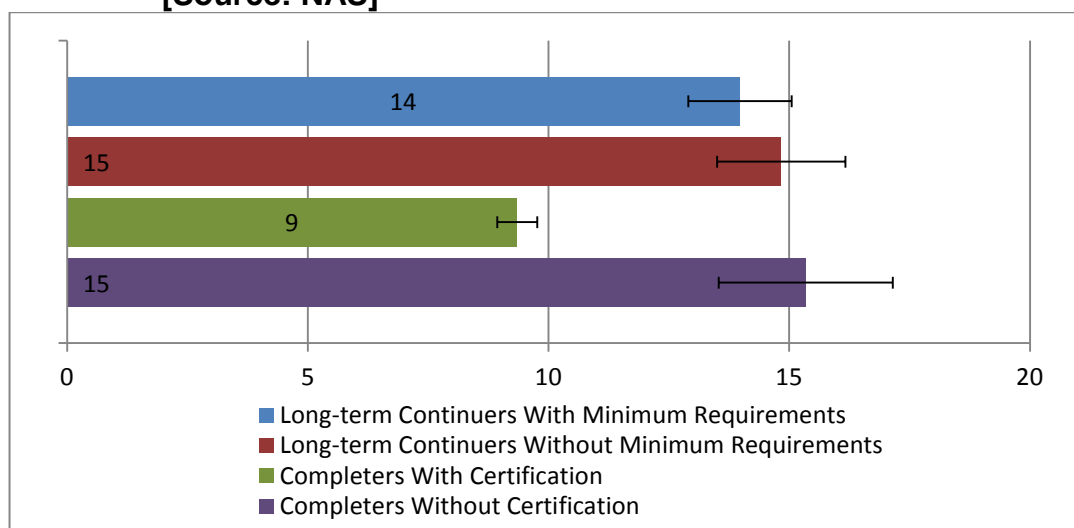


Chart 5.6 Percentage Citing “Technical Training” as an Obstacle Encountered During Apprenticeship by Apprenticeship Status [Source: NAS]



⁴³ Because NAS is based on a sample, with inferences made to the appropriate population, the reported numbers are subject to sampling error. The error in each case is represented by a “confidence interval” which represents a range around the reported number within which the population value is expected to be located, with 95% confidence. Confidence intervals are depicted as lines, referred to as “error bars,” at the end of each bar on the graph. A difference between two categories is considered to be statistically significant if the error bars do not overlap.

Chart 5.7 indicates that a smaller proportion of completers with certification had difficulty with written material during their apprenticeships than any other category. Chart 5.7 also indicates that while completers with certification are distinct from other categories, completers without certification are not significantly different from long-term continuers.

Chart 5.7 Percentage Having Difficulty with Written Material by Apprenticeship Status [Source: NAS]

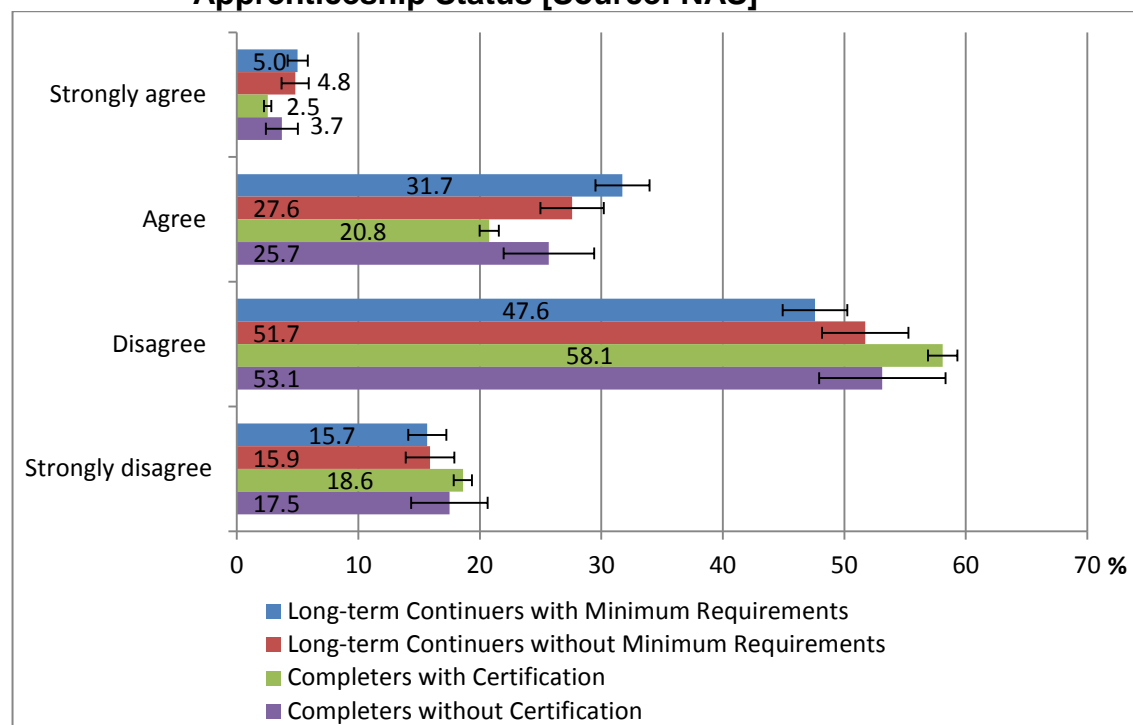
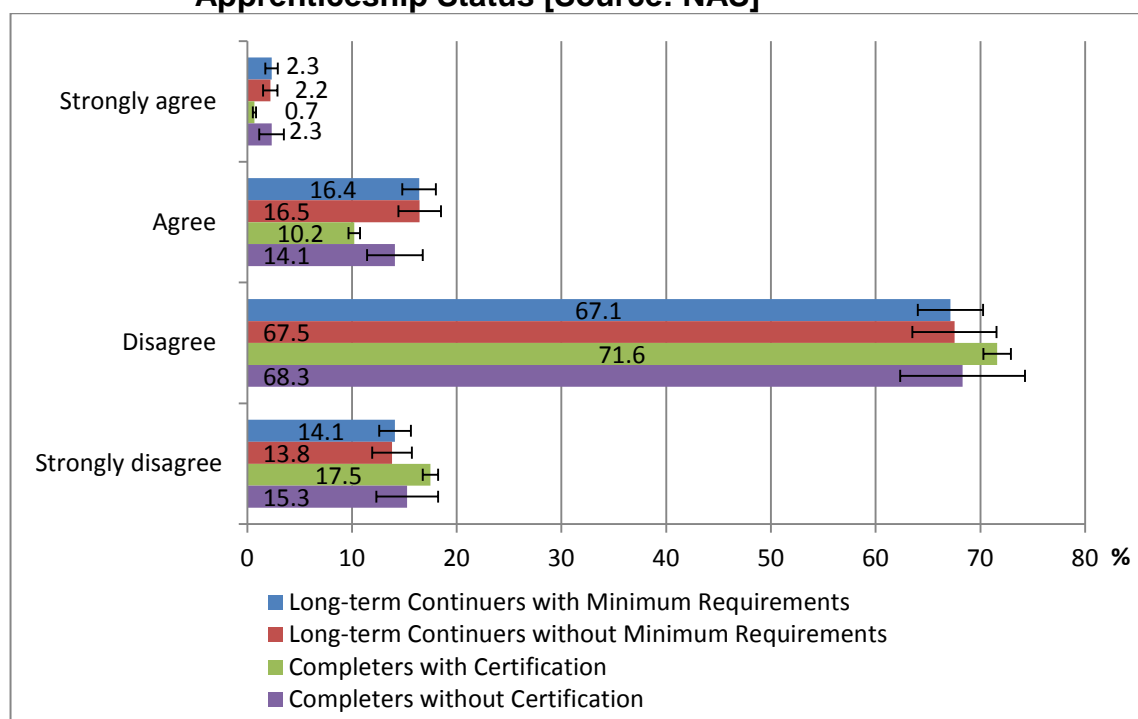


Chart 5.8 again indicates the distinctive nature of completers with certification; while only 10.9% of completers with certification were in agreement or in strong agreement that they had difficulty with technical training, a significantly higher percentage of respondents in the other categories agreed that they experienced difficulties.

Overall, these results show that completers with certification encountered the fewest obstacles to completion. Differences among the other groups were generally smaller, with the two long-term continuation groups not being much different from completers without certification. It can therefore be argued that the obstacles given are linked to incidence of long-term continuation, as well as to completion without becoming certified.

Chart 5.8 Percentage having Difficulty with Technical Training, by Apprenticeship Status [Source: NAS]

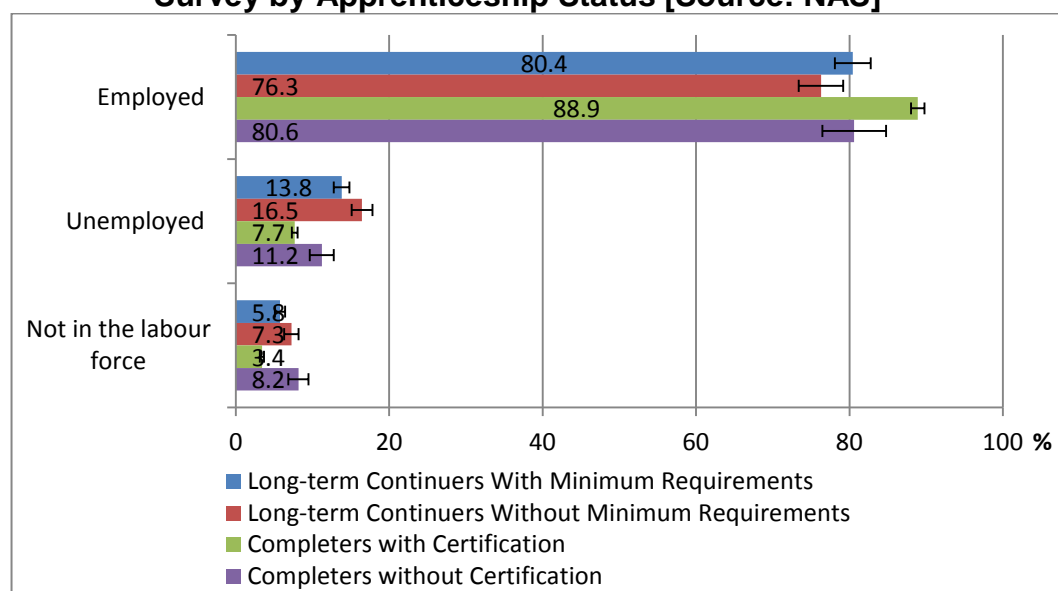


5.5.2 Labour Force Participation by NAS Apprenticeship Status

Having established the existence of statistically significant differences between the two categories of completers and long-term continuers along a number of dimensions with the NAS data, the next step was to investigate the labour force status of individuals in these four categories.

Chart 5.9 shows the percentages of NAS respondents employed, unemployed and not in the labour force, in the week prior to the survey, by apprenticeship status. Completers with certification have higher levels of employment and lower levels of unemployment than others, while there are no significant differences among the three other groups. The unemployment rate of completers with certification was also lower than for other groups, while that for long-term continuers without minimum requirements was higher than for other groups.

Chart 5.9 Labour Force Participation Status in the Week Prior to the Survey by Apprenticeship Status [Source: NAS]



5.5.3 Employment Earnings by NAS Apprenticeship Status

Because the NAS survey gathered only limited earnings data on long-term continuers, it was necessary to turn to the linked file for this information. Of particular interest were the earnings of individuals who changed apprenticeship status between the frame period (2002-04) and the survey period (2007). The longitudinal aspect of the NAS data set is a particularly useful feature from a research perspective since many variables are, in effect, held constant when the same individuals are examined over time. A simple comparison of means is thus a fairly reasonable estimation of the impacts of going from one state to another when the data are longitudinal (i.e., estimating the impacts of completion among long-term continuers).

For purposes of analysis, 2008 was chosen as the reference earnings year because it was the first full potential year of earnings following the NAS in 2007.⁴⁴ Table 5.3 gives mean 2008 employment earnings for all individuals with positive employment earnings in that year.

⁴⁴ Note that the one cannot rule out the possibility that apprenticeship status changed between 2007 and 2008. For example, some long-term continuers in 2007 may have completed by 2008. There was no way to identify these individuals from the data available.

Table 5.3 Mean 2008 Employment Income for NAS Frame Year Long-Term Continuers and Completers by 2007 Status and Province
[Source: Linked NAS T1FF]

Province	Apprentice Status in 2007			
	Long-term continuers with minimum requirements	Long-term continuers without minimum requirements	Completers with certification	Completers without certification
Newfoundland and Labrador	37,526	39,158	52,828	56,894
Prince Edward Island	---	---	---	---
Nova Scotia	42,624	39,384	52,340	34,854
New Brunswick	48,944	53,461	58,596	52,199
Quebec	38,058	36,245	51,069	32,115
Ontario	44,525	42,094	52,205	42,008
Manitoba	40,705	43,086	62,046	39,984
Saskatchewan	47,723	38,144	60,480	39,712
Alberta	67,079	64,346	87,828	65,150
British Columbia	56,325	41,530	57,140	63,931
Canada	42,778	40,136	58,280	40,956

Table 5.3 shows that a change of status from long-term continuation to completion with certification is associated with strong earnings gains. For example, the average earnings of long-term continuers without minimum requirements who completed with certification by 2007 increased by about \$18,000. By province, the estimated “completion premium” ranges from a low of about \$5,000 in New Brunswick to a high in excess of \$23,000 in Alberta. Consistent with charts 5.4 through 5.8, certification stands out as a distinct category. On the other hand, the earnings of completers without certification were not dissimilar to the earnings of the long-term continuer categories (\$40,956 compared to \$42,778 and \$40,136 for Canada as a whole).

Table 5.4 gives the same results for the ten largest Red Seal trades. Except for hairstylists and barbers (where annual incomes are generally lower than in other trades), completion with certification is associated with large earnings premiums. At the low end of the range are automotive service technicians with an earnings increase of about \$8,000 for completers with certification relative to long-term continuers without minimum requirements. At the opposite extreme are heavy duty equipment mechanics with a premium of about \$53,000.

Table 5.4 Mean 2008 Employment Income for NAS Frame Year Long-Term Continuers and Completers by 2007 Status and Trade [Source: Linked NAS T1FF]

Trade	Long-term continuer in frame years (2002,03,04)		Apprentice Status in 2007	
	Long-term continuers with minimum requirements	Long-term continuers without minimum requirements	Completers with certification	Completers without certification
Cooks	29,299	22,497	33,074	31,847
Hairstylists/Barbers	16,379	22,263	13,889	19,929
Electricians (except industrial)	52,209	44,159	66,466	45,435
Plumbers	53,537	38,346	61,972	42,912
Steamfitters/Pipefitters/Sprinkler System Installers	51,359	41,532	70,855	40,271
Welders and Related Machine Operators	52,421	47,481	85,464	49,666
Carpenters	35,033	33,474	41,867	40,188
Millwrights	59,761	57,865	80,554	51,924
Heavy Duty Equipment Mechanics	62,264	38,043	90,953	71,687
Automotive Service Technicians	42,784	43,283	50,804	44,105
All Other Trades	41,942	39,112	53,031	42,066
Total	42,588	39,736	57,773	41,162

In summary, these results show that, across most jurisdictions and trades, the largest income premium is enjoyed by completers with certification. Differences among the remaining groups are relatively small. In effect, those who have completed but not become certified have earnings that are not very different from long-term continuers. Indeed, for completers, not taking the final step to certification may be seen as being much the same as continuing as apprentices.

In reality, the NAS categories of long-term continuers and completers without certification may represent temporary states, as individuals complete some final steps to certification. Nevertheless, the existence of these categories does help reinforce the view that certification is a key element in determining labour market outcomes.

5.5.4 Regression Models: 2008 Income by NAS Apprenticeship Status

As before the bivariate results cannot clearly distinguish between the factors of main interest and others that may influence the outcome. For example, the differences between completers with certification and other groups may be related to age, education or other factors, as well as to location and trade as already indicated. Regression analysis offers a more robust approach to examining such differences, by controlling for other such factors that may be available in the data sets being used. NAS, in particular, includes data on many such factors. Accordingly, a regression model was developed, based on the Mincer model described in Chapter 1, to predict 2008 employment earnings on the basis of apprenticeship status, controlling for available measures on a variety of other factors. The regression model was a conventional linear one, as described in Chapter 4.

Completion status was the main independent variable of interest. This was defined by a series of three dichotomous variables associated with 2007 apprenticeship status: long-term continuers with minimum requirements, completion without certification and completion with certification. The fourth category, long-term continuers without minimum requirements was designated as a reference category. The variables controlled were other wage-determining characteristics; age, gender, jurisdiction, educational attainment prior to apprenticeship, trade group, language spoken at home, disability status, Aboriginal status and immigration status. This is a more comprehensive set of variables than was used in the Chapter 3 models because NAS included data on these variables that was not available in RAIS.

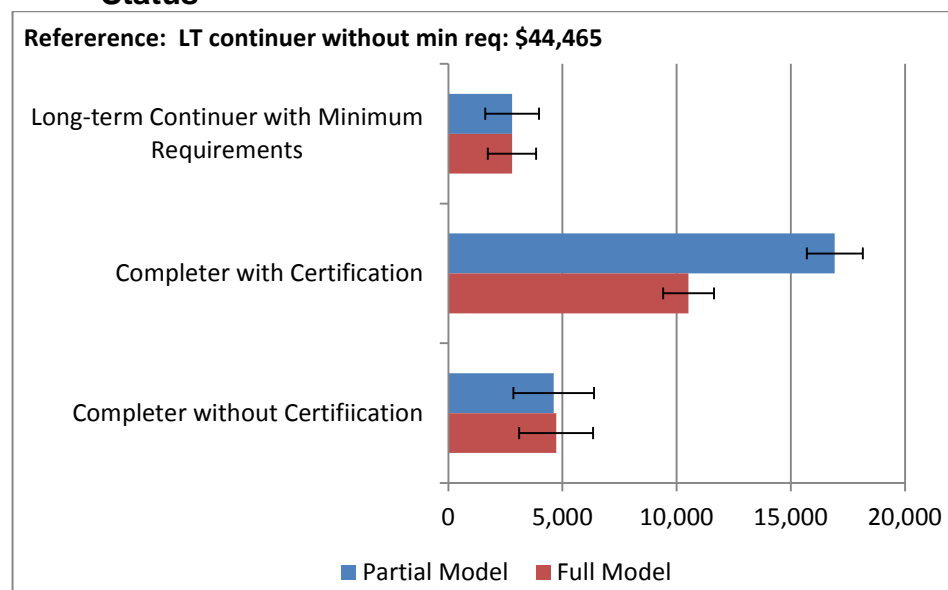
The sample was restricted to individuals who were long-term continuers in the survey frame period (2002, 2003, and 2004) and were either long-term continuers or completers in 2007 and had positive employment earnings in 2008. Observations were dropped if they contained any missing data on any of the variables listed above. These data restrictions resulted in a final weighted sample of 18,112 observations.

Unfortunately, some data restrictions commonly made in the analysis of earnings were not possible with the data set available. For example, we could not restrict the sample to full-year, full-time workers since the data set did not contain any information on either hours or weeks worked. Similarly, some other variables that are typically included in earnings regressions such as years of work experience and industrial sector could not be included due to lack of these variables in the data set.

Chart 5.10 shows regression coefficients for 2008 employment income of those

who were long-term continuers in 2002 to 2004 according to their 2007 apprenticeship status. The coefficients indicate the incremental dollar changes from the average income of long-term continuers without minimum requirements in 2007 (\$44,465) (full model results are presented in Appendix 1.)

Chart 5.10 Regression Coefficients for 2008 Employment Earnings of Long-Term Continuers in Frame Period by 2007 Apprentice Status



The “bivariate” results represent the earnings differences between groups with no other variables controlled. Other than differences due to missing data, these are similar to the bivariate results included earlier, and are given here as baseline differences. The “full model” is the model with other variables controlled. Only the coefficients for the variables of main interest are shown in the graph. Results for all variables are given in Appendix A. All results are interpreted as differences between the group shown and the reference group (long-term continuers without minimum requirements, mean earnings \$44,465).

Results from the “full” model indicate that completers with certification enjoyed the largest earnings premium, just over \$10,000. The earnings premiums of those in other categories were not significantly different from each other with long-term continuers with minimum requirements having an estimated premium of \$2,790 while completers without certification had an estimated premium of \$4,723.

As expected, the estimated earnings premium for completion with certification is smaller in the full model than in the bivariate model because the regression

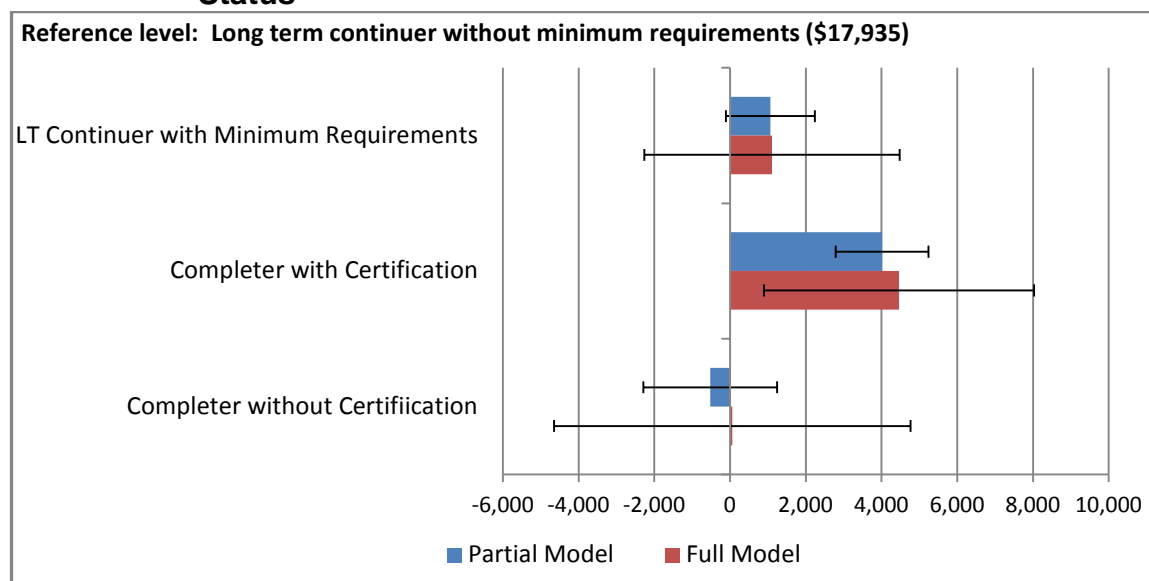
analysis controls for other wage-determining factors. The full model can be said to represent the “unique” effect of completion, after removing the effects of all other factors in the model. It is always possible, of course, that other potential factors remain uncontrolled. However, it is noted that jurisdiction and trade, which were earlier shown to be strongly associated with earnings, are controlled in the model.

