UNIVERSITY OF ALBERTA
DEPARTMENT OF ECONOMICS
Institute for Public Economics

An Examination of Alberta Labour Markets

Authored through a partnership led by the Western Centre for Economic Research, U of A, Applications Management Consulting Ltd., the Conference Board of Canada, Professor Joseph Marchand (University of Alberta), and doctoral student Tao Song (University of Connecticut).

July 2013

UNIVERSITY OF ALBERTA
DEPARTMENT OF ECONOMICS
Institute for Public Economics

ISBN: 978-1-55195-322-9

PREFACE AND ACKNOWLEDGEMENTS

One of the principal objectives of the Institute for Public Economics is to foster informed debate on public policy issues. Labour shortages and provincial in- and out-migration have characterized the Alberta economy over the past several decades. These fluctuations have much to do with the principal commodities (natural gas and oil) the province exports.

At the direction of the Institute's External Advisory Committee, a Request for Proposal (RFP) was released. As we developed the RFP, we spoke to a number of interested parties inside government and in the construction industry to formulate research questions. The RFP described the scope of the project as follows:

1. Definition of labour markets in Alberta and/or Western Canada. The investigators must critically analyze earlier studies to ensure what labour markets are relevant for which classes of occupations.
2. Using a stated methodology, a critical analysis of whether labour shortages are occurring or will occur and in what selected regional markets and occupations. This will require an analysis of both supply and demand for labour.
3. Building on previous studies, an identification of shortages in critical occupations that could lead to bottle-necking in the investment process.
4. Where critical shortages are determined, identify causes of such shortages (e.g. demographic trends, government policies, institutional barriers, labour conditions in other relevant jurisdictions).
5. A calculation of the opportunity cost to Alberta's economy from failing to address labour shortages. This calculation should include the fiscal impacts on provincial governments and the federal government.
6. Recommendations for identifying new policies or program actions; enhancing existing actions by or through coordination mechanisms between key stakeholders (government, industry, educational institutions, credentialing bodies) including changes to government policies or programs, industry practices or other actions; and identifying weaknesses in data availability, quality or comparability.
7. Submit a report of the study's findings.

The RFP requires that some or all of the study be submitted to a reputable scholarly journal for publication.

In February 2012, a joint proposal from the Western Centre for Economic Research and Applications Management Consulting Ltd. was accepted. In November 2012, the Conference Board of Canada was engaged to assist in the examination of opportunity costs.

A key challenge for the researchers was to analyze previous studies on labour shortages and to understand – from a rigorous, evidence-based perspective – the key dynamics of Alberta's labour markets over time. Moreover a major goal was to outline key policy issues and recommendations to assist industry, labour unions and governments in formulating strategies to maximize labour productivity and labour income and to reduce the volatility in labour markets.

Such a research undertaking is daunting and enormously complex. Labour markets in Alberta are connected to the rest of the Canadian economy and indeed the global economy. Technological change has a profound impact on both the resource and goods and services economy. Alberta, as an economic unit, competes against other resource economies (e.g. Australia, Venezuela, Saudi Arabia) for capital to develop its resource base. Unlike many resource economies, development opportunities are open to Canadian and international private firms seeking to maintain or increase their access to energy reserves.

The research team structured the final report in a way that addresses all of the required issues in the most comprehensive format possible. This allows readers to peruse the complete report, or focus on the chapter or chapters most meaningful to them.

The Institute is grateful to the following organizations that have funded the project:

Alberta Enterprise and Advanced Education

Alberta Human Services

Alberta Energy

Alberta Construction Association

Canadian Association of Petroleum Producers

Canadian Home Builders' Association – Alberta
Construction Labour Relations – Alberta Association

Christian Labour Association of Canada

Construction Owners Association of Alberta

Electrical Contractors Association of Alberta

Human Resources Institute of Alberta

Institute of Chartered Accountants of Alberta

International Union of Operating Engineers, Local 955

Merit Contractors Association of Alberta

Petroleum Services Association of Canada

The investigation undertaken by the Western Centre for Economic Research and Applications Management Consulting was commissioned by the Institute and carried out at arm's–length from the project's financial sponsors. The analysis and recommendations contained in the report should not be taken to mean that the foregoing sponsors endorse the findings of this research study.