The fit of the model is about the same as for the models in Chapter 3, with about one quarter of the variation in earnings accounted for by the independent variables included in the full model.

The second model developed was for self-employment income. As indicated earlier, self-employment among tradespersons is of interest because at least some trades lend themselves to individuals or small groups working as independent contractors. Chapter 3 gives some information on the prevalence of self-employment and the earnings of those who are self-employed. Generally, the proportions self-employed are low and the income generated from this source is much less than that from employment.

This section, examines self-employment earnings for the same groups of NAS participants as before. Specifically, equation 1 was estimated with 2008 net business income (BNET_2008 in the linked file) as the dependent variable and with all of the explanatory variables (trade, jurisdiction, etc.) remaining the same. Chart 5.11 shows the results.

Chart 5.11 Regression Coefficients for 2008 Self-Employment Earnings of Long-Term Continuers in Frame Period by 2007 Apprentice Status



While this model does not explain as much of the variation in net business income as it did for employment earnings, as a group, the independent variables are still statistically significant. Completers with certification earned a significantly higher income (about \$4,000 more) than other groups in the partial model but not in the full model. The latter result is likely a consequence of the relatively large error term in the full model. In this case, there was no significant change in the premium for completion with certification from the partial to the full model, indicating that the controlled variables have very little impact on self-employment income. Also, none of the other groups showed any significant premium relative to the reference group.

5.6 Labour Market Outcomes: RAIS

Continuers and long-term continuers for any RAIS year cannot be tracked longitudinally because status changes over time. As indicated by the NAS results, those who are defined as long-term continuers in any one year may change status to either completer or discontinuer in subsequent years. Continuers may become long-term continuers or may also complete or discontinue. In reality, as shown by the completion rate results in Chapter 3, only a relatively small proportion of long-term continuers in any one year will eventually complete. It is thus useful to look at labour market outcomes over time for long-term continuers, especially in comparison to continuers.

This section presents selected comparisons of labour market outcomes for continuers, long-term continuers and discontinuers, drawn from the more comprehensive results given in Section 3.3. Discontinuers are included because many long-term continuers in any one year become discontinuers in subsequent years.

5.6.1 Employment Income

Chart 5.12 gives the employment income trajectories for the three groups of interest based on their RAIS 2004 status. Income levels increase fairly rapidly for all groups, reflecting both experience and change of status in some cases. Long-term continuers have higher incomes than either of the other two groups over the whole period. The most striking part of this pattern is that discontinuers do about as well as continuers over most of the period, with the trajectories diverging slightly only near the end of the period. While some continuers from 2004 obviously went on to complete and become certified, the trajectories confirm that this cannot be a large proportion because the income differential between continuers and discontinuers is much smaller than that given earlier between continuers and completers.

Chart 5.13 shows the same picture looking backward from RAIS 2008. In this case, no members of any of the three groups would have been certified at least until 2009. The income pattern here is similar to the previous one, with long-term continuers having higher earnings than either of the other two groups. What is interesting about this, however, is that while not all 2008 long-term continuers would have had that status over the whole period (some would have been continuers for at least part of the period), the income premium for that group relative to continuers is maintained over the whole period.

Chart 5.12 Median Employment Income 2002-2009 by 2004 RAIS Status
[Source: Linked RAIS/T1FF]

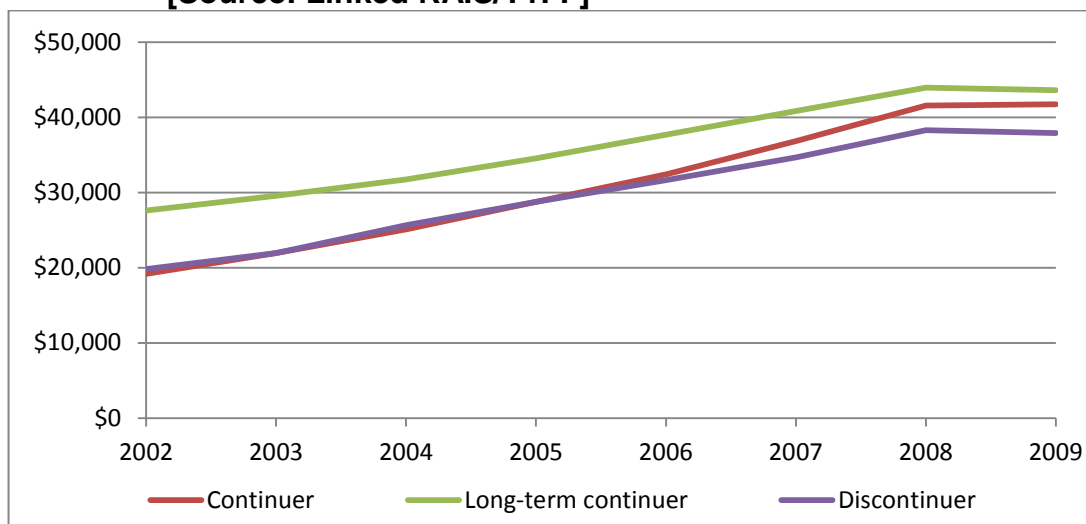
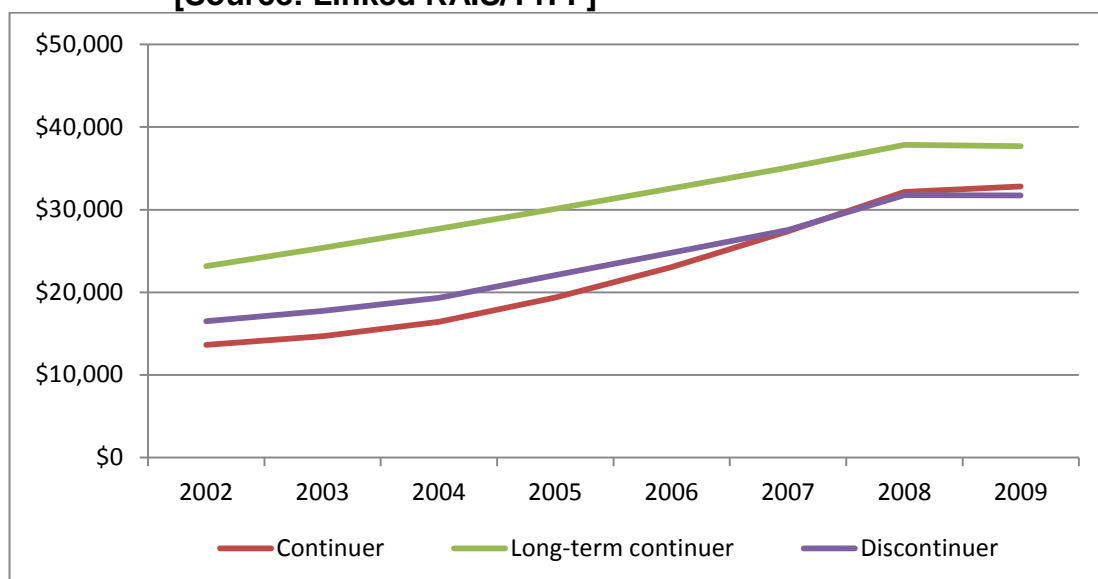


Chart 5.13 Median Employment Income 2002-2009 by 2008 RAIS Status
[Source: Linked RAIS/T1FF]



5.6.2 Self-Employment

As discussed in Section 3.3.4, self-employment is not especially prevalent in the trades with relatively high incidence in only a small number of trades and especially among trade qualifiers. The breakdown by trade of the incidence of

self-employment in 2009 for continuers, long-term continuers and discontinuers is shown in Chart 5.14. This shows long-term continuers to have the highest self-employment rates in most trades, the notable exceptions being carpenters and electricians, where discontinuers have higher rates.

Net self-employment earnings from 2002 to 2009 for these three groups, defined by RAIS 2004, are shown in Chart 5.15. This shows earnings increases for all groups, with little difference between long-term continuers and discontinuers, and both of these at higher levels than continuers.

Chart 5.14 Percent Reporting Self-Employment Earnings in 2009 by Trade and 2008 Status [Source: Linked RAIS/T1FF]

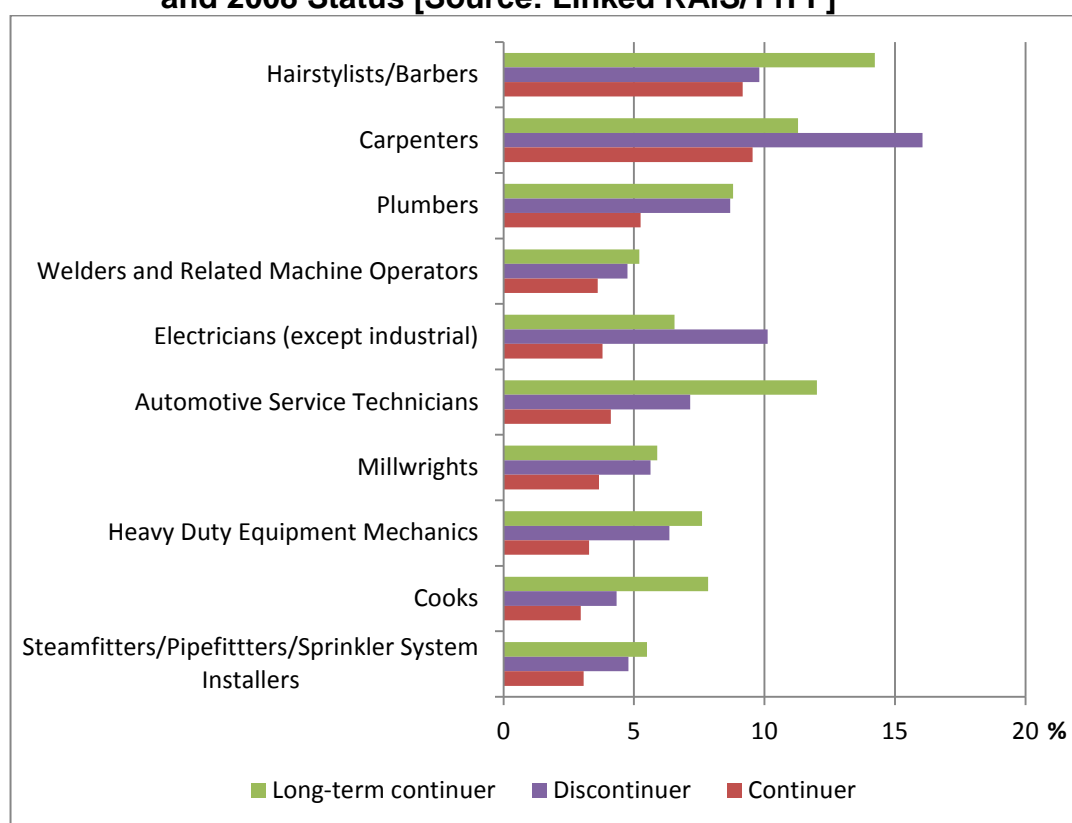
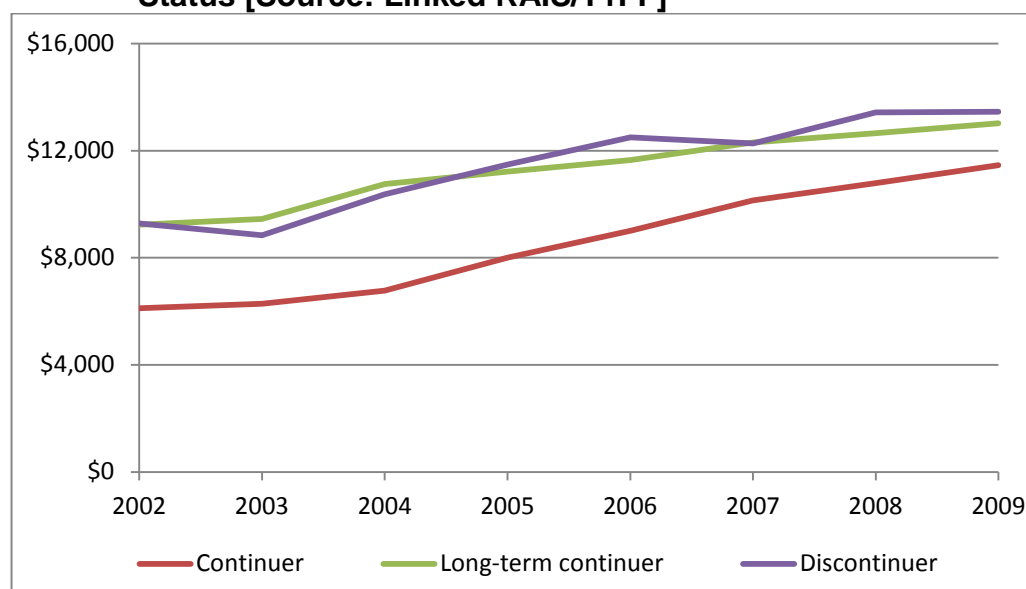


Chart 5.15 Median Net Self-Employment Income 2002-2009 by 2004 RAIS Status [Source: Linked RAIS/T1FF]



5.6.3 Employment Insurance

Chart 5.16 shows the percentage receiving EI income in 2009 by the top 10 trades for the three RAIS 2008 status groups. EI incidence is generally highest for continuers and lowest for discontinuers. Long-term continuers have lower EI rates than continuers in most trades. The exceptions are cooks, where the rate is similar (and quite low) for all three groups and hairstylists/barbers, where long-term continuers have higher rates than either of the other groups.

Chart 5.17 gives median EI income in 2009 by trade for the three status groups in RAIS 2008. For most trades, long-term continuers had higher EI income than continuers. The picture for long-term continuers relative to discontinuers is more mixed. For welders, plumbers and heavy-duty equipment mechanics, discontinuers had higher EI income than long-term continuers. The opposite is true for most other trades.

The data source used reports all EI income and therefore cannot distinguish between Part I benefits paid during in-class training, Part I benefits arising from lack of work, Part II benefits paid and administered by the jurisdiction, as well as special benefits available for maternity, parental, and sickness. In the case of completers, discontinuers, and trade qualifiers, their EI benefits received in 2009 are assumed to be comprised of regular EI benefits (non-training) and possibly special benefits. It is important to note that EI differences between trades may be

largely driven by the training method used by the jurisdiction for that particular trade. Block release training is more prevalent in particular jurisdictions and particular trades, which impacts the amount of EI received by trade and jurisdiction.

Chart 5.16 Percent Reporting EI Income in 2009 by Trade and 2008 Status
[Source: Linked RAIS/T1FF]

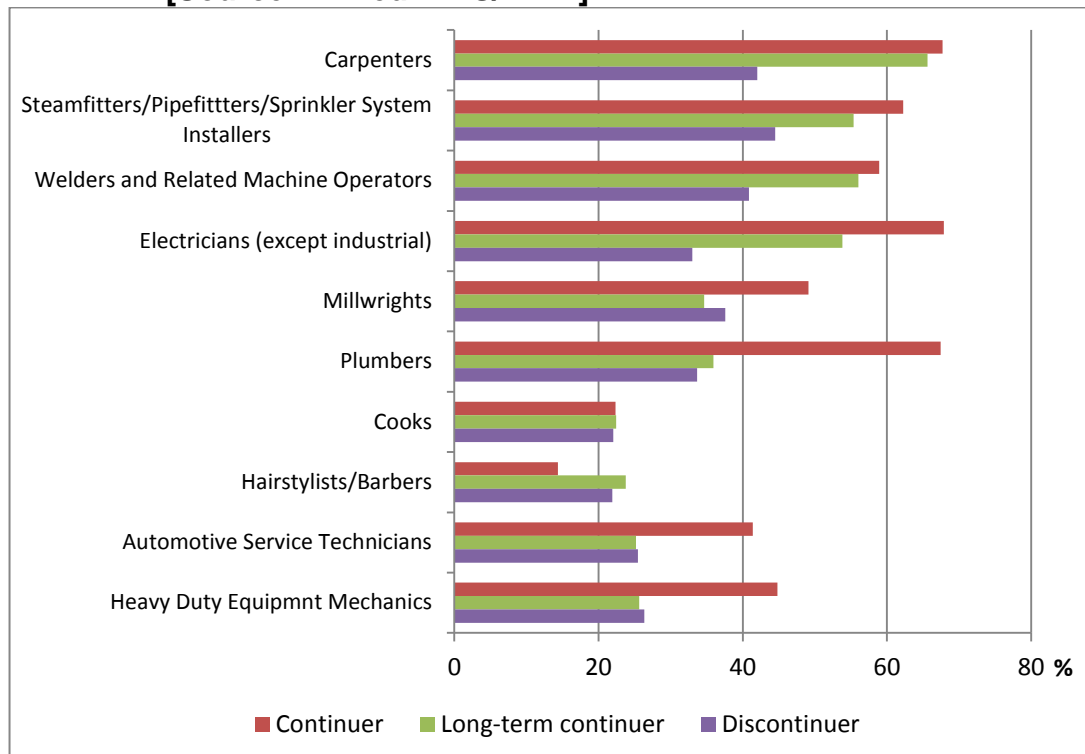
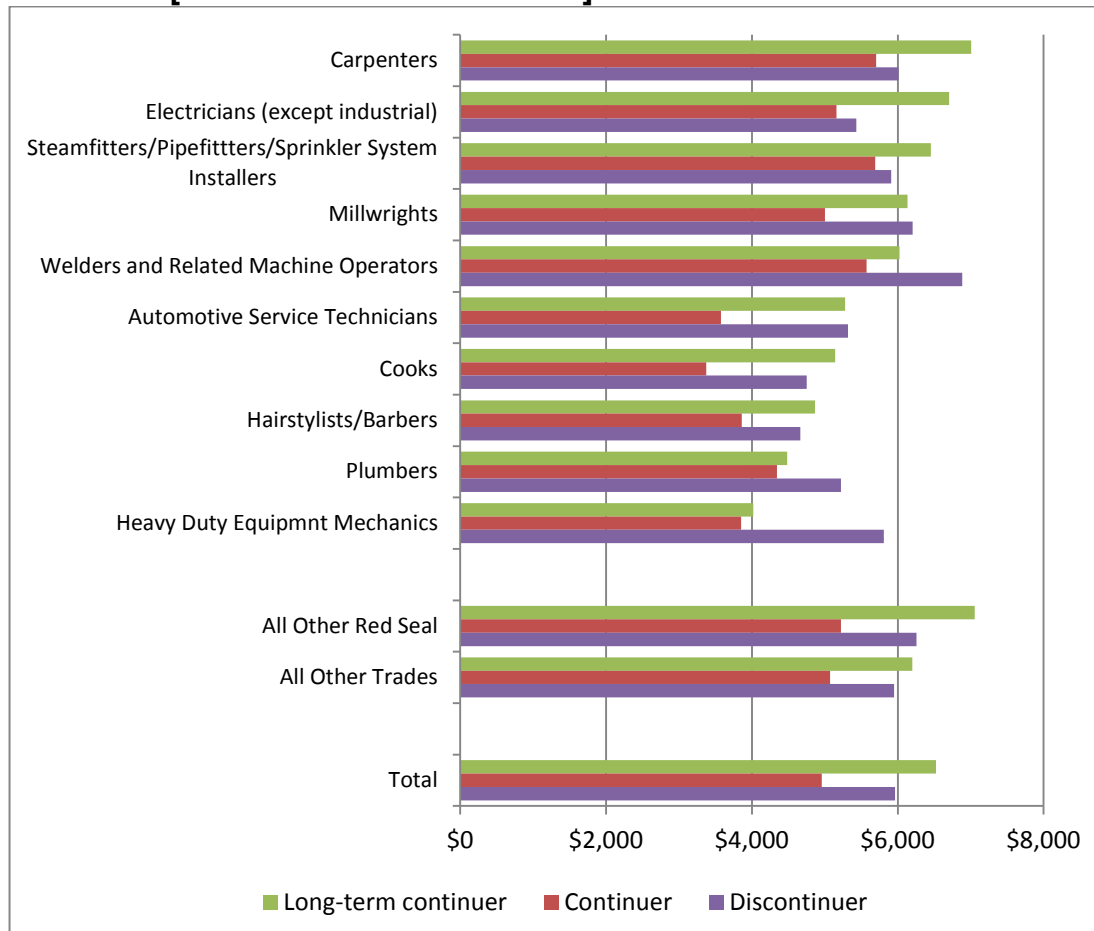


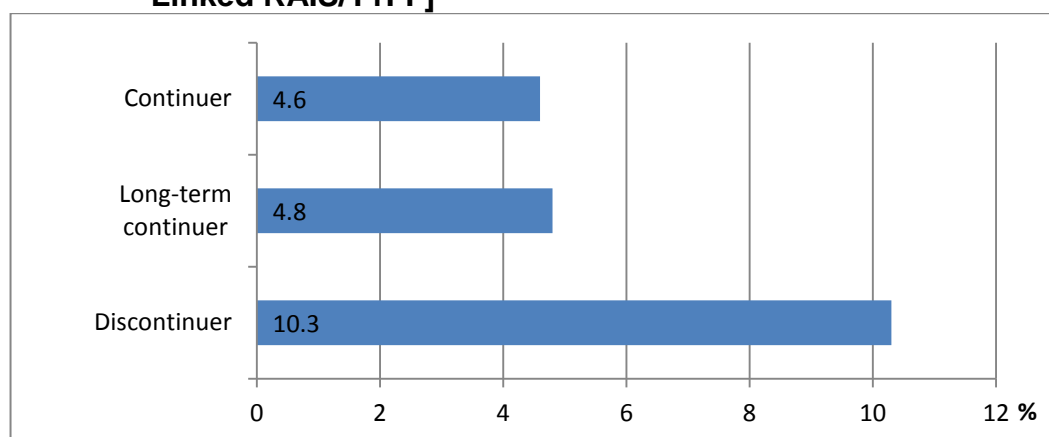
Chart 5.17 Median 2009 EI Income by Trade and 2008 Status
[Source: Linked RAIS/T1FF]



5.6.4 Interprovincial Mobility

The results for interprovincial mobility for all of the status groups were given in Chapter 3, Section 3.3.7. The focus there was mainly on mobility among completers and trade qualifiers and on the effect of the Red Seal endorsement. Based on the NAS results, relatively few continuers or long-term continuers were expected to be mobile. This is confirmed by the fact that the mobility rate of discontinuers is more than twice as large as the mobility rate of the two apprentice groups (shown in Chart 5.18).