Bob Ascah
Director, Institute for Public Economics
July 2013

ACKNOWLEDGEMENTS

This study was prepared by a research team consisting of the following organizations and contributors:

Western Centre for Economic Research

Edward J. Chambers

Jason Brisbois

Rolf Mirus

Stephen Janzen

Jean Frost

Tamara Kulyk

Joseph Marchand, Economics, University of Alberta

Tao Song, Economics, University of Connecticut

Applications Management Consulting Ltd.

Darryl Howery

Mirella Temizova

Conference Board of Canada

Pedro Antunes

Todd Crawford

CONTENTS

EXECUTIVE SUMMARY

This report is a comprehensive analysis of the Alberta labour market, labour shortages and how those shortages can be addressed. The report was prepared through a research partnership led by the University of Alberta's Western Centre for Economic Research, and supported by Applications Management Consulting Ltd., the Conference Board of Canada, Professor Joseph Marchand (University of Alberta), and doctoral student Tao Song (University of Connecticut).

The report begins with an introduction to labour markets in Alberta. It reviews the volatile character of Alberta's energy sector and considers the adjustments required due to the ups and downs of the economy. There is a summary of recent research on the regional employment and income effects of this volatility within Alberta. The introduction sets the stage for the report by noting that an economically uncertain economy, like that of Alberta, requires an adaptable, well-educated labour force and the infrastructure necessary to attract highly-skilled immigrants.

Chapter 2, authored by Marchand and Tao, explores the performance of the Alberta labour market during the previous energy boom, from the mid-1990s to the mid-2000s, through a comparison with the national labour market. It first considers the meaning of labour shortages under a benchmark unemployment rate and compares the trends between energy prices and unemployment rates. It finds that labour shortages may have arisen in Alberta but only during the tail end of this boom. Chapter 2 then examines the similarities and differences in the employment shares and wage changes between Alberta and Canada along the occupational and educational distributions. It finds that the relative employment shares moved towards the occupations with the largest relative wage gains during the last energy boom. Workers in the lower half of the educational distribution were most likely to fit the occupations in demand. However, the relative supply of trades and apprenticeship graduates who best fit this occupational demand actually decreased during the period.

Chapter 3 provides an examination of a number of labour forecasting models including those of the Government of Alberta, the Petroleum Human Resource Council of Canada and the Construction Sector Council. It compares the short- and long-term forecasts for labour shortages and identifies the occupations in which shortages are forecast to be the highest. The chapter explains the classification system used in labour forecasting

and draws on studies assessing the accuracy of forecasts. Two methodologies used to identify markets capable of adding to the Alberta workforce are examined. The chapter concludes with observations and recommendations aimed at improving labour market forecasting in Alberta. These include producing more frequent forecasts and potentially consolidating Alberta's forecasts into a single joint effort between industry and government. It is recommended that industry work with Statistics Canada to improve the National Occupational Classifications so they align better with industry job descriptions, particularly in the oil and gas sector. An appendix demonstrates how Alberta is ahead of other provinces, both in labour market strategies and in forecasting activities.

Chapter 4 quantifies the opportunity cost of unfilled labour shortages. The approach assesses the costs to the Alberta economy should it fail to attain its output potential because of a labour shortage (i.e. a shortfall in the labour supply that employers require). The primary goal of the analysis is to identify the effect of a labour shortage on the Alberta economy using a timeline through 2016. To do this, a Base Scenario is constructed to largely follow the Government of Alberta's projections of economic activity as outlined in the *Economic Outlook: Budget 2013*. Applications Management Consulting Ltd. prepared the associated demand and supply of required workers required for this scenario of economic growth. These were placed in the Conference Board of Canada's model of the Alberta economy to estimate foregone GDP (income) and other variables, including total labour income, consumption, corporate profits, federal and provincial personal income taxes, and indirect taxes. For more detail on labour shortages under differing economic scenarios, readers are directed to the Technical Appendix found on the Institute for Public Economics website.

Chapter 5 presents options for dealing with barriers to labour skill development and labour shortages. Six specific topics are addressed. The first asks: how does an economy go about securing and maintaining a skilled workforce? It is clear that a first-class education system from pre-school to post-secondary is a necessary condition. Beyond that, a vibrant apprenticeship structure is the primary assurance of skilled tradespersons. There is much to praise in Alberta's apprenticeship programs that encompass tens-of-thousands of registered apprentices and participation by almost 14,000 business establishments, most of them small and medium-sized. However, there is evidence that apprentice completion rates have declined over the past 15 years in the face of high demands for the skilled trades. This is significant. Consider that if completion rates during the recent decade remained at the levels of the late 1990s, there would be some 38,000 more Alberta certified skilled trades people available today. Dropouts from the program are costly to the individual apprentice; they are costly to the employer by increasing turnover; and they are a cost to society in forgone certified skilled labour. We believe these facts justify a provincially-funded mentorship program, specifically aimed at reducing the first-year attrition rate, which is the highest in the country. We also

believe it is essential to improve the apprentice databases used to track apprentices. In addition, we recommend some financial disincentives for apprentices be addressed by making apprentices eligible for student loans.

The second topic looks to Aboriginal people, the most rapidly growing component of the Alberta population. Aboriginal education and workforce involvement is a second area where the Alberta record is falling short and we need to improve. The key objective, very much a forward-looking one, is to raise the high school graduation rate as soon as feasible to levels approximating that of non-Aboriginal people. Higher literacy skills and basic educational attainment will increase Aboriginal workforce involvement. Our recommendations include Early Learning Centres in neighborhoods with large concentrations of Aboriginal families, supplementary funding for school districts to pursue discretionary Aboriginal educational initiatives, and abolishing tuition fees for the 19- to 25-year-old Aboriginals (and others) attempting to achieve a high school diploma.

The third topic of workforce development concerns both mature workers and workers with disabilities. Demographic trends record an aging workforce and societal trends suggest there is no longer a fixed date for retirement, with many choosing to transition into retirement over a number of years. With adaptive human resource management by Alberta enterprises that recognizes these trends, mature workers can and will contribute significantly in selected industries and occupational groups. Governments should remove disincentives, including financial disincentives, for workforce participation beyond the age of 65. People with disabilities should also be provided every opportunity to participate fully in a quality workforce. Disabled workers are likely to require on-the-job capital equipment beyond that required by non-disabled workers. This can be a disincentive to the worker's employment, unless governments assume 100 per cent of this enabling capital cost.

The fourth topic considers the place of the temporary Northern Alberta workforce, otherwise known as 'fly in – fly out' (FIFO) and drive-in drive-out (DIDO). Any serious discussion of FIFO/DIDO is hampered by a lack of systematic data, which needs to be corrected through regular quarterly surveys of this workforce; providing detail on construction workers, maintenance workers, and their occupational composition. One must also be concerned about the possible adverse impact of FIFO/DIDO on the continuity of the training of apprentices and young workers generally, as it is a major concern for the development of a quality labour force. One thing is certain: a much more detailed information base about this population is badly needed.

The fifth topic examines productivity and notes that if aggregate productivity growth in Alberta matched the Canadian average, approximately 12,000 fewer workers would be required to produce provincial GDP. The section concludes that the essential work of Productivity Alberta must not only be sustained, but enhanced.

The last topic looks at immigration and points to the highly competitive international market for skilled permanent immigrants. With every developed nation in the world and many newly developing nations competing for these skills, it is a delusion that labour shortage in Alberta can be solved through immigration. There are many reasons for a political jurisdiction to pursue immigration, but in the context of immigration's contribution to the long-run development of the labour force, the interest naturally lies in skilled labour. Our recommendation is that the Provincial Immigrant Nominee Program assigns its priority to skill. Temporary foreign workers should enhance the program's original purpose – filling gaps in particular skills on a temporary basis. Data on this program reveal the high numbers of lower-skilled temporary foreign workers entering under Labour Market Opinions. This does not contribute to the sustained development of a high-quality workforce. The provincial government should phase out, over a reasonable three- to five-year period the eligibility in Alberta Immigration Nominee Program of low skilled occupational categories and should support return of the Temporary Foreign Worker Program to its original purpose of meeting temporary shortfalls for skilled workers.