Chart 5.18 Percent Resident in a Province Other than the Province of Registration in 2009 by 2008 Registration Status [Source: Linked RAIS/T1FF]



5.7 Summary and Conclusions

5.7.1 Summary

This report examined one specific aspect of apprenticeship completion: the completion of apprenticeship programs by those who have been registered well beyond their normal program duration. This report contained three major strands of empirical analysis:

- An examination of trends in long-term completion by trade and province with data from the RAIS;
- A re-examination of NAS data to probe important relationships by apprenticeship status; and
- Regression analysis of employment and self-employment earnings to estimate the impact of completion on individual earnings.

On the basis of analysis of RAIS data, it was estimated that about one quarter of apprentices have been registered for at least one and half times the expected duration of their program; these individuals were considered long-term continuers. In terms of trends involving long-term continuers, it was concluded that:

- Overall, there is an upward trend in the proportion of long-term continuers;
- Of the ten largest Red Seal trades, five had upward trends in the proportion of long-term continuers while five did not have a discernible upward trend; and
- While only two provinces had an increasing proportion of long-term continuers over the period under examination, their large size caused their trends to dominate national patterns.

A re-examination of data from the NAS, illustrated the value of having data on completers with and without certification and long-term continues who had and had not met the minimum requirements for certification. Specifically it is clear that certification, rather than completion, is the key to improved labour market outcomes.

The NAS/T1FF linked file was used to estimate the impacts on earnings when long-term continuers complete their apprenticeship programs. The longitudinal design of the NAS was ideal for this analysis since we were able to analyze the earnings of individuals who made transitions from long-term continuation to completion. The analysis of earnings was done with a comparison of means as well as with multiple regression models.

The comparison of means of 2008 employment earnings indicated that:

- Completers with certification had earnings that were well-above those in other apprenticeship categories, with their earnings about \$18,000 higher, on average, than long-term continuers without minimum requirements;
- The estimated earnings premium associated with certification varied across provinces from a low of \$5,000 in New Brunswick to a high of about \$23,000 in Alberta; and
- The estimated earnings premium associated with certification also varied dramatically by trade with automotive service technicians only enjoying an \$8,000 increase in pay compared to an extremely high premium for heavy duty equipment mechanics of about \$53,000.

Regression analysis was generally consistent with the conclusions based on the comparison of mean earnings. The regression analysis for 2008 employment earnings led to the conclusion that completion with certification results in an

earnings premium of approximately \$10,000. Although it was more challenging to model self-employment earnings, a similar regression model also led to the conclusion that completion with certification entails a premium estimated at about \$4,500.

5.7.2 Conclusions

Given the magnitude of the estimated earnings premium for completion with certification, along with the conclusion that long-term continuation is a fairly frequent (and growing) occurrence, the estimated gains from having more long-term continuers complete is substantial. Results from the regression model may be used to estimate the economy-wide effects of increasing completions. Specifically, the effects of having all long-term continuers complete was estimated.

Overall, according to the RAIS data, about 26.4% of registered apprentices, or more than 90,000 individuals were long-term continuers at the end of 2009. Applying the estimated employment earnings premium associated with completion and certification of \$9,977 to the number of long-term continuers results in an aggregate estimate of close to \$900 million in additional earnings if all of these were to complete. These results are suggestive rather than definitive because they do not account for externalities, such as downward wage pressure, that might result from any influx of newly certified labour of this magnitude.

Chapter 5 References

Ahmed, N. 2010. "National Apprenticeship Survey 2007: *Influences of Labour Market and Economic Conditions on Completion and Long-Term Continuation of Apprenticeship Programs in Canada*. Ottawa: CCDA/HRSDC.

Cadieux, B. 2010. *National Apprenticeship Survey 2007: Factors Influencing Completion of Apprenticeship*. Ottawa: CCDA/HRSDC.

Charlton, E., R. Hu and S. Stowe. 2010. *Perceptions of the Quality of Training*. Ottawa: CCDA/HRSDC.

Crocker, R. 2010. *National Apprenticeship Survey 2007 Summary Report*. Ottawa: CCDA/HRSDC.

Desjardins, L. 2011. Apprenticeable Occupations and the Employment Downturn in Canada. *Education Matters: Insights on Education, Learning and Training in Canada*. Vol. 7 no. 6. Statistics Canada Catalogue no. 81-004-X.

Desjardins, L. and N. Paquin. 2010. *Registered Apprentices: The Cohorts of 1994 and 1995, One Decade Later*. Ottawa: Statistics Canada Catalogue no. 81-595-M – No. 080.

Laporte C. and R. Mueller. 2011. *The Completion Behaviour of Registered Apprentices: Who Continues, Who Quits, and Who Completes Programs?* Ottawa: Statistics Canada Catalogue no. 11F0019M, No. 333.

Ménard, M., F. Menezes, C. Chan and M. Walker. 2007. *National Apprenticeship Survey: Canada Overview Report 2007*, Ottawa: Statistics Canada Catalogue no. 81-598X.

6.0 Trades and Apprenticeship in the Context of the Overall Labour Market

6.1 Introduction

6.1.1 Purpose

This chapter examines the overall impact of trades and apprenticeship in the Canadian labour market. Although the concern remains with apprenticeship completion and certification, this chapter addresses macro-level effects and thus requires a broader approach than the remaining chapters.

More specifically, the effects of apprenticeship and trades training are examined from both demand side and supply side perspectives. The demand side refers to overall labour market demand in trade occupations and the role of trade and apprenticeship training in filling this demand. From this perspective, apprentices are contributors to the trade labour market both during the apprenticeship period and afterwards. On the demand side, this chapter examines the employment share of apprentices in different occupations as well as by province, age groups, gender, immigrant status and aboriginal identity.

The supply side may be thought of in terms of trades and apprenticeship training as a form of post-secondary education.⁴⁵ On the supply side, this chapter examines trades and apprenticeship registration and completion and the trends in apprenticeship enrolment and trade completion and certification for various demographic groups.

These two perspectives are brought together through an examination of demand and supply projections, using Canadian Occupational Projection System (COPS) projections to 2020 for selected trades and relating these to apprenticeship registrations and completions.

6.1.2 Background

⁴⁵Statistics Canada does not consider apprentices to be post-secondary students, but counts apprentice enrolments and completions separately, using RAIS. However, it is appropriate to think of apprentices as students from a supply side perspective because apprentices come from essentially the same youth pool.

The issue of supply and demand for tradespersons in the overall labour market has been has received significant attention from Canadian policy makers, as evidenced by the many incentive programs that have been directed to increasing the number of apprentices. At the federal level, Human Resources and Skills Development Canada (HRSDC) has launched several such programs in recent years including the *Apprenticeship Incentive Grant*, the *Apprenticeship Completion Grant*, the *Apprenticeship Job Creation Tax Credit* and the *Tradesperson's Tools Deduction*.⁴⁶

Many Canadian jurisdictions have also launched apprenticeship and trades related policy initiatives in recent years. The following are illustrative examples:

- Ontario and Alberta have introduced programs to encourage high school students to pursue trade occupations by allowing students to work towards an apprenticeship through a cooperative education placement while still in high school.
- British Columbia launched an Aboriginal Apprenticeship Strategy in 2007 to increase Aboriginal participation in the trades, recognizing the current and projected shortage of qualified trades workers in the province and the rapid growth rate of the province's Aboriginal youth population,.
- Manitoba unveiled a suite of new policies pertaining to publicly funded capital projects in June 2011. The objectives of these policies are to increase workplace safety on capital projects and to increase employment in the skilled trades for Manitobans.
- Nova Scotia is working in partnership with other agencies to deliver the Techsploration Program. Its goal is to increase the number of women working in skilled trades, technology and science related occupations by assisting grade nine female students and alumnae in grades ten through twelve to explore a wide range of career options.

With the notable exception of the Apprenticeship Completion Grant, most policy initiatives have been directed towards increasing apprenticeship registrations rather than completions. Whether or not as a consequence of these policies, or for other reasons, it is clear that apprenticeship registrations have grown very rapidly over the past decade, as have completions, allowing for the time lag between registration and completion.

⁴⁶Details on all of these programs are available at the Red Seal website: <http://www.red-seal.ca/c.4nt.2nt@-eng.jsp?cid=24>.

In spite of the growing interest in trades and apprenticeship, little research has been done on the contribution of apprenticeship training and trade certification to the Canadian labour market. This chapter provides some basic data on the scope of trades and apprenticeship within the overall labour market. While not a full analysis of the balance between supply and demand, some information is also given on demand projections in the trades and on the implications of the recent growth in apprentice registrations and completions on supply.

6.1.3 Research Questions

This part of the study was guided by the following research questions:

1. How do apprenticeship training and trade certification contribute to the Canadian labour market in general?
 - a. What share of the Canadian labour market is occupied by trade occupations?
 - b. How do labour market participation rates, employment and unemployment rates in the trades compare to those in other occupations and for persons with other levels of education?
2. What is the place of trades and apprenticeship play in the demand side of the Canadian labour market?
 - a. What is the share of employment of those with trades and apprenticeship certificates in various occupations?
 - b. How do employment shares of those with trades and apprenticeship certificates change over time? How do the shares of employment change during economic downturns?
 - c. How do the shares of employment of Canadians with trades and apprenticeship certification vary by province, age group, gender, immigration status, and Aboriginal identity?
3. What is the place of trades and apprenticeship in supplying skilled trades people in Canada?
 - a. How do the numbers of registration in trades and apprenticeship vary in the skilled trades, provinces, and in various demographic groups?
 - b. How does the supply of apprenticeship registrants and completers compare to labour market demand in the trades?

6.1.4 Data Sources and Methodology

Most of the data sources used in this component were as described in the

introduction in this report. In this case, greater emphasis was placed on results from the Labour Force Survey (LFS) because this survey provides the most comprehensive view of labour market component and their changes over time. Additional sources used here include statistics on post-secondary education and supply and supply and demand projections given by the Canadian Occupational Projection System.

The main method used was cross tabulations of various aspects of apprenticeship and trades training compared to other occupations, and in respect to a number of important labour market outcomes including labour market participation, employment, unemployment and income. Where possible, time series data are presented. Specifically, it was possible to give 22-year time series (1990-2011) results for most of the questions of interest, using LFS data. Finally some results on labour market supply and demand are presented, based on tables from the Canadian Occupational Projection System.

6.2 Overview of the Trades Labour Force, Apprenticeship Training and Trades Certification

6.2.1 Definition of Trade Occupations

There is no “standard” definition of what constitutes a “trade” occupation. Different definitions can provide different estimates of the size of the trades labour force and of the proportion of the total labour force occupied by the trades. The following are several different ways in which trades occupations have been defined:

- 1. All occupations included in Statistics Canada NOC-S⁴⁷ major category H: Trades, Transport and Equipment Operators and Related Occupations) (93 occupations at the NOC 4-digit level)**

This classification is frequently used in reporting trades occupations because this is a Statistics Canada grouping and because the numbers are readily available. However, this is not particularly useful for studies of apprenticeship because it includes many occupations that are not apprenticeship trades (e.g. trades helpers) and excludes several major apprenticeship trades (e.g. cooks, hairstylists).

⁴⁷ NOC-S refers to Statistics Canada’s National Occupational Classification-Statistics, used in the Census and LFS, which has ten main letter designations with 3-digit codes under each. NOC-4 refers to 4-digit National Occupational Classification codes for individual occupations, used in RAIS.

2. Major Apprenticeship Trades (56 occupations at the NOC 4-digit level)

Nominally, the apprenticeship trades would include all occupations found within the RAIS system (Approximately 200 at the NOC 4-digit level). However, this has the disadvantage that many such occupations are apprenticeship trades in only one or two provinces. Also some large occupations in this group have only a small number of apprentices because apprenticeship is not a common pathway to the occupation. Indeed, more than half the occupations in RAIS have very few apprentices (e.g. 10 or fewer), making it questionable whether these should be counted, especially in relation to the total size of the labour force in such occupations. This has led to the selection of a list of 56 trades which may be considered “major trades.” This selection is used for most purposes in this study.

3. A list of 100 occupations compiled internally within HRSDC and used to compute the proportion of the total employed population that are in trade occupations according to the 2006 Census. This overlaps substantially but not fully with NOC-S Group H.

4. A subset of 33 of the above, labeled “traditional trades.” This is also a subset of the 56 major apprenticeship trades defined above. However, the total labour force is similar because the 56 trade list includes many relatively small trades.

Chart 6.1 gives the trends in percentages of the total labour force that are trades according to these definitions, derived from the Labour Force Survey. This shows the HRSDC 100 trade group to have been almost constant at about 17% over the period. NOC-S Group H declined slightly during the 1990s but has been almost constant at about 15% since then. The effect of the recent recession can be seen in a small drop between 2009 and 2010, with a slight recovery in 2011. The major apprenticeship trades follow much the same pattern, but with a smaller proportion of just over 10% over the past decade. The difference between the major apprenticeship trades and the HRSDC traditional trades is quite small, which supports the point that the bottom 20 or so trades in the major group have a relatively small labour market share.

Chart 6.1 Percent of Total Labour Force, 1990-2011, under Four Definitions of Trades Occupations [Source LFS]

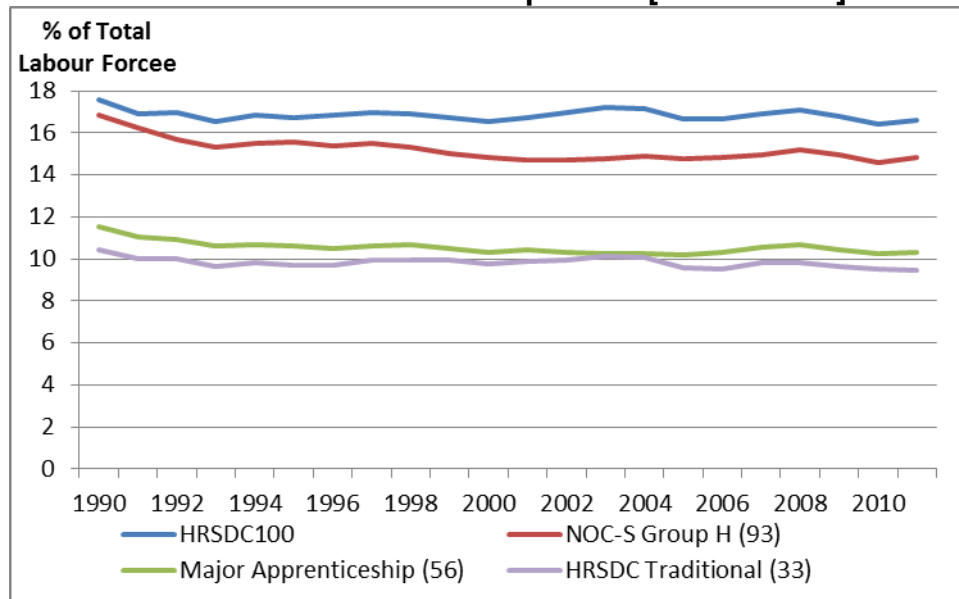
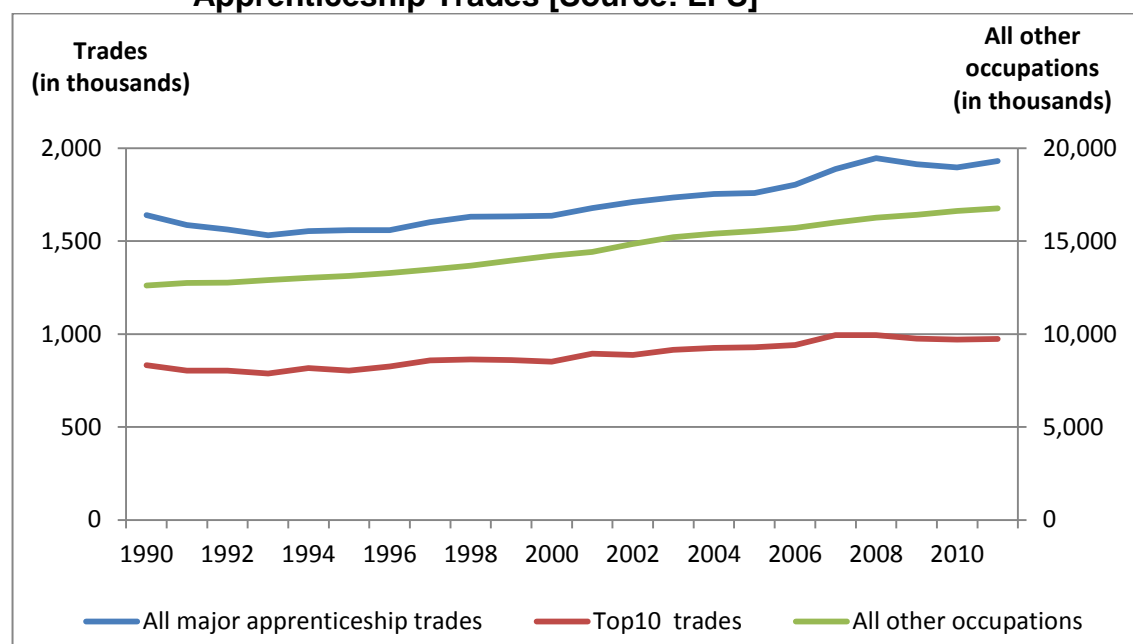


Chart 6.2 places this in the context of total labour force numbers. Looked at this way overall growth in the major apprenticeship trades has not been very different from that in other occupations, but with slightly greater fluctuations over the years. In particular, the trades showed stronger growth than other occupations in the mid-2000s, followed by a drop during the 2009 recession and some recovery since. Numbers in the Top 10 trades have leveled off in recent years.

Chart 6.2 Total Labour Force and Trade Labour Force, 1990-2011, Major Apprenticeship Trades [Source: LFS]



6.2.2 Labour Force Activity by Educational Background

Chart 6.3⁴⁸ indicates that, in 2006, the labour market participation rate and employment rate of Canadians with trades or apprenticeship certificates were higher than for those with high school education or less but lower than for those with college or university credentials. The opposite pattern holds for the unemployment rate, where those with trades and apprenticeship certificates had lower unemployment than those with high school education or less but higher unemployment than those with college or university credentials.

Chart 6.4 shows that between 1990 and 2010, the trend in overall unemployment rate was generally downward. Unemployment rates for those with trades and apprenticeship certificates were much lower than for those with less than high school education, about the same as those with high school education and higher than for those with college or university credentials. The effects of the recent

⁴⁸ Having a trades or apprenticeship certificate does not imply that these individuals are actually working in the trades. As other results in this report have shown, many of those working in these occupations do not have these credentials and many with trades and apprenticeship credentials were actually working in other occupations. Moreover, neither the Census nor the LFS can identify those with trades and apprenticeship credentials in addition to other credentials.

recession are visible for all groups in 2009, affecting those with trades and apprenticeship certificates more than those with college or university credentials, about the same as those with high school credentials and less than those with less than high school.

Chart 6.3 Labour Force Activity by Educational Background, 2006
[Source: 2006 Census]

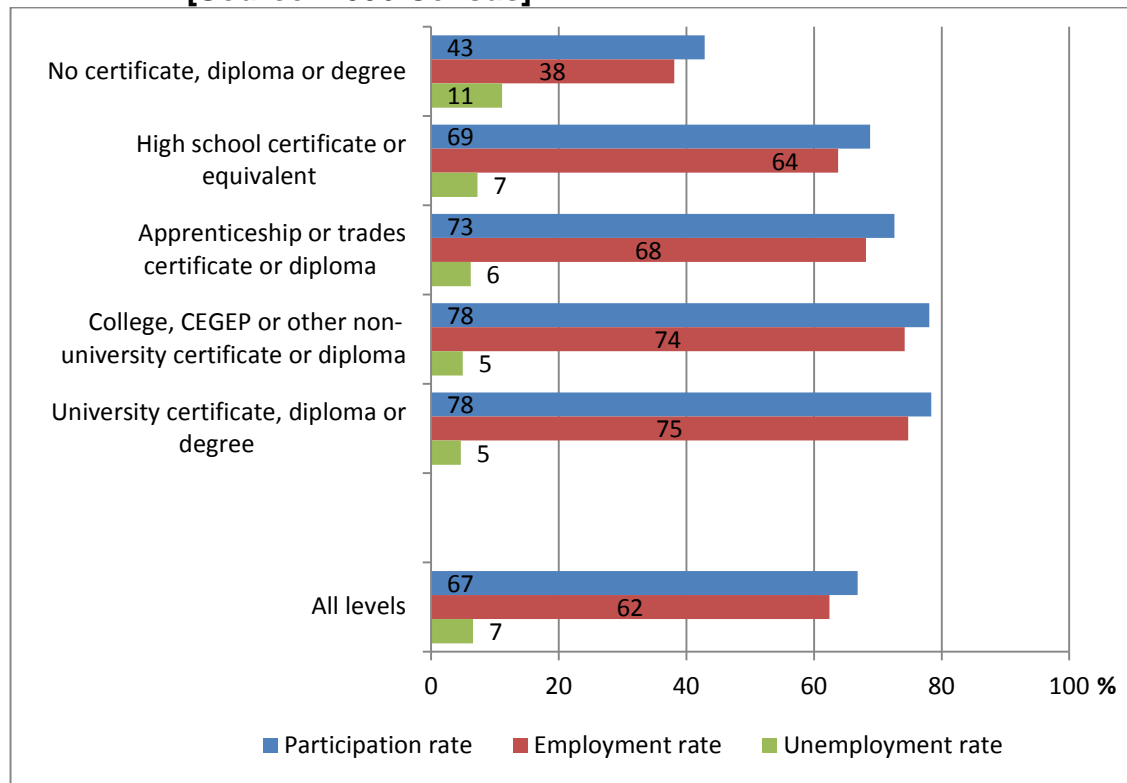
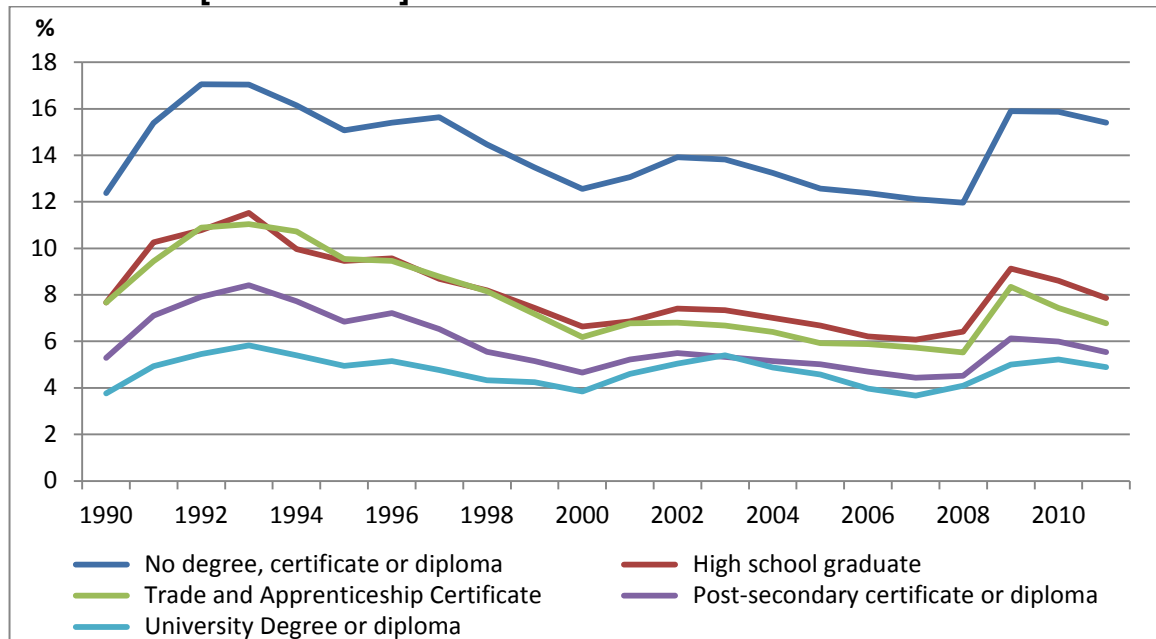
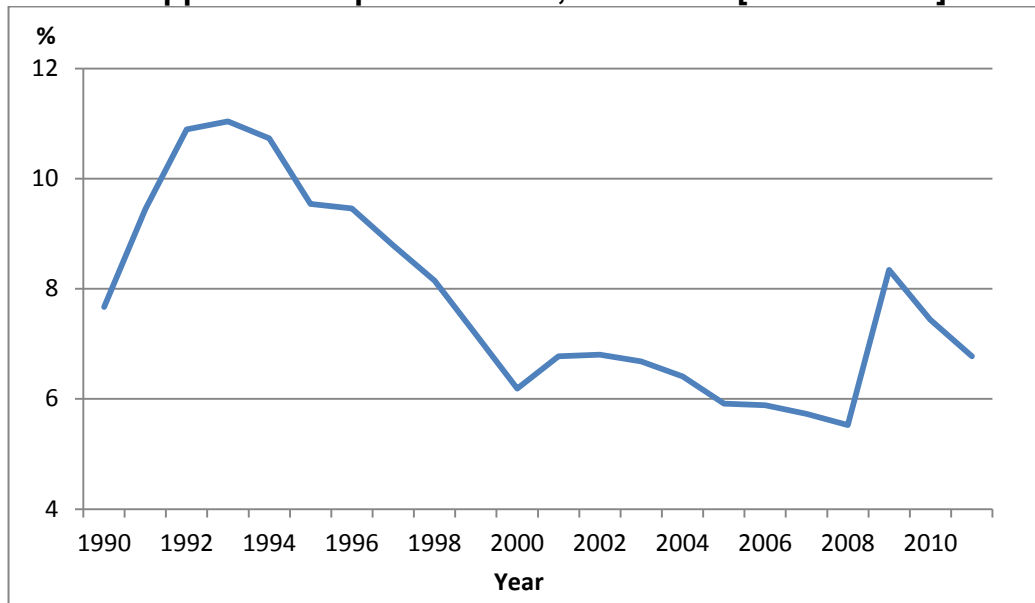


Chart 6.4 Trends in Unemployment Rate by Education Level, 1990-2011
[Source: LFS]



The trend for trades and apprenticeship certificate holders is reproduced on a larger scale in Chart 6.5 to show more clearly the fluctuations for this group over time. The effects of two recessionary periods, in the early 1990s and in 2009, stand out in this chart. Aside from these spikes, this also shows more clearly that the trend in unemployment for those at this level of education has generally been downward. This result is consistent with that reported by Desjardins (2011).

Chart 6.5 **Percent Unemployed for Those Holding Trades or Apprenticeship Certificates, 1990-2011 [Source: LFS]**



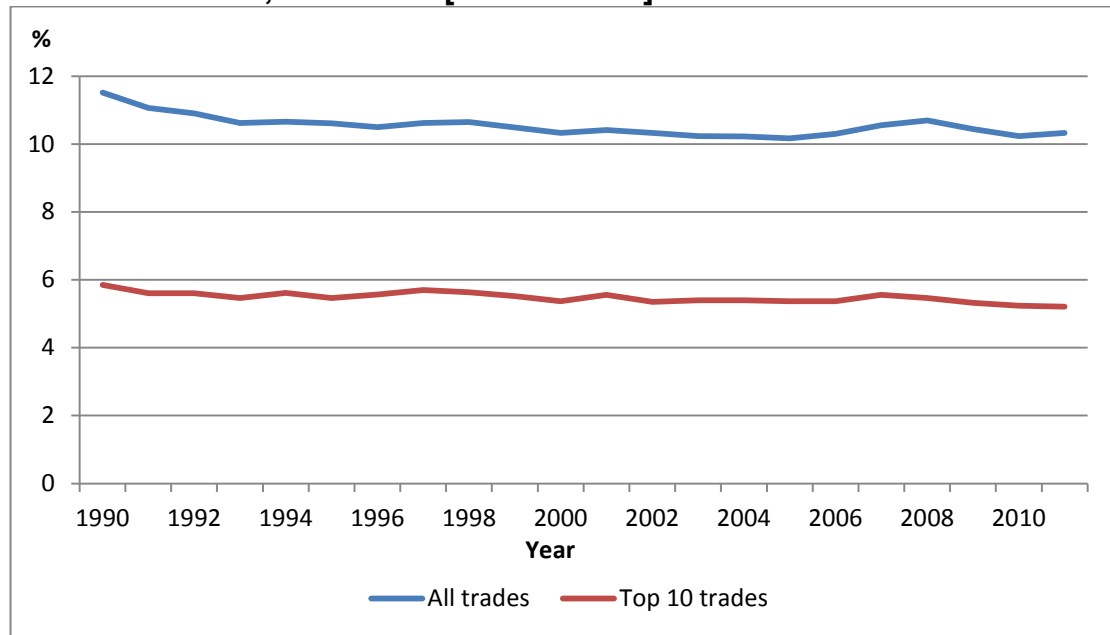
6.3 The Demand Side

6.3.1 Trade Certification in the Overall Labour Force

Chart 6.6 gives the percentage of the total labour force holding trade or apprenticeship certificates for all trades and the Top 10 trades.⁴⁹ This shows a relatively stable pattern, over the past decade, following a slight decline in the 1990s. The Top 10 trades have shown a slight decline over the whole period.

⁴⁹ The LFS does not separate those with registered apprenticeship certificates from those with other types of trade certificate. However, the 2006 Census indicates that about half of all of those with trade type certificates have obtained these through registered apprenticeship programs.

Chart 6.6 Trade Certificates as a Percentage of the Total Trade Labour Force, 1990-2011 [Source: LFS]



6.3.2 The Match of Certification to Occupation

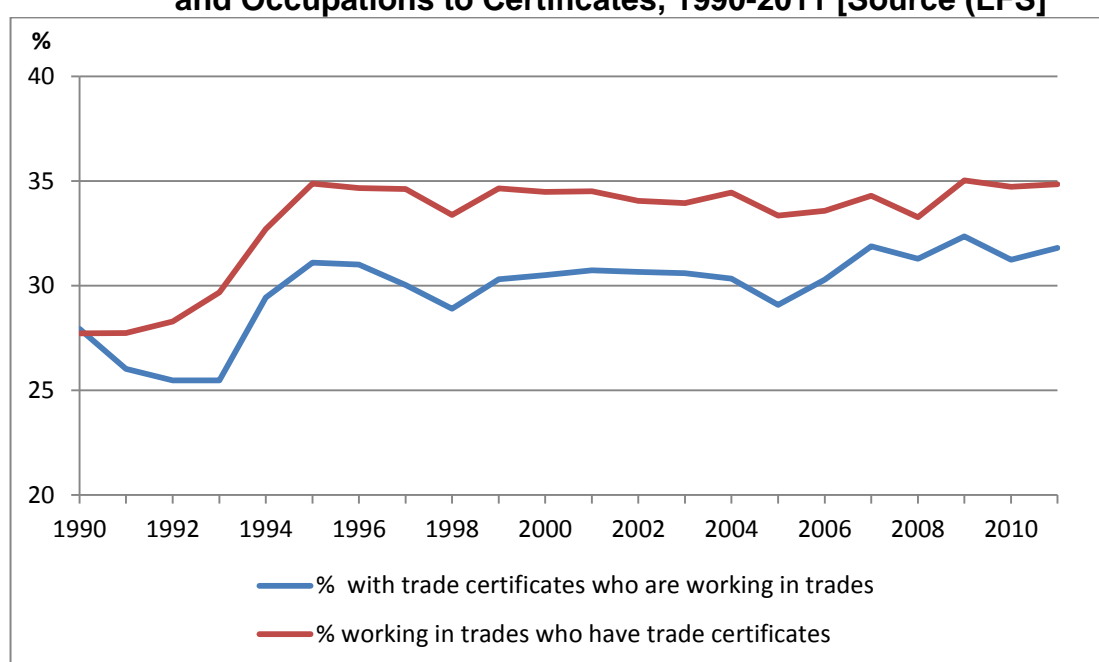
The above results show that those with apprenticeship or trade certificates make up just over 10% of the total labour market. However, these results do not tell us what proportion of this group is actually working in trade occupations or what proportions of those who are working in these occupations hold other types of educational credentials or other levels of education. It is thus useful to look more generally at the match between credentials and occupations.

Chart 6.7 gives the time trend in the match in both directions. The blue line on this chart shows that, on average, about 30% of those who hold trade certificates are actually working in trades occupations. This suggests that there is a large pool of certified trade persons working in areas other than their trade. The match has improved slightly in recent years, which may be related to the improved employment prospects in the trades noted earlier.

Interestingly, the percentage of those working in the trades who actually hold trade certificates is only slightly higher than the opposite match, even though these figures are not directly related. In effect, we observe a substantial mismatch in both directions. Indeed, these figures indicate that the supply of certified trade workers would almost exactly match the size of the trade labour force if everyone certified in a trade were actually working in a trade.

It is important to note that these figures are slight under-estimates, because the LFS does not allow us to identify those holding trade certificates who also hold what Statistics Canada defines as “higher” levels of education. This is because the LFS records only the highest level, which subsumes all lower levels. In reality, more of those working in trade occupations have credentials “lower” than trade or apprenticeship certificates (Chart 4.2, page 107). Assuming that the goal is to improve the number with credentials that match their occupation, this latter group is the one of most interest from a training perspective.

Chart 6.7 Match of Trade and Apprenticeship Certificates to Occupations and Occupations to Certificates, 1990-2011 [Source (LFS)]

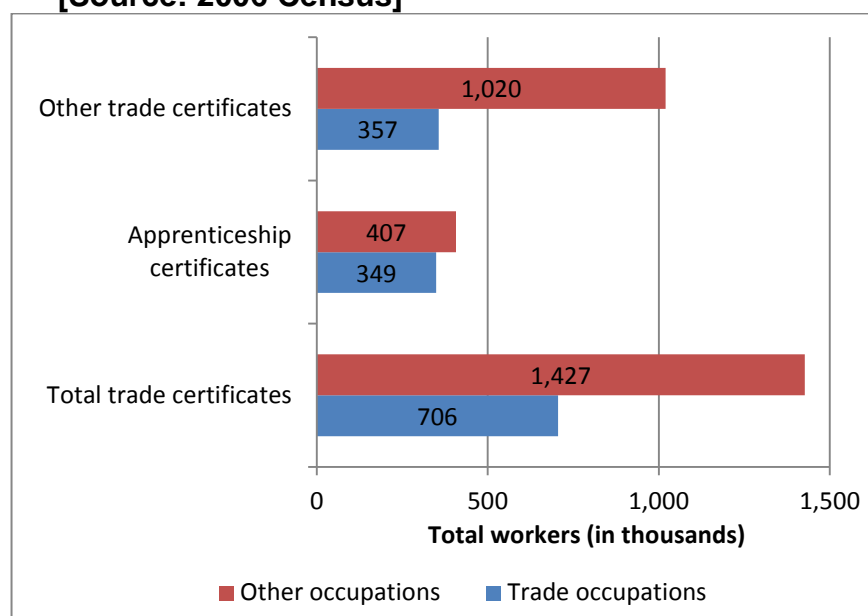


The education level classification given in the 2006 Census allows a more explicit breakdown of those holding registered apprenticeship certificates and those with other types of trade certificates (the latter presumably included trade qualifiers but also those with school-based or other forms of certification that do not lead to journeyman status). Chart 6.8 shows this breakdown, using actual labour force numbers rather than percentages, to give a picture of the actual size of these groups.

Of those holding registered apprenticeship certificates, slightly fewer are working in occupations classified as trades than in non-trade occupations. However, the difference is much larger for those with other types of trade certificates. The latter difference is likely attributable in part to the fact that many occupations that might

be classed as trades for training and certification purposes are not, in fact, apprenticeship trades. Examples are found in NOC-S major categories I and J, representing workers in primary industries and manufacturing respectively.

Chart 6.8 Total Workers Holding Apprenticeship and Other Trade Certificates Working in Trade and Non-Trade Occupations
[Source: 2006 Census]



6.3.3 Trade and Apprenticeship Certification in the Top 10 Trades

Chart 6.9 shows the education levels of those in the Top 10 trades, according to the 2006 Census. Hairstylists/barbers have the largest proportion of apprenticeship or trade certificates and the lowest percentage with high school or lower levels of education. Cooks are at the opposite extreme, with the lowest percentage having apprenticeship or trade certificates and the highest having high school or less. The percentages at each level are similar for most of the mechanical and construction trades, with the exception of carpenters, where education levels are generally lower.

Chart 6.9 Education Levels of Top 10 Red Seal Trades, 2006
[Source: 2006 Census]

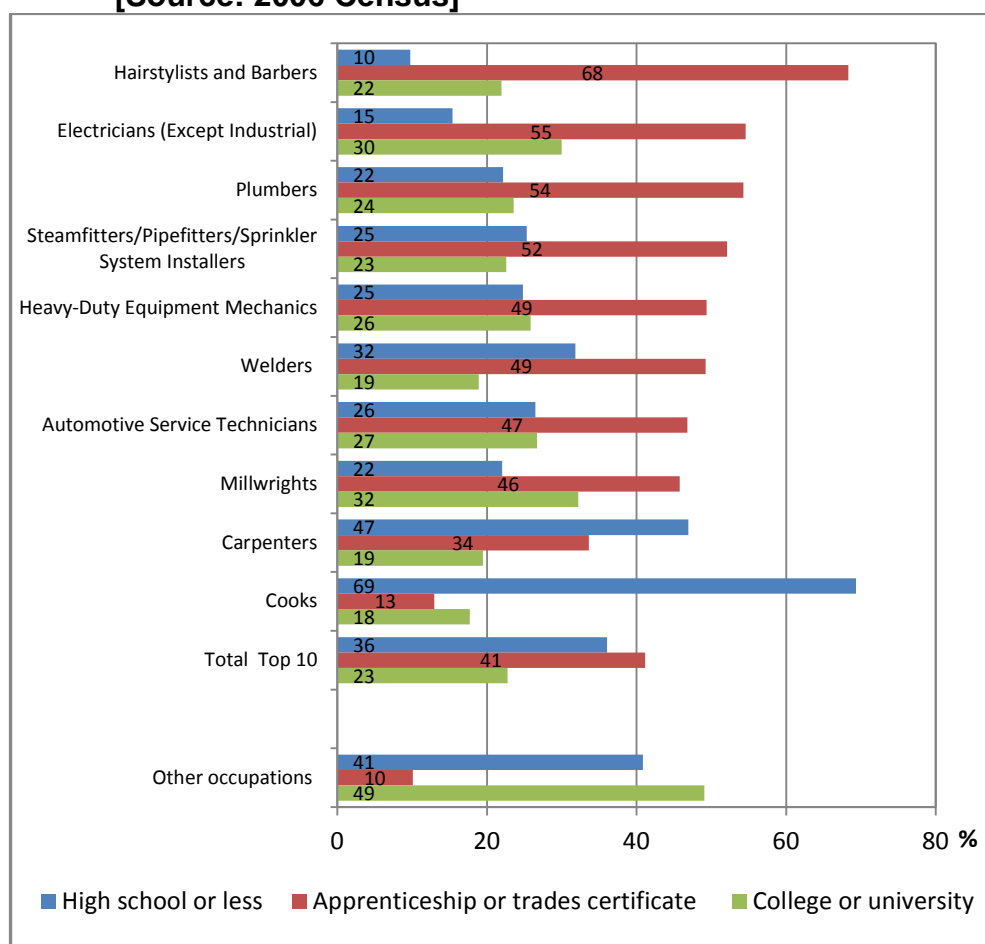
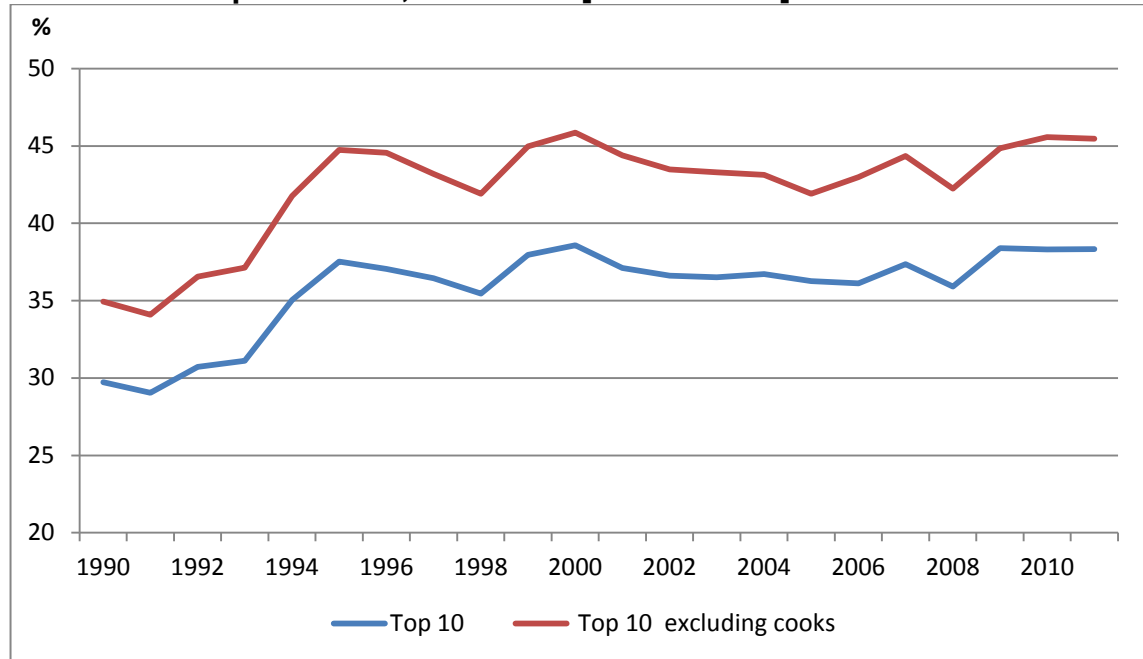


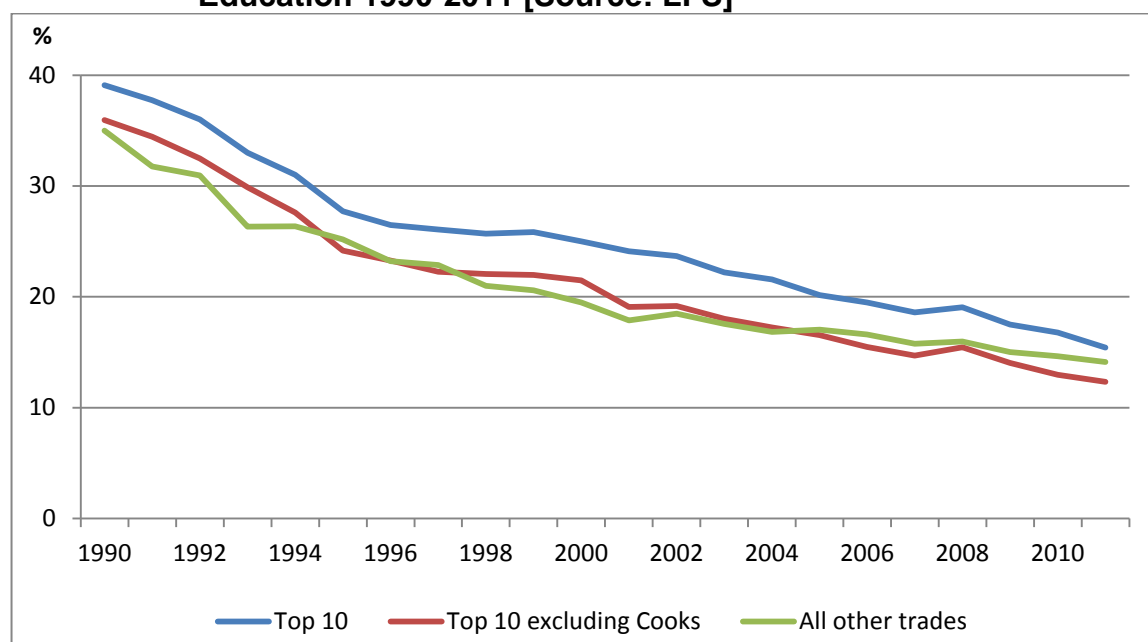
Chart 4.1 (page 105) indicates that the proportion holding apprenticeship or trade certificates has been fairly constant since the mid-1990s. Chart 6.10 shows the same trend for the Top 10 trades as a whole and for the Top 10 excluding cooks, because that trade is obviously an anomaly among the Top 10. The overall pattern is similar in both cases with a substantial increase in certification in the early 1990s but little change since then. This indicates that the proportion of certified personnel leaving the trades is closely matched by the proportion entering. Even in the most recent years, where the number of completers has been increasing, this has been insufficient to yield any gain in the proportion of trade personnel who are certified.