Chapter 6, the final chapter, presents the conclusions and the recommendations from the

other chapters.

CHAPTER 1

LABOUR MARKETS STUDY: INTRODUCTION

1.1. Setting the Stage

Like any market for goods or services, the labour market tends to reach equilibrium in the long run, as employment and remuneration adjust to demand and supply. It is, however, the path to a new equilibrium in response to shocks in local or regional labour markets that is of keen interest to researchers and public policy makers. Such demand and supply shocks may result in transitory, or even medium term, unemployment or labour shortages, with potential ripple effects on requirements for housing, schools, medical and social services, on infrastructure needs, and related implications for government budgets.

While the Organization of the Petroleum Exporting Countries (OPEC)-induced energy price shocks of the 1970s and the energy price shocks of the 1990s and early 2000s reflected different causes, their effect was increased exploration and production of oil, gas and coal in those North American regions referred to as "oil and mineral states" (Blanchard, Katz, Hall & Eichengreen, 1992). Increased demand for labour led to increased employment and wages in the energy sector, with spillover effects on non-energy sectors. In instances where the demand for sector-specific labour subsequently dropped, the consequences for employment, income, and the spillover effects for other sectors have also been the subject of study by specialists.

Western Canada's provinces, in particular Alberta, contain large amounts of energy resources, most of them in remote and sparsely populated regions that require substantial capital outlays and construction services. The portion of Alberta's labour force employed by the resource sector has grown from five per cent in 2000 to 8.2 per cent

in 2012. The 117.6 per cent increase in resource sector employment significantly exceeds the 32.9 per cent increase in the total labour force of the Province during that period. At the same time, the rate of employment growth in the resource sector has been much more variable, suggesting a causal cyclical connection from the resource sector to the overall economy of Alberta. Essentially, the big ripple effects in the resource extraction sector turned into smaller but still substantial ripples in overall employment (Government of Canada/Statistics Canada, 2012).

The energy price shocks have had a particularly strong effect on those regional labour markets in which the energy sector plays a prominent role. High energy prices in the 1970s and 1980s and again in the early years of the 21st century resulted in regional booms, while the drop in nominal oil and gas prices of the 1990s led to a bust in Western Canada, with pervasive and long-lasting disruptive effects. The volatility that characterized the energy prices induced undesirable repercussions, not only for the immediately affected regions, but for unemployment. In addition, housing cost and land price fluctuations spread to neighbouring regions and non-energy sectors, such as retailing, and there was significant impact on government revenues. After a shock, a new long-run labour market equilibrium takes an uncomfortably long time to reach.

This experience gave rise to some serious analysis of the "boom and bust" phenomenon. If labour market shocks can be so severe, what can be done to have the human resources in place to prevent cost run ups that are hard to reverse? Are there lessons for infrastructure development, migration, social policy and immigration policy? What are the lessons from temporary foreign worker inflows for future boom situations?

The first thing that needs to be examined is the extent of the impacts on wage levels in energy intensive and non-energy intensive regions. How did labour markets adjust in terms of employment and income? What are the sources of shocks and what implications do they have for future training and human resource needs? If energy price shocks derive from technological progress, a different set of skills may be required than when they arise from cyclical swings in prices. Which skill levels are particularly critical for the future development of the energy sector? How prepared are our institutions to provide such training and how are demographic and social factors influencing career choices? It very quickly becomes clear that a complex set of forces is at work when labour markets are to be analyzed over the long term.

What we have learned from the most recent energy boom and bust in Western Canada's labour market is based on Marchand (2012). It is but a beginning, namely the pursuit of the initial ripples from a rock thrown into a pond: by how much more did income in various occupations rise? How much more did employment and per capita income increase in the last boom periods compared to the evolution of these variables in unaffected labour markets nearby? It is necessary to examine what happened in the bust; that is, what were the differences in response between energy-intensive and less

energy-intensive regions? These are important questions. The answers require a complex structure because there is, of course, no counterfactual: we do not have data on what would have happened if there had not been the oil-, gas-, or coal-price shock that led to increased or decreased demand for various types of labour. Marchand's approach is quasi-experimental in nature. It allows the identification of the employment effects of the recent booms and busts on energy-reliant census divisions by contrasting them to the evolution of employment in regional labour markets that were not, or rather substantially less, reliant on the energy extraction sector.