Chart 6.10 Percent Holding Apprenticeship or Trade Certificates in the Top 10 trades, 1990-2011 [Source: LFS]



The major change over the time period under examination is actually in the percentages holding less than a high school certificate (Chart 4.1, page 105). This is broken down in Chart 6.11 for the Top 10 trades and all occupations. A plot for the Top 10 excluding cooks is also included because that occupation has the highest proportion of workers with less than high school education among the Top 10. In all cases, there has been a steady decline in the percentages with less than high school education. That percentage has actually been higher for the Top 10 trades than for other trades. However, when cooks are excluded, the percentages for the remaining nine largest trades are comparable to those for all trades.

Chart 6.11 Percent of Trades Labour Force with Less than High School Education 1990-2011 [Source: LFS]



The figures in Chart 6.11 are actually reflective of general educational trends, in which high school completion rates have been increasing rapidly to the point where very few students now fail to graduate from high school. As older trades workers leave the labour force, the proportion with less than high school education can be expected to continue to decline. At the same time, this does little to change the picture for apprenticeship and trade certificates. In effect, the result is that more high school graduates are entering the trades but not more with the certificates most directly associated with the trades.

6.3.4 Trades and Apprenticeship Certification by Province

Chart 6.12 shows trends in the percentage of the employed population holding apprenticeship or trades certificates by province in 2010. This shows fairly wide variations from a high of 25% in Newfoundland and Labrador to a low of 6.2% in Ontario. There appears to be no obvious regional pattern.

Chart 6.13 gives the time trend in these percentages, for selected provinces which have shown the greatest change over the 22 year period. Newfoundland and Labrador shows considerable fluctuation in recent years, with a decrease in the first part of the last decade and an increase in more recent years, though not to the levels of the 1990s. Saskatchewan showed an increasing trend in the 1990s, which has since leveled off. The trend for Quebec has been generally increasing

and that for British Columbia and Nova Scotia decreasing. Those provinces not shown have had fairly stable trends, similar to that for Canada as a whole.

Chart 6.12 Percentage of the Labour Force Holding Apprenticeship or Trade Certificate by Province, 2011 [Source: LFS]

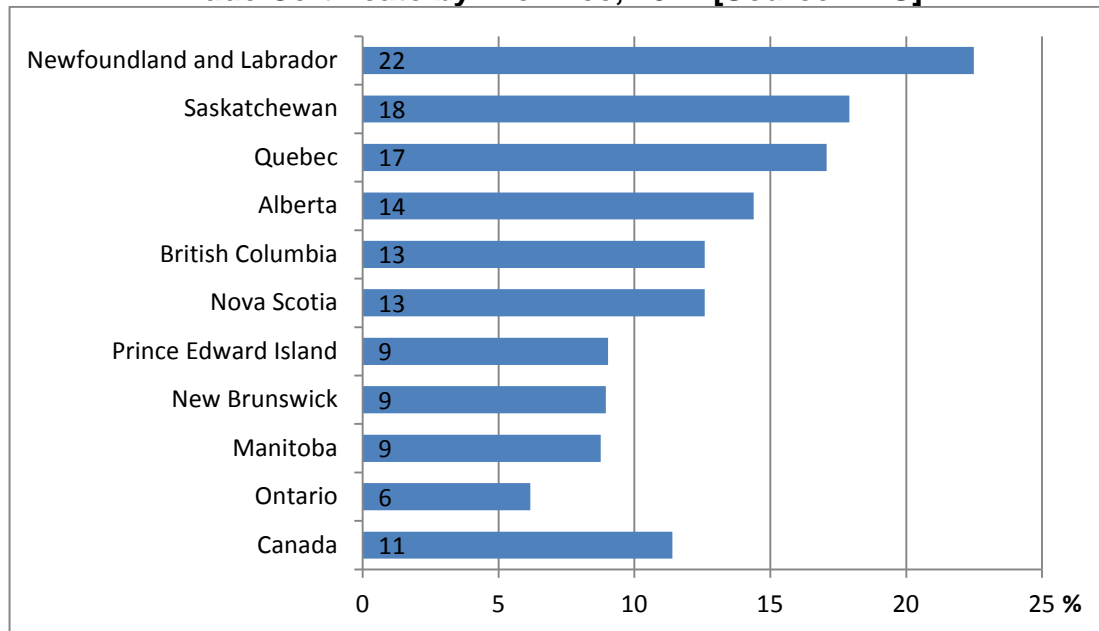
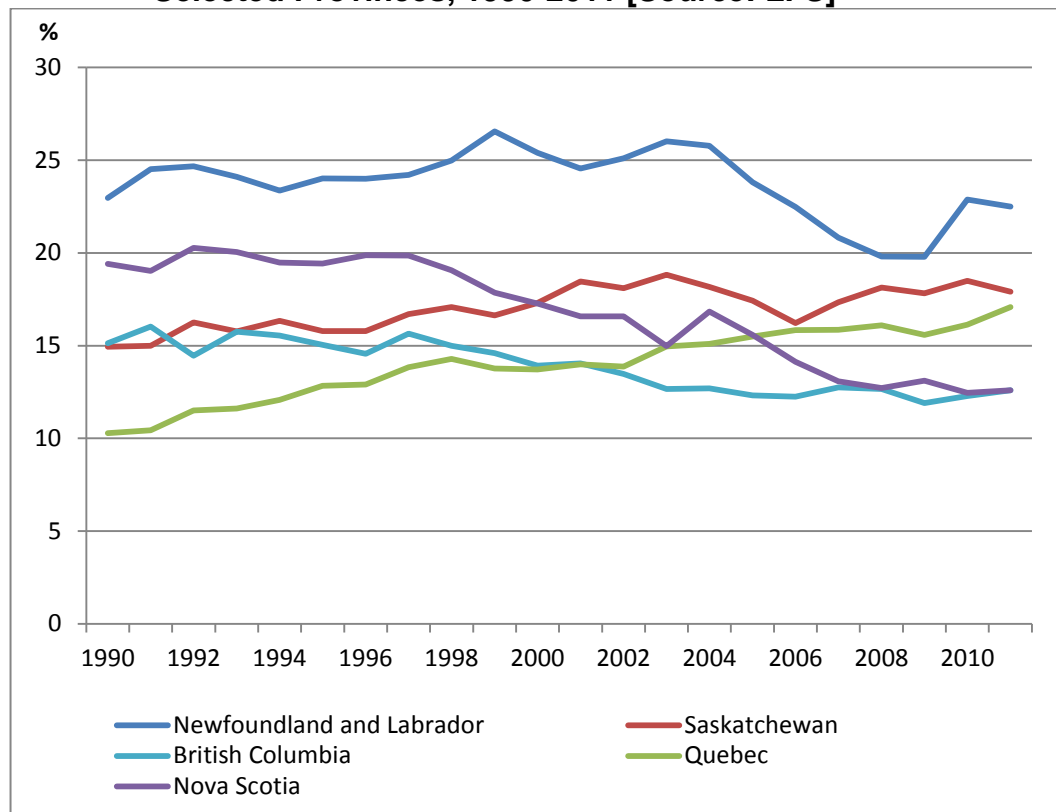


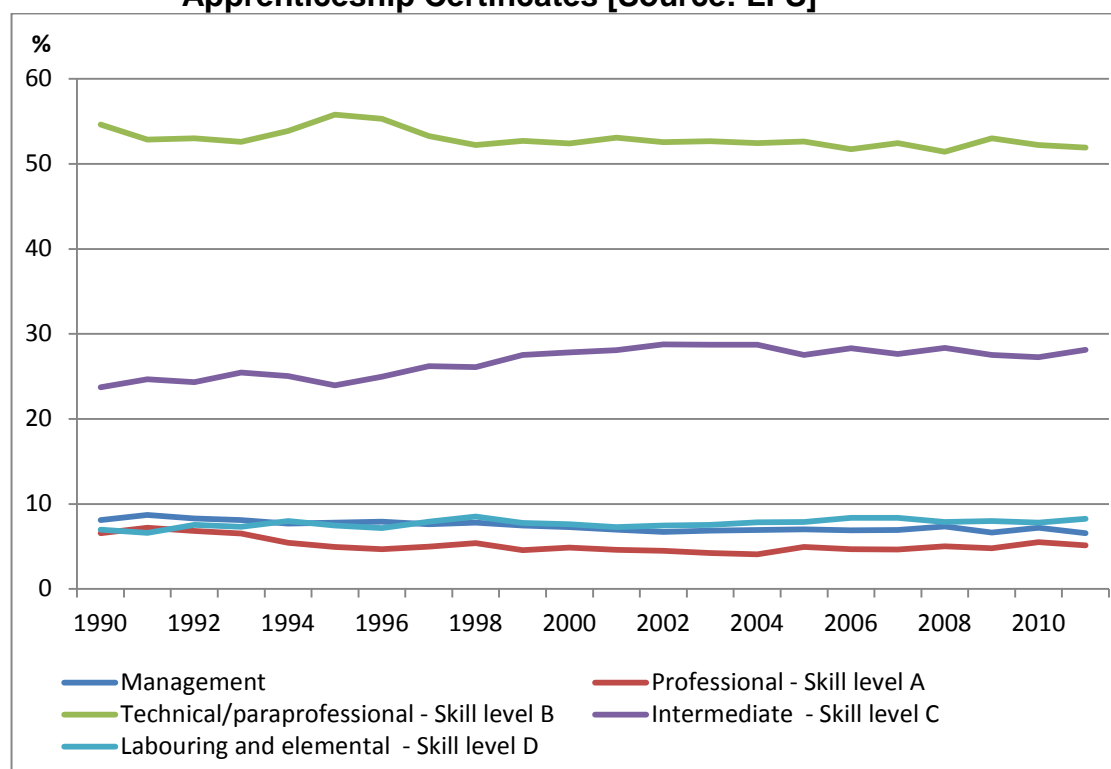
Chart 6.13 Trends in Percentage with Apprenticeship or Trade Certificates. Selected Provinces, 1990-2011 [Source: LFS]



6.3.5 Trades and Apprenticeship Certification by Skill Level

Human Resources and Skill Development Canada (HRSDC) has developed a matrix which provides an overview of the entire occupational classification structure based on skill levels and skill types (<http://www5.hrsdc.gc.ca/noc/english/noc/2011/pdf/Matrix.pdf>). Chart 6.14 shows that more than 50% of trades and apprenticeship certificate holders are in jobs classified as skill level B (technical/paraprofessional). Most of the remaining trades and apprenticeship certificate holders are at the next lower level, skill level C (intermediate). Relatively few are in management or professional occupations (A) or at the lowest skill level (D). The pattern has been relatively stable in recent years following a slight decline in skill level B and a corresponding increase in skill level C in the 1990s.

Chart 6.14 Skill Level Classification of Those with Trade and Apprenticeship Certificates [Source: LFS]

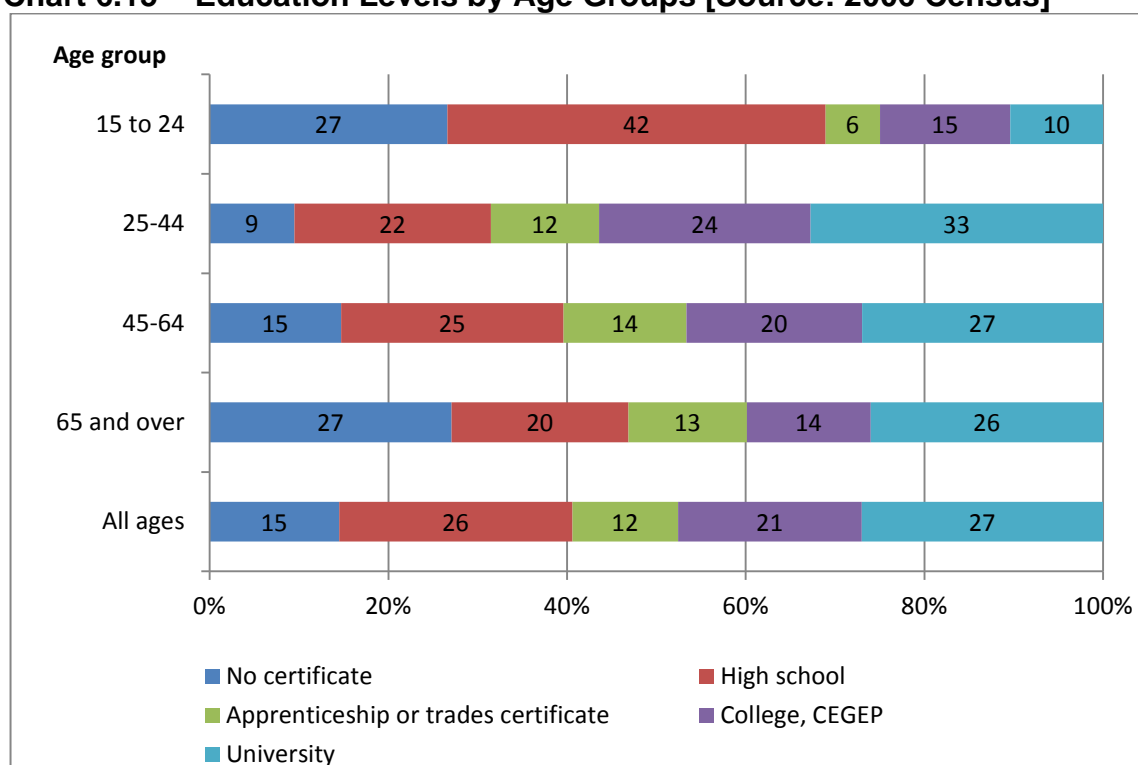


6.3.6 Trades and Apprenticeship Certification by Demographics⁵⁰

Chart 6.15 shows that the percentage of employed population with trades and apprenticeship certificates is fairly evenly distributed across the age groups, with the exception of the 15-24 group, which is below the level at which apprenticeship completion usually occurs. Other education levels show somewhat wider variations. The proportion of those aged 65 and over is interesting because it is as high as that for most other age groups. This reinforces the point made earlier that replacement proportions for those certified are comparable to those who have left the trades, in this case likely mainly through retirement. The results for the 25-22 age group also support the earlier results indicating that the proportion holding trade or apprenticeship certificates is not changing by very much while the proportion with less than high school education is decreasing and those with college or university education increasing.

⁵⁰ Again, it is important to note that most of the results in this section are based on education credentials and not on occupations. The figures should not be interpreted as representative of those actually working in trades occupations.

Chart 6.15 Education Levels by Age Groups [Source: 2006 Census]



Earlier results (e.g. Table 4.1, page 118) show that women make up a very small proportion of apprentices in trade occupations, with the notable exceptions of hairstylists and cooks. The proportion is increasing slowly, from a very low base in the Top 10 trades and is increasing at a somewhat higher rate for other trades. This section extends these results by looking at the proportion of women in the labour force with trade or apprenticeship and other types of credentials.

Chart 6.16 shows that the percentage of employed Canadians with trades and apprenticeship certificates is considerably lower for females than for males. On the other hand, more females than males have college or university credentials and fewer have no certificate. The percentage of high school graduates is about the same for both genders.

Chart 6.17 shows the distribution of women in a few selected trade occupations over time. The pattern here is similar to that shown earlier for apprentices, with a higher proportion of cooks being found in the work force than in apprenticeship registrations. In addition to hairstylists/barbers and cooks, bakers, painters and decorators and storekeepers and parts clerks have 10% or more women. The proportions of women in other trades remain (2% or less) very small and are thus

not shown. Over time, the proportion of female hairstylists/barbers has been increasing slightly, while that for cooks has been decreasing slightly. For the remaining trades, the proportion of female bakers and painters/decorators has been increasing while that for storekeepers and parts clerks decreased slightly in the earlier years and remained steady in more recent years. It is noted that the latter is a relatively large occupation, similar to cooks, in having only a small proportion of apprentices.

Chart 6.16 Education Levels by Gender [Source: 2006 Census]

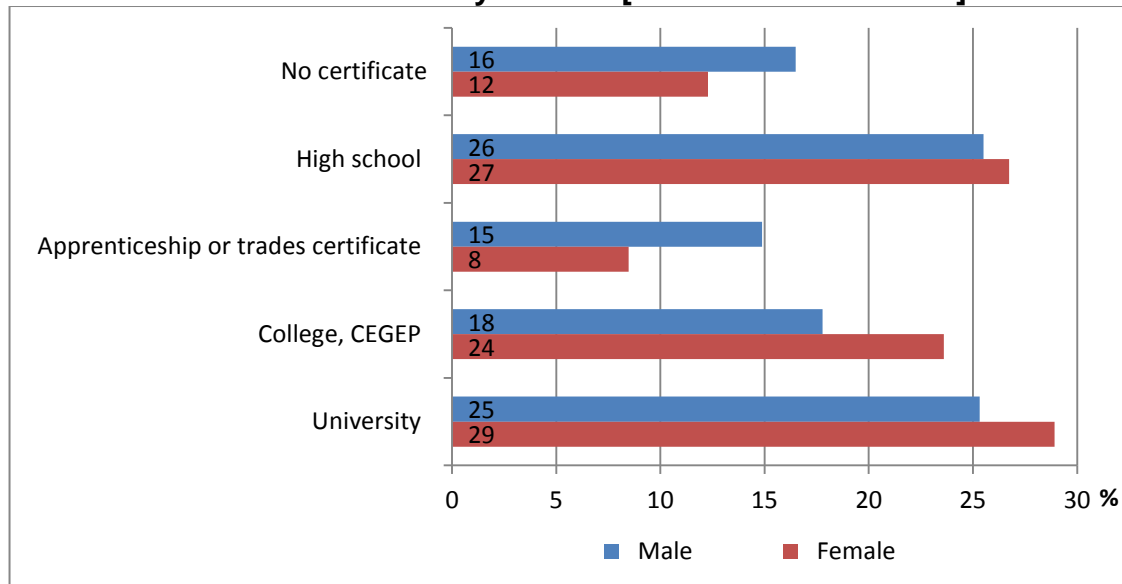


Chart 6.17 Percentage of Women in Selected Trade Occupations, 1990-2011 [Source: LFS]

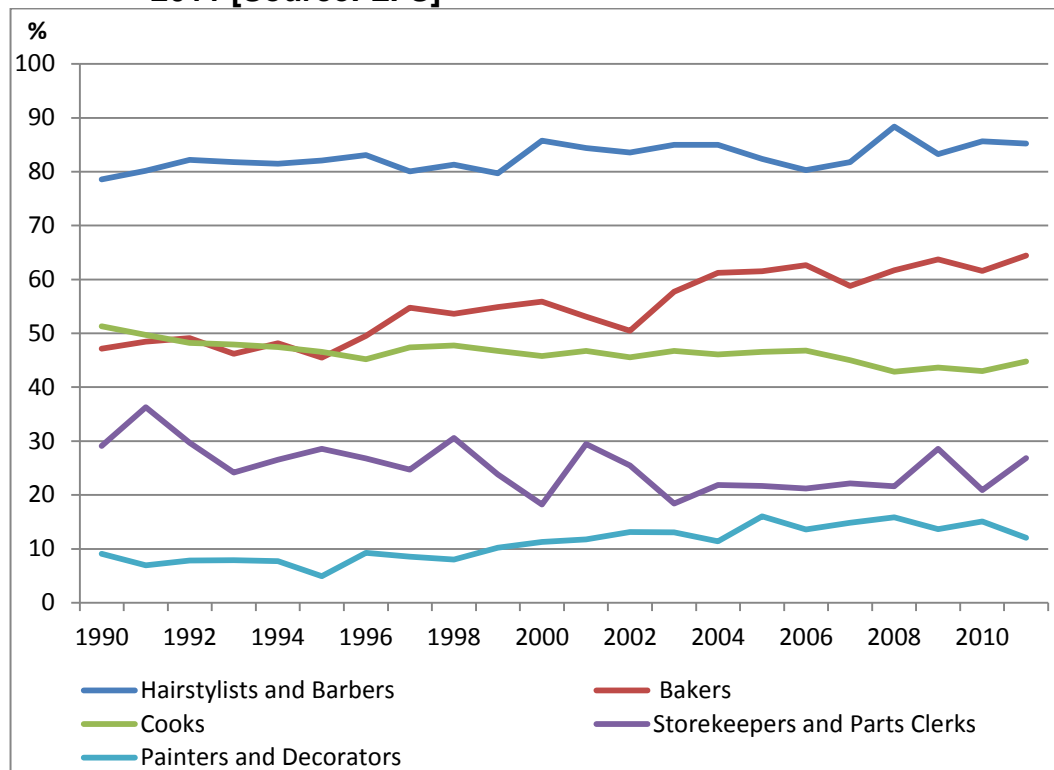
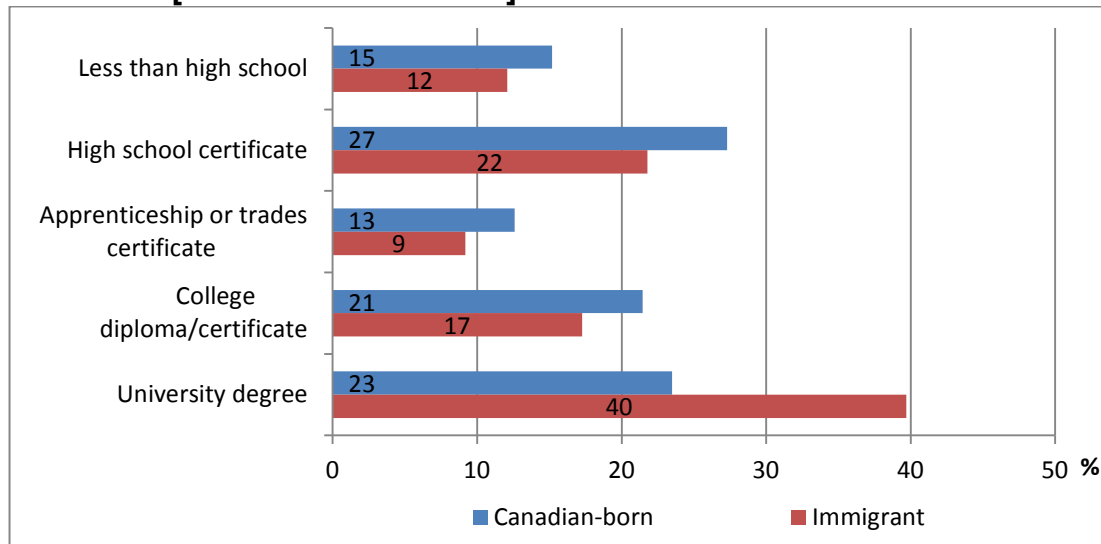


Chart 3.35 (page 95) indicates that immigrants are under-represented among apprentices relative to their population proportion. The results shown in Chart 6.18 help explain why this is so. Immigrants are somewhat under-represented in trades and apprenticeship certificates compared to those born in Canada. However, a much larger proportion of immigrants than those born in Canada have university level education. LFS data from 2006⁵¹ to 2011 show that about 13% of all immigrants worked in the trade occupations during that period, roughly comparable to the proportion for all Canadians. Due to lack of more complete data for immigrants, it is difficult to obtain detailed information about the match of trade and apprenticeship certificates to occupations and occupations to certificates.

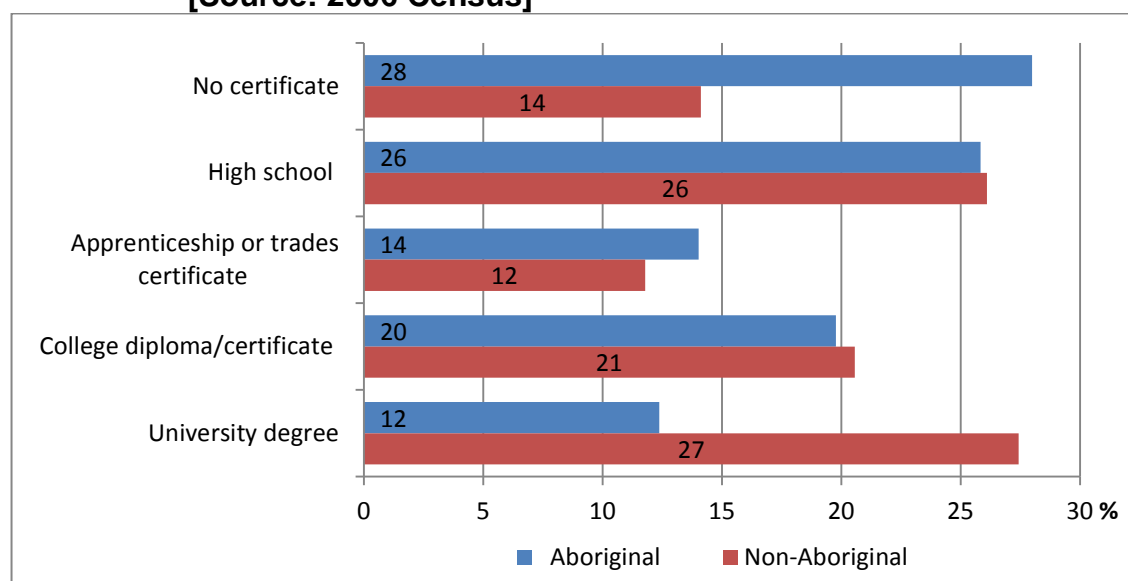
⁵¹ Information on immigrants in the LFS is available from 2006.

Chart 6.18 Distribution of Educational Levels by Immigration Status
[Source: 2006 Census]



Detailed information on Aboriginal apprentices cannot be given because of the large amount of missing data in this element in RAIS. However, education levels are available from the 2006 Census. Chart 6.19 shows a different picture for persons of Aboriginal identity compared to that for women and immigrants. A slightly larger proportion of Aboriginals have apprenticeship or trades certificates compared to non-Aboriginals. The picture for other education levels shows greater divergence, between the two groups with Aboriginals a higher proportion for those with no certificate and a lower proportion for those with university education. LFS data from 2007 to 2011 shows that about 22% of Aboriginals worked in the trade occupations during that period. Due to data limitations it is difficult to obtain detailed information about the match of trade and apprenticeship certificates to occupations and occupations to certificates.

Chart 6.19 Distribution of Educational Levels by Aboriginal Status
[Source: 2006 Census]



6.4 Supply Side: Sources of Trade Workers

6.4.1 Apprenticeship Registration and Completion in the Labour Market Context

Because apprentices are not explicitly identified in either the Census or the Labour Force Survey, there is some ambiguity over whether apprentices should be treated as part of the labor force or as trainees or students, whose contribution to employer productivity occurs only after completion. A recent Canadian Apprenticeship Forum study (CAF, 2009) indicates that, in Canada, there is significant net benefit to hiring apprentices, with each dollar invested yielding an average of \$1.47 in payoff. Some payoff was found for all trades but the amount was widely variable across trades.

Strictly speaking, none of the data sources explicitly identify apprentices with their specific occupation. Neither the Census nor the LFS have a category to identify apprentices and RAIS does not have a variable to identify the occupation. For purposes of this section, however, apprentices are considered as part of the labour force and thus as a contributor to labour market supply. In reality, some reduction factor may be needed to allow for the possibility that some apprentices are not working or are working in occupations other than their trade of registration. Since the main concern here is with trends, the exact proportion of apprentices

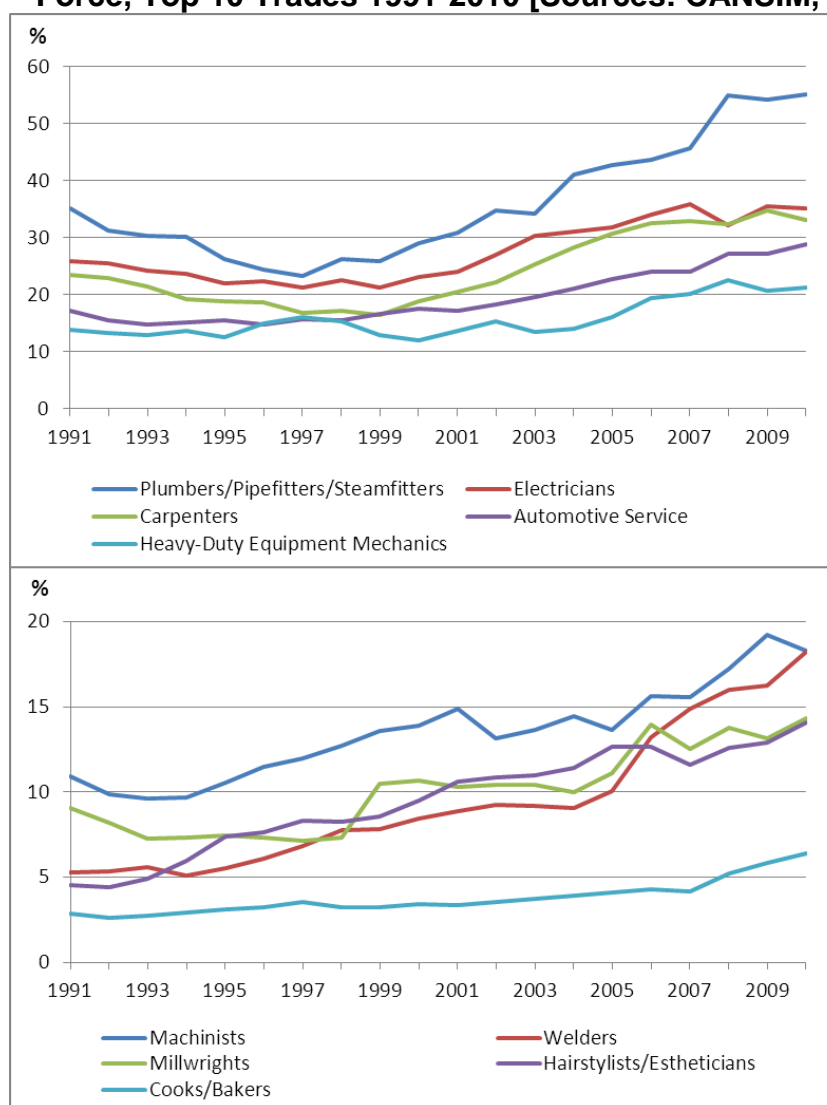
who are working in their trade is less important than how this is changing over time.

Because the proportion of apprentices to the total labour force varies widely by trade and because many trades have only a small number of apprentices, the analysis given here is limited to the Top 10 trades.⁵² Chart 6.20 shows registered apprentices as a percentage of the total labour force in these trades. The most striking feature of these data is the rapid increase in ratio in the pipe trades, where the number of apprentices is now more than half the total labour force. This is driven mainly by the increase in apprenticeship registrations, which have increased by about 140% since 2001 while the labour force in this area has increased by only about 35%. Growth in the apprentice to labour force ratio has also been quite rapid for carpenters and electricians, with the number of apprentices more than doubling while the labour force has grown by about one-third since 2001. In each of these trades, the number of apprentices is now in the range of 35% of the total labour force.

The ratios for all other trades show some increase since about 2000, indicating that apprentices have been making a larger contribution to the overall labour force over time. However, except for automotive services and heavy-duty equipment mechanics, the percentage of apprentices remains less than 20% and below 10% for cooks/bakers.

⁵²The trades given here are slightly different from those in other parts of this report because CANSIM uses a “major trades” classification rather than individual NOC trade codes reported in the LFS. Since the match is not exact for some trades, it is important to focus on the time trends, rather than the exact numbers.

Chart 6.20 Apprenticeship Registrations as a Percentage of Total Labour Force, Top 10 Trades 1991-2010 [Sources: CANSIM, LFS]

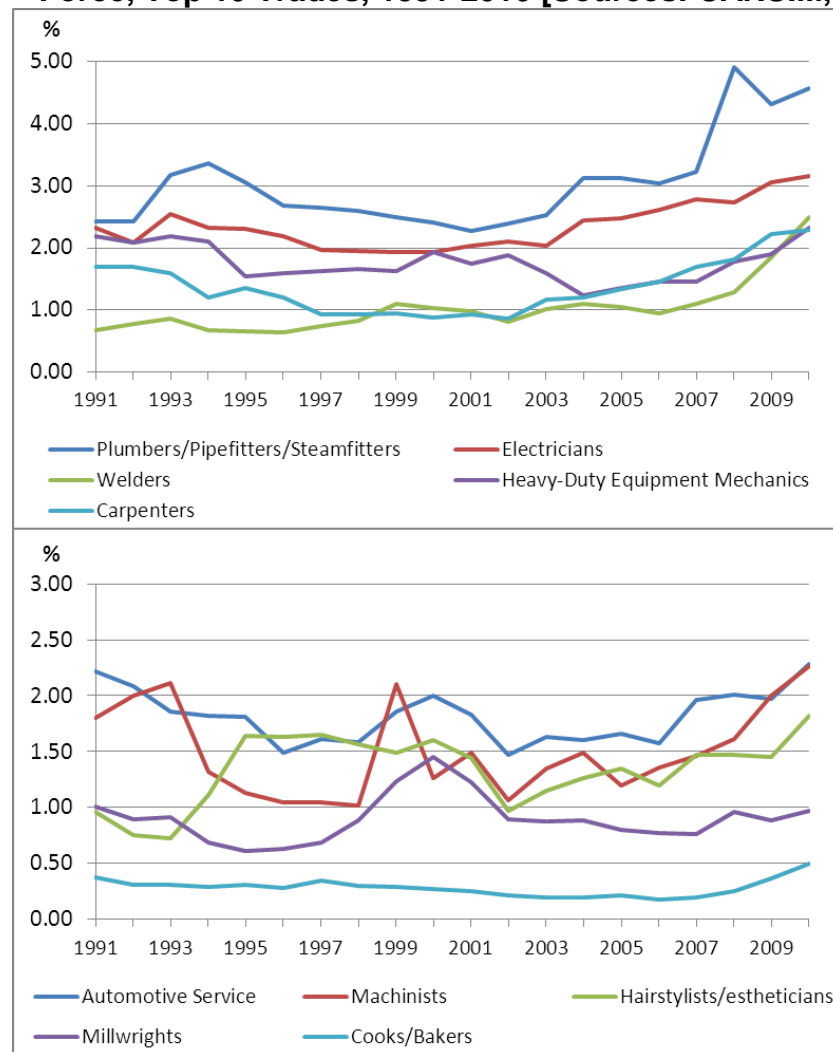


If apprentices are part of the labour force, apprenticeship completers cannot be considered as adding to labor market supply. More appropriately, completers should be considered as additions to the supply of journeypersons. Depending on the qualifications of those exiting the labour force at any time, this can potentially add to the overall proportion of certified personnel. It is useful to look at completers as a proportion of the overall labour force, to give a sense of this potential.

Chart 6.21 gives these results for the same trades as in Chart 6.19. The pattern

here is similar to that for registrations, with sufficient newly certified apprentices to replace an increasing proportion of the labour force in most trades but with considerable difference in these proportions across trades. Again, the pipe and electrical trades show the largest proportions, with rapid growth in recent years. Growth has also been substantial for welders, carpenters and heavy-duty equipment mechanics. The proportions are smaller and the growth rates lower for the remaining five trades, as shown in the second panel of Chart 6.20. The important question of course is whether these numbers are sufficient to meet current and future demand. This question is addressed in a later section.

Chart 6.21 Apprenticeship Completions as a Percentage of Total Labour Force, Top 10 Trades, 1991-2010 [Sources: CANSIM, LFS]

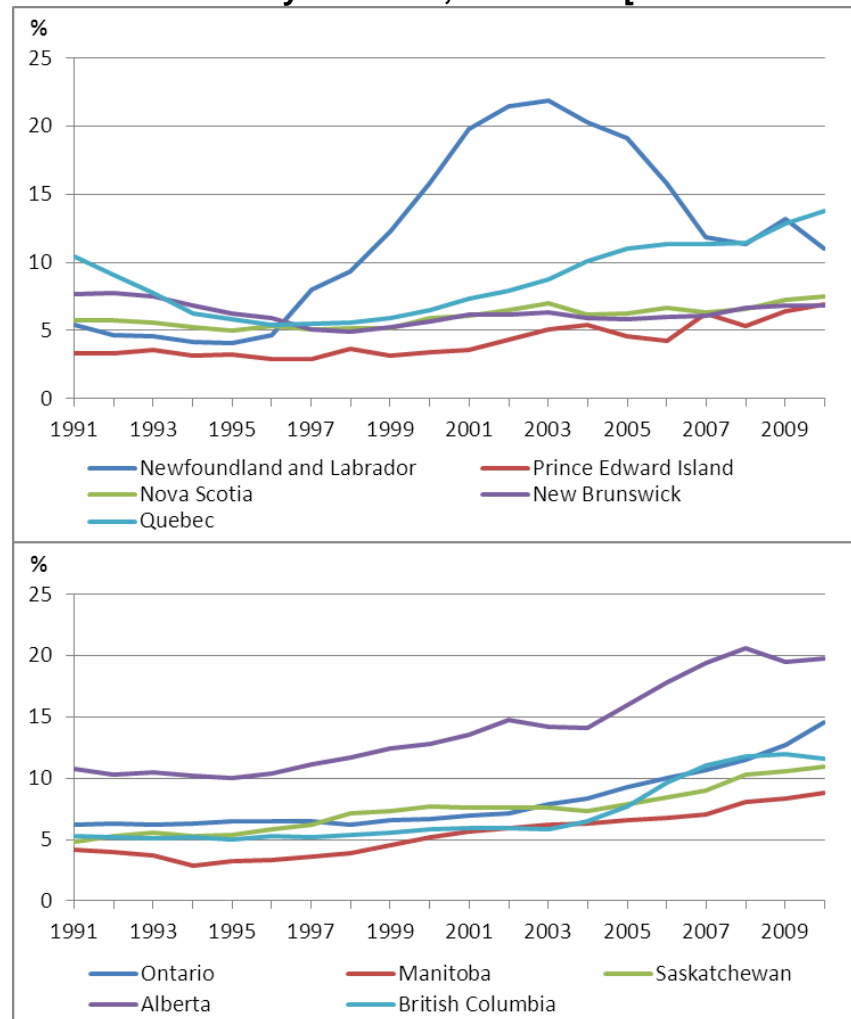


6.4.2 Apprenticeship Registration and Completion by Province

Chart 6.22 shows apprenticeship registrations as a percentage of the total trade labour force by province⁵³. Again, the pattern of increasing ratios is apparent in most provinces, with the notable exception of Newfoundland and Labrador. The rapid increase followed by decrease from 1997 to 2007 is a consequence of a major rise and fall in apprenticeship registrations during that period. This pattern is not found in any other jurisdiction. Even in the most recent years, however, the ratio for Newfoundland and Labrador remains higher than in most other jurisdictions. Alberta and, to a lesser extent, Quebec show the most rapid increases in apprenticeship registrations relative to the labour market. Ontario also shows a greater increase than other provinces from 2007 to 2010 but from a lower base than the above provinces.

⁵³ In computing these ratios, the number of registrations in all trades was the numerator and the trade labour force, defined as NOC-S plus some trades from other NOC categories, was the denominator. This gives lower ratios than those for the Top 10 trades. However, this does not affect the time trends.

Chart 6.22 Apprenticeship Registrations as a Percentage of the Trade Labour Force by Province, 1991-2010 [Source: CANSIM, LFS]



6.4.3 Apprenticeship Registration and Completion in the Context of Post-Secondary Education

Although apprenticeship is not treated by Statistics Canada as post-secondary education, it is useful to look at apprenticeship registrations and completions in relation to post-secondary enrollments because, at least nominally, both draw from the same youth pool.⁵⁴ The comparison of apprentice registrations to post-

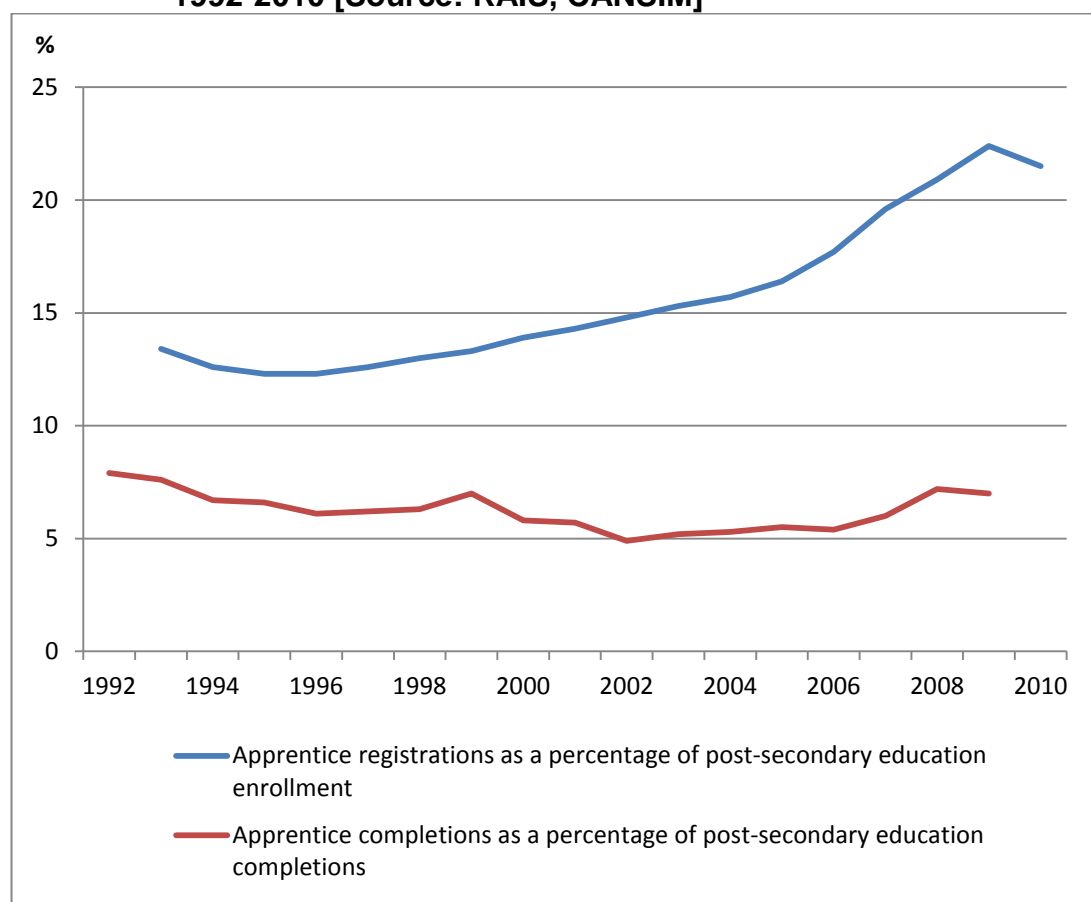
⁵⁴ It is important to keep in mind that, on average, apprentices are older on registration than most post-secondary students on initial enrolment and that some apprentices would have had at least some previous post-secondary experience.

secondary enrolments can give some sense of whether apprenticeship is becoming more attractive to the youth population.