The latter type of regional labour markets, therefore, provides the answer to the question of what would have happened if there had been no energy price shock. Further refinements of the model specification allow the elimination of the effects of geographical proximity to energy-intensive census divisions, as well as the derivation of job multipliers: how energy shocks and the resultant job increases or decreases led to the creation or destruction of jobs in local industries like construction and retailing, or in tradable goods sectors, like manufacturing.

Various other methodological and data issues were addressed and resulted in a close match-up of census data and boom and bust periods, with the percentage of total census division earnings serving to separate the sample into energy-intensive and non-intensive census divisions, leaving aside those that did not clearly meet the separation criteria.

In boom periods, when the demand for labour rose, significant increases in employment, earnings and earnings per worker were observed for the strongly energy-extraction census divisions. Not only statistically significant, the increases were of significant order of magnitude. Booms resulted in significant income and employment bumps in the affected areas.

By contrast, the energy price bust of the 1981-1991period did not show up in a higher reduction of employment, total earnings, or earnings per worker in that sector when compared to the corresponding developments in unaffected markets. The estimated differential impact of the bust is not statistically different from zero, suggesting stagnation rather than bust, or merely a temporary bust in income and employment.

These initial findings, pertaining to total employment, earnings and earnings per worker in the energy-intensive sector, do not show the types of labour making employment and income gains, nor do they indicate the indirect impact on the non-energy-intensive sectors. However, Marchand does pursue these directions and is able to distinguish spill-over effects of boom and bust on construction, retail trade, services (i.e. the local non-tradable industries) and manufacturing.

1.2. Preliminary Synthesis

Alberta's energy sector faces shocks from world prices that are beyond the province's control. These shocks are reflected in start-ups of new energy projects which require construction, manufacturing, oil and gas field services, and industry specific skills and trades. The price shocks are reflected in labour demand increases that are much larger than the natural labour force growth in the province.

Similarly, labour demand shocks are reflected in cost pressures, not only in the energy sector, but also in the non-energy sectors. Such situations are exacerbated by increases in the demand for industry-specific skills in other energy-intensive regions of North America, such as North Dakota, Saskatchewan, British Columbia and off the coast of Newfoundland. Shortages of skilled labour also exist beyond North America, for example in Australia. This demonstrates that not only is development of the domestic labour force an issue for Alberta, but there is also significant competition for skilled immigrant workers from the rest of Canada and from abroad.

These developments, namely labour market shocks emanating from unpredictable changes in energy prices coupled with an aging and slow-growing labour force, may be accompanied by similarly unpredictable shocks in the offsetting direction that derive from breakthroughs in technology.

The resulting uncertainty, the ripple- and the ratchet-effect nature of past (and likely future) shocks, coupled with the need to be an attractive location for immigrants with requisite skills, enable the following preliminary and general conclusions:

- The large measure of uncertainty surrounding an energy-based economy like Alberta's requires an adaptable labour force.
- Flexibility and adaptability are the characteristics of a well-educated, skilled work force that can adjust to changes in technology and absorb new knowledge. A well-educated, rather than an unskilled work force, will serve Alberta better in the medium and long term.
- Alberta must prioritize the provision of appropriate infrastructure, including social and educational services in order to remain an attractive destination for skilled immigrants, given global competition for such people.

While the types of skilled and unskilled labour required by the energy and construction sectors is the subject of later sections of this report, it is also the case that ripple effects emanating from energy sector activities to varying degrees touch on other sectors.

We learn, for example, from a recent study of the Conference Board of Canada (CBoC, 2012) that expansion of the energy sector relies on a supply chain that extends to non-energy industries not only locally but, to a considerable extent, across the country and internationally.