Chart 6.23 gives apprenticeship registrations as a percentage of total post-secondary enrolments and apprenticeship completions as a percentage of total post-secondary graduates. This shows that apprenticeship registration growth since about 2000 has considerably exceeded the growth in post-secondary education. Considering that apprenticeship is a late-entry career choice for many individuals, the post-secondary result suggests the possibility of some transfer from other post-secondary options to apprenticeship. However, the data do not definitely address this point. The slight drop in the ratio in 2009 is an indication that the recession had a greater impact on apprenticeship registrations than on post-secondary enrollment.

The picture for apprenticeship completions is different from that for registrations, with apprenticeship completion rates showing an overall slight decline relative to post-secondary completions in the 1990s, followed by a stable ratio for most of the 2000s, a slight increase in 2007-08 and a leveling off in 2009. Overall, the most recent ratio is about the same as that in the early 1990s. This is likely related to the earlier results on apprenticeship completion rates, which showed some decline in the late 1990s before stabilizing in more recent years.

Chart 6.23 Apprenticeship in the Context of Post-Secondary Education 1992-2010 [Source: RAIS, CANSIM]



6.4.4 Apprenticeship Registration and Completion by Gender

Chart 6.24 shows apprenticeship registrations as a percentage of the trade labour force for men and women. In each case, each percentage is based on the ratio of apprentices to trade workers by gender. While women make up only a very small percentage of both apprentices and the trade labour force, the percentage of women apprentices relative to women in the trade labour force is increasing at a faster rate than that of men. As indicated earlier in this report, this is mainly due to an increase in the number of women apprentices in trades other than the Top 10.

The same pattern for apprenticeship completions is given in Chart 6.25. While completions make up only a small proportion of the trade labour force, that proportion has almost doubled in the past decade, with the proportions for men and women being similar. These proportions are not directly comparable to those

for the Top 10 trades given in Chart 6.20 because both numerator and denominator of the ratios encompass a much broader range of trades. What these results indicate, however, is that the proportions for trades other than the Top 10 are much lower than for the Top 10.

Chart 6.24 Apprenticeship Registrations as a Percentage of the Trade Labour Force by Gender, 1991-2010 [Source: CANSIM, LFS]

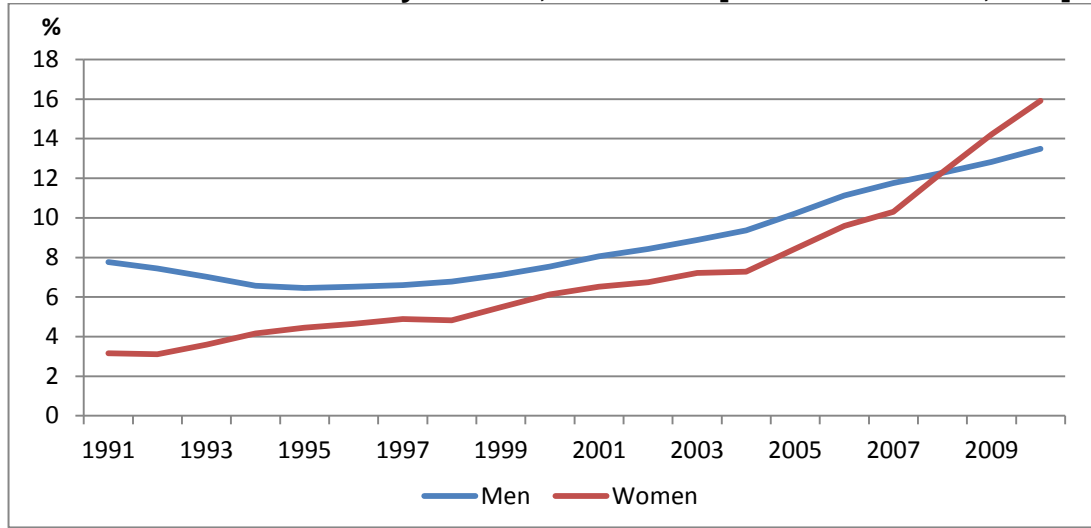
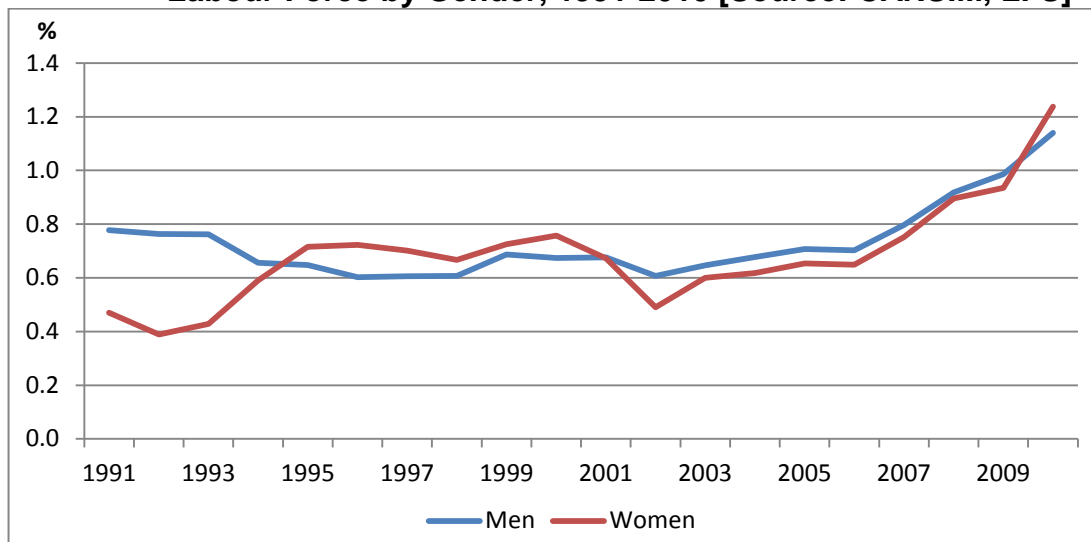


Chart 6.25 Apprenticeship Completions as a Percentage of the Trade Labour Force by Gender, 1991-2010 [Source: CANSIM, LFS]



6.4.5 Apprenticeship Registration among Immigrants

Available data sources such as LFS and RAIS do not provide the number of apprenticeship registrations and certifications by immigration status. Citizenship and Immigration Canada data does provide data on the numbers of immigrant entries by skill level. An earlier analysis (Section 6.3.5) indicates that most of the jobs that require skill level B also require trades and apprenticeship certification. Looking at the proportion of immigrants with that skill level should provide some insight into the match between immigrant skills and trade skills. This is shown in Chart 6.26. This shows the percentage of workers at Skill Level B to be somewhat greater than the proportion of the labour force at this level. However, given the large percentage for which the skill level is not given, these figures are rather imprecise.

The 2006 Census provides some additional information on the trade credentials of immigrants. Chart 6.27 shows the breakdown for established immigrants and more recent immigrants, relative to Canadian born persons. This indicates that recent immigrants are less likely to have trade credentials than earlier immigrants. In conjunction with the results for all education levels given in Chart 6.17, this suggests that more recent immigrants are more likely to have university than trade credentials.

Chart 6.26 Percentage of New Foreign Workers by Skill Level, 2001-2010

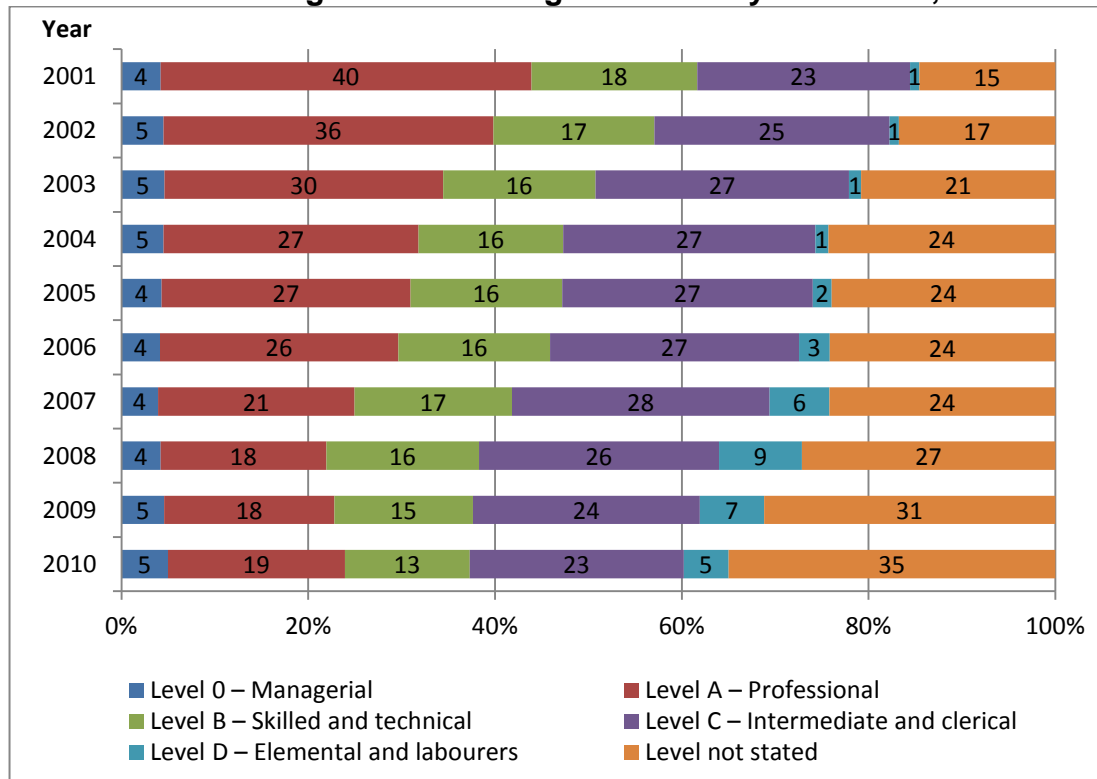
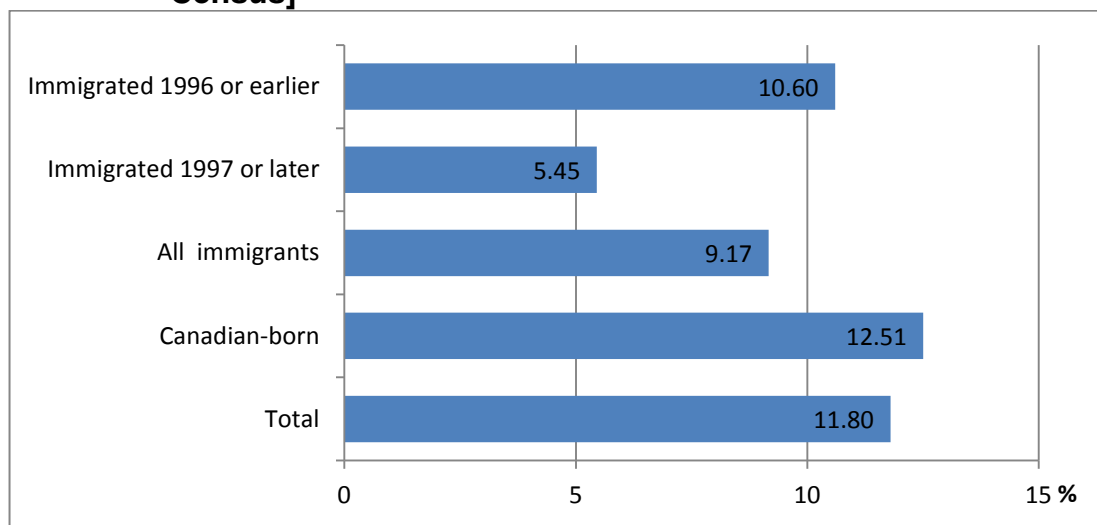


Chart 6.27 Percentage of Immigrants and Canadian-Born Persons with Trade or Apprenticeship Certificates, 2006 [Source 2006 Census]



6.5 Supply and Demand: The Place of Apprenticeship in the Trade Labour Market

The broad question for this chapter is “what is the impact of apprenticeship on the labour market? While this question cannot be answered fully it is possible to provide some insight from the available data. Charts 6.20 and 6.21 in Section 6.4.1 give a preliminary sense of this, showing that the proportion of apprentices and completers relative to the labour force has been increasing in recent years. The contribution of apprentices to the labor market is clearly increasing. Although the proportion of completers is also increasing, the trend for completers is less clear because completers are not considered to be additions to the overall labour force but only to the pool of certified personnel.

To the extent that the number of newly certified persons in any year is greater than the number of certified persons leaving, then completers (as well as trade qualifiers) add to the proportion of the labour force that is certified. Since that proportion has not been increasing (See Charts 6.7 and 6.10) it can be concluded that, up to now, the number of newly certified personnel has been just sufficient to replace those leaving and to accommodate growth.

Nevertheless, the large influx of new apprenticeship registrations, and the accompanying increase in certifications (allowing for the lag between registration and completion), raises the prospect that the long-standing stability in the proportion certified will change over the next few years. This raises the issue of whether it is possible to project the impact of these changes. Human Resources and Skills Development Canada regularly develops projections of future labour demand and labour supply by broad skill level and by occupation, using models developed by the Canadian Occupational Projection System (COPS). These projections are used here to give a broad picture of trade labour market supply and demand in selected trades. The COPS projections are supplemented by projections of apprenticeship registrations and completions. Together these projections are intended to answer, within the limitations of the available data and the relevant assumptions, the question asked at the beginning of this section.

As indicated earlier, this is not intended to be a comprehensive study of labour market supply and demand. Such a study would require access to data sources other than those available here, including employer surveys and closer analysis of the age distribution of workers, the impact of immigration and other demographic and economic factors. Nevertheless, the mandate of this chapter is to bring together the supply and demand sides to look briefly at what the next decade may hold for the trades and where apprenticeship fits into the overall trade labour market.

The COPS projections have a prominent place in the recent report of the House of Commons Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities (2012) cited in the literature review. A version of the relevant table from that report, for selected trades, is given in the Appendix (Table A6.1). The results show many trades with a balance of supply and demand over the period. A significant shortage is projected for the electrical trades. Smaller shortages are projected for the various types of mechanics and for machinists. Surpluses are projected for cooks, plumbers/pipefitters/gasfitters, carpenters/cabinet makers, metal trades, masonry and plastering trades and other construction trades.

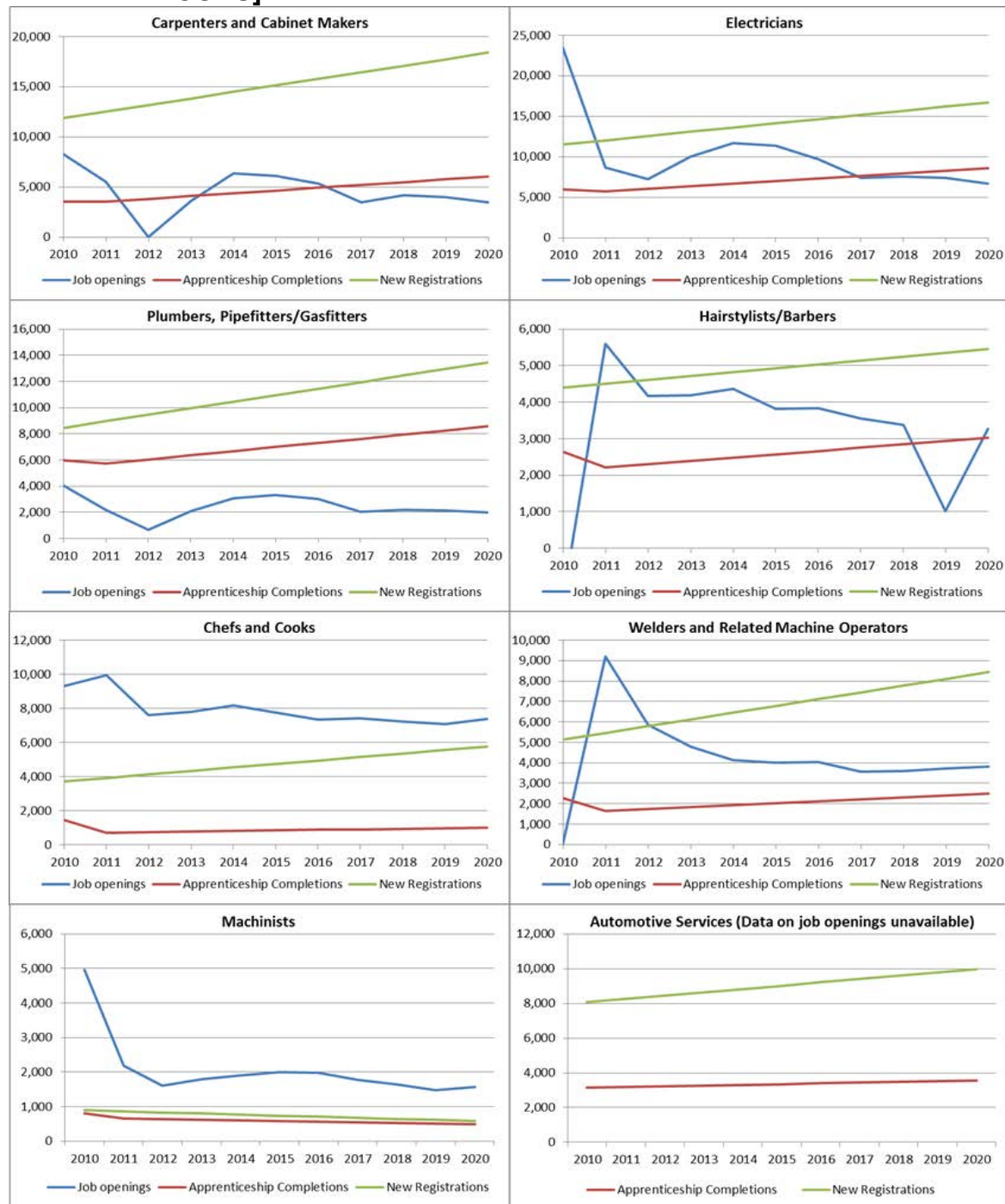
It is important to note that, aside from the usual hazards of projections, these projections are national in scope and do not reflect regional or local variations in supply or demand. Regional projections are even more hazardous because numbers are much smaller and the impact of economic conditions relatively greater (for example, regional trends are more likely to reflect the impact of large construction projects). It is quite likely, that local shortages and surpluses of labour will be found, whatever the national picture reveals. Results given in other components of this study have shown that trade workers are not as highly mobile as might be expected. This can have an obvious impact on regional supply and demand.

These projections say nothing about where apprentices fit into the supply side of the market because the job seeker category is not broken down in terms of sources of supply. Also, while these projections address overall supply and demand, they do not speak to the availability of certified personnel. The large wage premiums enjoyed by certified personnel in many trades attest to the fact that such people are in greater demand than non-certified personnel. It is therefore appropriate to examine both the contribution of new apprentices and that of newly certified personnel (apprentices and trade qualifiers) to the supply picture.

Chart 6.28 shows projected new apprenticeship registrations and completions from 2000 to 2010 and projections to 2020 in selected trades corresponding as closely as possible to the occupations for which COPS projections exist.⁵⁵ COPS projections for 2012 to 2020 are also given.

⁵⁵ It is not possible to give a complete breakdown of the Top 10 or other trades because the COPS projection categories do not correspond directly to the RAIS NOC-4 Codes.

Chart 6.28 Projected New Apprenticeship Registrations, Completions and Job Openings, 2010-2020, Selected Trades [Source RAIS, COPS]



These results must be interpreted with great caution for a number of reasons.

First, they do not allow for the likelihood that some apprentices are unemployed or not working in their trade area. This proportion should not be very high for new registrants because this group would have had to have a job to be registered. Also, linear projections do not reflect year-to-year fluctuations, especially in recession periods, as is shown by the drop in registrations in 2009 and recovery in 2010. Overall, however, the general trend in registrations has been fairly linearly upward. Nevertheless, there remains a question of whether the rate of increase of the past decade can be sustained into the next. The projections are likely more accurate for completers than for new registrants because most completers for the next several years will come from those already registered. Finally some level of surplus workers is required to allow for mobility limitations or other reasons for mismatch between supply and demand. These are all normal hazards of projections.

Nevertheless, the results point to some general patterns that shed light on how supply and demand is expected to evolve. First, the apparent large surplus of new registrants to job openings for carpenters/cabinetmakers is related to the fact that this area has seen a large proportional increase in registrants, which the projections carry forward. In the case of carpenters/ cabinetmakers the large gap between projected registrations and completions suggests that this trade group will continue to have a large proportion of uncertified workers. The projected surplus in this area is consistent with that given in Table A6.1.

The pattern for the pipe trades is similar to that for carpenters/cabinetmakers, and is also related to a large increase in both registrations and completions in this area. In this case, the gap between registrations and completions is smaller, with the number of completions exceeding job openings for the whole period. This pattern is also consistent with that of Table A6.1.

The picture for electricians is somewhat more balanced, indicating a surplus of new registrants but a shortage of completers for most of the period. Because the electrical trades are compulsory in most jurisdictions, demand for certified personnel can be expected to be stronger than in many other trades. Indeed, the COPS projections indicate an overall shortage over the projection period. Assuming that the growth trend in registrations and completions does continue, the supply situation for the electrical trades should improve later in the decade.

The patterns for hairstylists/barbers and for welders look similar with a surplus of new apprentices and a shortage of completers for most of the period. However, judging by the difference in wage premium for the two groups, demand for completers is likely to be stronger for welders than for hairstylists/barbers. Neither of these two groups is explicitly identified in Table A6.1. However, that table does point to a small surplus in the metal trades generally.

The two areas in which Chart 6.28 show a clear shortage are chefs and cooks and machinists. The latter is also the only trade showing no growth in the number of new apprentices or completers. Table A6.1 shows a small shortage of machinists over the projection period. Again, with a high premium for certified machinists, this trade is one where a shortage of certified personnel seems likely.

Chefs and cooks present a unique situation, where Chart 6.28 shows a substantial shortage of both new apprentices and completers. However, Table A6.1 projects a surplus in that area. The underlying issue here is the very few personnel in that trade are now certified and there is little or no premium on being certified. The most likely scenario for this trade is that positions will continue to be filled by uncertified personnel, with apprenticeship playing only a small part in the labour market.

The situation for hairstylists/barbers over most of the period is one of surplus of new apprentices and shortage of completers. That area already has the highest proportion of certified personnel among all trades. One possibility here is that a saturation point has been reached in certified personnel. That trade generally has a short period of apprenticeship (usually two years), with fewer work hours required for completion than in most other trades. Since there is almost no wage premium for certified personnel, it is difficult to argue that there is significantly higher demand for such personnel than for uncertified persons.

6.6 Macro-Economic Factors Related to Trade Employment and Apprenticeship Registrations

The number employed in trade occupations and the number of apprentices registered and completing are likely influenced by many macro level variables related to the state of the overall economy, acting together. As in previous chapters, these effects were examined using regression analysis. For this purpose, a data file was compiled based on annual values for a number of macro-level economic factors as predictors and apprenticeship registrations and level of employment of certified personnel as outcomes. Data were available for 22 years, from 1990 to 2010, giving 22 “cases” in the file. Although this is a small number of cases and the data are highly aggregated, it was judged useful to try a regression model for each of the outcome variables.

Specifically, the outcome (dependent) variables were:

- Annual number of employed persons with trades or apprenticeship

certificates

- Annual number registered in apprenticeship programs

The first is considered a measure of demand and the second a measure of supply.

For the number employed, the predictor (independent) variables were:

- Average hourly wage rate in the trades
- Consumer price index
- GDP share contributed by construction
- Recession (coded 1 for a recession year, 0 otherwise)
- Completion number with trade or apprenticeship certificate
- Time (year, coded 1 to 22)

For apprenticeship registrations, the predictor variables were:

- Average hourly wage in the trades
- Average unemployment rate in the trades
- Recession
- Time

In both cases, the model accounted for about 98% of the variance in the outcomes. In contrast, for example, the models for employment income in Chapters 4 and 5 accounted for about 25% of the variance. The latter is much more typical, given that it is impossible to capture in a single model all of the factors that might be related to any labour market outcome

Such an outcome usually indicates that the predictors are very highly correlated with each other and with the outcome. An examination of the correlation matrix among the independent variables, along with “collinearity” indices produced by the computer program, confirmed that this was indeed the case. In effect, all of the variables in the model are “proxies” for economic growth (or the opposite in the case of the recession variable), and hence are effectively measures of the same underlying phenomenon. Added to this difficulty is the fact that, with only 22 cases to analyze, the error levels in the model coefficients were quite high, rendering the observed coefficients highly unstable. Finally, this type of outcome is common using macro-economic data, because of the high level of aggregation of the data.

Because of these limitations, the details of the models are not presented here. Results of the models are given in Appendix Tables A6.2 and A6.3. Within the limitations noted, the models do suggest that both trade employment and

apprenticeship registrations are positively related to economic growth and negatively related to recession. This is consistent with earlier results indicating that apprenticeship registrations and trade employment decreased during the recent recession in 2009, while growing over the entire economic growth period of the 2000-2010 decade. This also shows that the projections given earlier are likely to be strongly subject to whatever economic conditions prevail over the rest of this decade.

On the demand side, the number of completions was also found statistically significant. This supports the view that stable completion rates may be associated with the stable rate (about 11%) of Canadians with trade and apprenticeship certificates over time. On the supply side, government incentives programs and growth in trade labour force were also found to be statistically significant. This thus seems to be a plausible explanation for the growth of apprenticeship registration in Canada.

6.7 Summary and Conclusions

6.7.1 The Trades in Context of the Overall Labour Force

- There is no standard definition of what counts as trade occupations. Under the broadest definitions, which include some occupations with no or few apprentices, the trades constitute approximately 17% of the total labour force. Under the narrower definition of “major” apprenticeship trades, the trades make up about 11% of the labour force. After declining slightly during the 1990s, these percentages have been stable for the past decade.
- Those with trade and apprenticeship certification have higher labour market participation, higher employment and lower unemployment rates than those with high school or lower education levels but lower participation, lower employment and higher unemployment than those with college or university credentials.
- Unemployment rates in the trades have trended downwards over the past decade, with the exception of the recessionary period in 2009.

6.7.2 The Demand Side

- About 11% of the employed population has some form of trade or apprenticeship certification. This has been stable over the past decade following a slight decline in the 1990s. The Top 10 trades have shown a

- slight decline as a proportion of the total labour force over a 20 year period,
- Approximately one-third of those with trade or apprenticeship credentials are working in trade occupations. This proportion has increased slightly recent years.
- Approximately 35% of those working in trade occupations have trade or apprenticeship credentials. This has also increased slightly in recent years.
- Certification levels tend to be higher in the Top 10 trades, averaging about 40% but with wide variations across trades, ranging from 68% for hairstylists to 13% for cooks.
- Close to 15% of those working in trades occupations have less than high school education. This proportion has declined significantly over the past 20 years. Certification levels show wide variations across jurisdictions, from a high of 25% in Newfoundland and Labrador to a low of 6.2% in Ontario. Time trends also differ across jurisdictions, with some increasing and others decreasing.
- Trade and apprenticeship certificates are fairly evenly distributed across age groups.
- In the overall labour force, fewer women than men have trade or apprenticeship certificates but more women than men have college or university credentials.
- Women are concentrated in a small number of trade occupations, particularly hairstylists and cooks. The proportion of women is increasing slowly, from a very low base in the Top 10 trades and is increasing at a somewhat higher rate for other trades.
- The proportion holding trade and apprenticeship certification is lower and the proportion with college or university credentials is higher among immigrants than within the Canadian-born population.
- A slightly larger proportion of those of Aboriginal identity than of non-Aboriginal identity have apprenticeship or trades certificates. More of those of Aboriginal identity have less than high school and fewer have university degrees. Those with Aboriginal identity are also more likely than others to be working in trade occupations.

6.7.3 The Supply Side: Sources of Trade Workers

- Apprenticeship registrations have shown a considerable increase relative to the total trade labor market over the past decade. The increase is particularly pronounced for the pipe trades, electricians and carpenters but is much less than average for cooks.
- Much the same pattern is found for apprenticeship completions, with the

most rapid increase in more recent years, allowing for the lag between registration growth and completion growth.

- Apprenticeship registrations have grown substantially relative to post-secondary enrolments. However, completion rates show a more variable pattern with a slight decline in the 1990s followed by a period of stability and then an increase in more recent years
- The changes in registrations are also evident across jurisdictions, with Alberta and Quebec showing greater rates of increase than other jurisdictions. Newfoundland and Labrador is unique in experiencing a large increase in registrations relative to the labour force in the early 2000s and almost as great a decrease in the later part of that decade.
- The rate of increase in registrations relative to the labour market is greater for women than for men. However, the completion rate relative to the labour market is about the same for both genders.
- New immigrants are less likely to hold trade or apprenticeship certificates than either native born Canadians or earlier immigrants.
- Aboriginals are more likely to hold trade or apprenticeship certificates than non-aboriginals. More of those of Aboriginal identity have less than high school and fewer have university degrees. Those with Aboriginal identity are also more likely than others to be working in trade occupations.

6.7.4 Supply and Demand Projections

Projections of supply and demand, at a national level, are given based on the COPS model and on projected new apprenticeship registrations and completions up to 2020. It is cautioned that this is not a full analysis because it is limited to a few large trades, it does not account for regional or local variations nor does it consider specific employer or skill requirements. However, it presents a broad picture of how apprenticeship completions fit into the overall supply. These projections are intended to bring together the separate supply and demand sides of trades and apprenticeship.

The projection results are quite mixed. A surplus is shown for carpenters/cabinetmakers and the pipe trades, related to the fact that these areas have seen a large proportional increase in registrants. The picture for electricians is somewhat more balanced, indicating a surplus of new registrants but a shortage of completers for most of the period. Welders also show a surplus of new apprentices and a shortage of completers for most of the period. The large wage premium for certified welders indicates that demand in that area is primarily for certified personnel. Machinists show a shortage over the period, with no

growth projected in the number of new apprentices or completers. Again, with a high premium for certified machinists, this trade is one where a shortage of certified personnel seems likely.

Chefs and cooks present a unique situation, where the projections show a substantial shortage of both new apprentices and completers. However, the COPS projections themselves show a surplus in that area. Very few personnel in that trade are now certified and there is little or no premium on being certified.

The situation for hairstylists/barbers over most of the period is one of surplus of new apprentices and shortage of completers. However, since there is almost no wage premium for certified personnel, and the proportion of certified personnel in this area is higher than in any other trade, it is difficult to argue that there is significantly higher demand for certified than for uncertified persons.

6.7.5 Conclusions

The results in this chapter support the following conclusions:

- The trades constitute a relatively large proportion of the overall labour market, ranging from about 11% to 17% depending on what occupations are counted as trades.
- The place of the trades in the overall labour market has been relatively stable for the past decade. This holds true under several different definitions of what constitutes a trade occupation.
- The proportion of those working in trade occupations who are certified has also been stable.
- There is no way to determine with any precision what proportion of apprentices corresponds for those actually working in occupations corresponding to their apprenticeship program. However, assuming that this proportion is relatively high, or at least stable, apprentices are making up an increasingly large proportion of the trade labour market because the number of apprentices is increasing much more rapidly than the labour force.
- The same is true for apprenticeship completers or newly certified personnel. While the annual number of completers represents only a small proportion of the trade labour force, this number is increasing and is projected to continue to increase, as recently registered apprentices work their way to completion.
- While this study cannot answer in any definitive way the question of whether there is a shortage of trade workers, the projections do indicate that completing apprentices should be sufficient to meet demand in some

trades but not in others. This assumes that most completing apprentices will find work in their trade, an assumption that cannot be adequately tested with the available data. This also holds at a national level and not necessarily at regional or local levels. However, this does suggest that in some areas, the issue of shortage of skilled workers may be more local than national and more related to mobility than to total numbers.

- Finally, the LFS and Census are most likely to under-represent the extent and contribution of Canadians with trades and apprenticeship background since they do not identify those who are uncertified but have some trades and apprenticeship training while working in related jobs; or those who have trades and apprenticeship certificates along with higher education levels. In order to understand the full contribution of these individuals future surveys should collect more detailed information on the links between education and occupation

Chapter 6 References

Canadian Apprenticeship Forum (2009). *Assessing Apprenticeship Outcomes: Building a Case for Pursuing and Completing an Apprenticeship*. Ottawa: Author.

Appendix A Tables

Chapter 3 Tables

Table A3.1 2009 Employment Income for RAIS 2008 Status Groups

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	3198.511	232.024		13.785	.000
Completer	17512.062	162.640	.166	107.673	0.000
Long-Term Continuer	3371.754	154.253	.036	21.859	.000
Discontinuer	-3314.158	155.439	-.033	-21.321	.000
Trade Qualifier	10050.199	217.097	.073	46.294	0.000
Gender	14131.093	165.384	.161	85.444	0.000
Age in years	328.853	4.851	.114	67.790	0.000
Electrician	6121.001	176.496	.071	34.681	.000
Plumber	2378.383	236.406	.018	10.061	.000
Welder	1709.831	239.820	.013	7.130	.000
Carpenter	-699.852	178.526	-.008	-3.920	.000
Millwright	16651.393	265.590	.106	62.696	0.000
Hairstylist	-4764.660	267.005	-.036	-17.845	.000
Steamfitter	13924.744	244.240	.102	57.012	0.000
Heavy Duty Equipment Mechanic	18099.511	282.784	.108	64.005	0.000
NL	3376.348	339.851	.015	9.935	.000
PE	-2282.861	873.343	-.004	-2.614	.009
NS	26.974	332.734	.000	.081	.935
NB	2084.537	358.251	.009	5.819	.000
QC	-1763.661	130.395	-.026	-13.526	.000
MB	3275.874	278.599	.018	11.758	.000
SK	10638.711	242.145	.069	43.935	0.000
AB	17049.811	126.283	.247	135.013	0.000
BC	2936.420	142.190	.036	20.651	.000
NT	8507.292	1055.943	.012	8.057	.000
All Other Trades	6600.069	173.895	.083	37.954	0.000
All Other Red Seal	8309.884	154.658	.126	53.731	0.000
R² = .196					

Table A3.2 2009 Employment Income for RAIS 2004 Status Groups

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	59002.549	422.229		139.741	0.000
Completer	10369.987	280.460	.087	36.975	.000
LT Continuer	-278.579	220.408	-.003	-1.264	.206
Discontinuer	-3954.033	255.406	-.037	-15.481	.000
Trade Qualifier	6242.609	355.942	.042	17.538	.000
SEX	-15127.295	311.754	-.154	-48.523	0.000
AGE	-205.662	7.414	-.070	-27.740	.000
Cook	-7222.550	461.641	-.041	-15.645	.000
Electrician	11032.562	303.186	.115	36.389	.000
Plumber	7419.607	434.873	.044	17.062	.000
Welder	6895.727	819.423	.020	8.415	.000
Carpenter	-651.396	298.750	-.008	-2.180	.029
Millwright	17210.466	401.490	.116	42.867	0.000
Hairstylist	-10788.248	446.026	-.085	-24.188	.000
Steamfitter	13905.061	436.086	.086	31.886	.000
Heavy Duty Equipment Mechanic	13946.758	641.060	.053	21.756	.000
NL	438.714	1848.963	.001	.237	.812
PE	-3247.657	3827.368	-.002	-.849	.396
NS	-1266.811	425.978	-.007	-2.974	.003
NB	3037.154	460.771	.015	6.591	.000
QC	-5004.908	182.842	-.079	-27.373	.000
MB	3378.374	394.227	.020	8.570	.000
SK	10201.874	402.387	.064	25.353	.000
AB	24216.906	480.151	.117	50.436	0.000
BC	114.582	819.097	.000	.140	.889
NT	445.180	4726.808	.000	.094	.925
All Other Trades	5480.013	305.922	.060	17.913	.000
All Other Red Seal	4800.595	262.875	.069	18.262	.000
R² = .139					

Chapter 4 Tables

Chapter 5 Tables

Table A5.1 Regression Coefficients for 2008 Employment Earnings of Long-Term Continuers in Frame Period by 2007 Apprentice Status

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	26375.7	1736.9		15.2	.000
NL2008	-7145.7	908.5	-.055	-7.9	.000
NS2008	-7719.6	1237.0	-.041	-6.2	.000
NB2008	-1726.0	1540.7	-.007	-1.1	.263
QC2008	-9669.2	1053.2	-.159	-9.2	.000
MB2008	-789.8	1501.4	-.003	-0.5	.599
SK2008	4990.9	1456.5	.022	3.4	.001
AB2008	25609.6	758.5	.244	33.8	.000
BC2008	-3602.0	1546.8	-.015	-2.3	.020
NT2008	-14160.4	5065.3	-.018	-2.8	.005
Cook	-14486.8	1155.5	-.089	-12.5	.000
Hairstylist	-13238.6	1582.2	-.065	-8.4	.000
Electrician	9346.8	560.1	.131	16.7	.000
Plumber	2406.9	1213.9	.013	2.0	.047
Steamfitter	10764.2	1026.0	.071	10.5	.000
Welder	5976.7	1438.0	.028	4.2	.000
Carpenter	-2038.6	595.8	-.026	-3.4	.001
Millwright	13278.8	1051.4	.085	12.6	.000
HeavyMechanic	12286.9	1782.5	.045	6.9	.000
Autotech	-5024.3	706.3	-.052	-7.1	.000
LTHS	-5221.8	1778.8	-.019	-2.9	.003
SomePostSec	3615.6	626.1	.038	5.8	.000
TradeDip	-317.8	676.9	-.003	-0.5	.639
CollUniv	8033.0	545.6	.101	14.7	.000
French	-2332.2	1000.4	-.038	-2.3	.020
OtherLang	-16850.5	3660.1	-.030	-4.6	.000
Disability	-6534.0	816.1	-.051	-8.0	.000
Aboriginal	-3489.2	1048.2	-.022	-3.3	.001
BornCanada	7108.6	765.4	.062	9.3	.000
LTCMIN	2577.1	539.2	.043	4.8	.000
COMPCERT	9976.7	573.2	.156	17.4	.000
COMPNOCERT	4375.8	824.6	.040	5.3	.000
Male	17445.4	1047.1	.134	16.7	.000
DVAGE07	-65.1	25.6	-.019	-2.5	.011
$R^2 = .268$					

Table A5.2 Regression Coefficients for 2008 Self-Employment Earnings of Long-Term Continuers in Frame Period by 2007 Apprentice Status

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	28,047.1	4,887.4		5.7	.000
NL2008	-355.1	3,408.0	-.003	-0.1	.917
NS2008	-2,734.4	4,264.3	-.018	-0.6	.521
QC2008	-12,931.5	3,422.0	-.282	-3.8	.000
MB2008	3,593.4	5,330.3	.019	0.7	.500
SK2008	8,865.5	4,807.3	.052	1.8	.065
AB2008	-897.6	2,657.6	-.010	-0.3	.736
BC2008	-10,046.8	5,535.4	-.052	-1.8	.070
NT2008	23,421.6	9,645.6	.068	2.4	.015
Cook	-1,360.5	4,160.5	-.010	-0.3	.744
Hairstylist	-8,205.2	2,877.1	-.104	-2.9	.004
Electrician	-3,285.5	2,017.3	-.051	-1.6	.104
Plumber	11,060.0	3,121.7	.106	3.5	.000
Steamfitter	17,414.7	4,078.9	.123	4.3	.000
Welder	-11,946.1	8,839.7	-.038	-1.4	.177
Carpenter	3,839.8	1,588.9	.080	2.4	.016
Millwright	-4,306.3	3,828.2	-.032	-1.1	.261
HeavyMechanic	558.8	5,843.9	.003	0.1	.924
Autotech	-4,900.6	2,837.5	-.054	-1.7	.084
LTHS	708.9	4,981.8	.004	0.1	.887
SomePostSec	7,458.4	2,227.3	.097	3.3	.001
TradeDip	-3,526.2	2,312.4	-.045	-1.5	.128
CollUniv	1,091.9	1,649.6	.020	0.7	.508
French	10,671.0	3,559.0	.226	3.0	.003
Disability	-10,184.0	2,184.3	-.134	-4.7	.000
Aboriginal	-3,503.4	2,982.4	-.034	-1.2	.240
BornCanada	-1,543.4	2,010.7	-.023	-0.8	.443
LTCMIN	1,110.9	1,720.4	.025	0.6	.519
COMPCERT	4,462.6	1,818.5	.092	2.5	.014
COMPNOCERT	61.4	2,402.2	.001	0.0	.980
Male	4,451.1	2,721.8	.059	1.6	.102
DVAGE07	-324.3	81.0	-.128	-4.0	.000
$R^2 = .098$					

$R^2 = .098$

Chapter 6 Tables

Table A6.1 Occupational Projections 2010-2020, Selected Trades

Trade Area	Employment level 2010	New Job Seekers	New Job Openings	Shortage (-) or Surplus (+)	Status at Start of Projection Period
Chefs and cooks	194,893	94,613	77,627	16,986	Surplus
Butchers and bakers	70,447	35,389	26,396	8,993	Balance
Machinists	52,117	16,884	17,917	-1,033	Surplus
Electrical Trades	172,673	71,450	87,924	-16,474	Balance
Plumbers, Pipefitters and Gasfitters	71,531	31,687	22,679	9,008	Balance
Metal trades	123,305	52,750	46,727	6,023	Surplus
Carpenters and cabinetmakers	150,716	63,724	42,048	21,676	Surplus
Masonry and Plastering trades	69,813	29,054	23,383	5,671	Surplus
Other construction trades	95,610	49,819	32,664	17,155	Balance
Mechanics (except automotive)	177,513	75,686	77,587	-1,901	Balance
Automotive service technicians	147,480	36,660	40,842	-4,182	Balance
Other mechanics	30,601	8,712	10,304	-1,592	Balance
Crane operators, Drillers and blasters	16,357	6,702	7,788	-1,086	Balance
Other trades	36,766	10,357	13,905	-3,548	Surplus

Source:

Adapted from Labour And Skills Shortages in Canada: Addressing Current And Future Challenges. Report of the Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities, December, 2012. Table 4, p. 78.

Table A6.2 Regression Model for Number of Employed Canadians with Trade or Apprenticeship Certificates

Dependent Variable: Number with trades and apprenticeship certificates (thousands)					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3150.055	357.186		8.819	.000
Average wage rates in trades	-146.769	30.032	-2.575	-4.887	.000
GDP share of construction (%)	48.091	14.663	.277	3.280	.005
Recession	-2.833	15.415	-.007	-.184	.856
Completion Number in thousands	.008	.003	.356	2.844	.012
Time	76.100	10.536	3.106	7.223	.000
Model Summary					
R	R Square		Adjusted R Square	Std. Error of the Estimate	
.993 ^a	.987		.983	20.66994	

Table A6.3 Regression Model of Apprenticeship Registrations

Dependent Variable: Annual apprenticeship registrations (thousands)					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-1053.545	107.388		-9.811	.000
Average wage rates in trades	48.507	7.953	1.383	6.099	.000
Unemployment rate	-1.366	2.874	-.023	-.475	.641
Recession	-3.500	7.564	-.014	-.463	.650
Incentives	30.617	8.643	.151	3.543	.003
Trade LF in Thousand	.203	.055	.459	3.708	.002
Time	-15.585	2.842	-1.034	-5.484	.000
Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.997 ^a	.994	.992	8.87074	