Some hints regarding the mobility of workers and attendant needs and issues follow

from the finding that one in seven workers in construction, oil field services, and oil and gas extraction in the key Wood Buffalo-Cold Lake region actually lived outside Alberta. The estimated 5,200 out-of-province workers in that region added to the above-mentioned supply chain effects through the remittances they sent home.

The geographical impact of Alberta's energy sector is beyond the purview of this report. However, some of the findings of the CBoC serve as a motivation for the report's subsequent sections which pursue the specific skills needs that may exist or arise in Alberta under various economic scenarios and how they may be addressed, for example by: temporary solutions, such as fly in – fly out workers; medium-term policies that improve apprenticeship programs; training the fast-growing aboriginal labour force; and evaluating recent trends in retirement age and related policy measures. For the medium term, it will also be important to discuss the growth in productivity in Alberta, as this has a potentially significant impact on the demand for labour.

1.3. Alberta's Labour Market Shortages

The documented history of booms and busts (e.g. Emter, 2010; Mansell & Percy, 1990), with attendant upheaval in the labour markets, has led to concern about the availability of workers for the expansion of the resource sector and the overall economy in coming years, especially in the face of adverse demographic developments.

Alberta Human Resources and Employment addressed this issue in several reports, such as *Understanding Alberta's Labour Force: Looking to the Future* (2005, September). The issue was also addressed by the Government of Alberta in *Building and Educating Tomorrow's Workforce* (2006) and in *A Workforce Strategy for Alberta's Energy Sector* (October 31, 2007), among others. The Premier's Council for Economic Strategy also dealt with the issue in *Shaping Alberta's Future* (2011).

In addition to many such studies undertaken for government by consultants and internal researchers, private sector associations – like the Petroleum Sector Human Resources Council of Canada and the Construction Sector Council of Canada – have, in recent years, undertaken numerous studies and forecasts on the topic of actual and potential future shortages of various types of skilled workers.

An overview of these studies and their findings will be given in Chapter 3. While the resulting projections are based on models, it will be necessary to determine and analyze their underlying assumptions in some detail.

CHAPTER 2

ALBERTAN LABOUR IN THE PREVIOUS ENERGY BOOM

by Joseph Marchand, University of Alberta, and
Tao Song, University of Connecticut

2.1. Labour Demand Shocks

Under neoclassical economic theory, a positive labour demand shock results in increases to both the quantity and the price of labour, employment and wages respectively, due to an upward shift of the negatively-sloped labour demand curve along a positively-sloped labour supply curve. Various episodes of these labour demand shocks have been documented in the empirical economics literature. For example, during the California Gold Rush in the late 1840s to mid-1850s, common labourers were found to have experienced a large increase in their wages (Margo, 1997). The building of the Trans-Alaska Pipeline System in the 1970s was another such demand shock that induced large wage and employment movements in primarily the construction industry, but also in some other related industries as well (Carrington, 1996). More specific to the subject of energy, the coal boom of the 1970s additionally brought large increases in employment and earnings to the mining sector in the Appalachian region of the United States, which were accompanied by smaller spillovers to some of the local non-mining sectors (Black, McKinnish & Sanders, 2005). And more recently, the natural gas boom from shale and sandstone deposits in western states during the late 1990s and 2000s led to modest increases in earnings and employment in production areas (Weber, 2012).

A positive energy price shock causing a significant shift in the demand for labour has also been documented for the energy-rich localities of Western Canada over the previous boom-bust-boom cycle (Marchand, 2012). The increases in the employment and wages in Western Canada due to the energy booms have been similar to the other historical

episodes of labour demand shocks. The average generalized impact on employment and wages over the two previous booms was found to be substantial in the directly impacted industry of energy extraction, while spillover effects were also observed in the employment and wages of other industries, namely in construction, retail trade, and especially services. A substantial amount of these localities, containing most of the energy resources of the western region of Canada, were found in the province of Alberta.

Labour demand shocks due to energy price booms can lead to temporary shortages of labour, if the number of workers demanded remains in excess of the number of workers supplied, even at the heightened wage rate. However, given that energy booms are typically followed by energy busts, which would theoretically push wages and employment back down to their original equilibrium levels, any such labour shortage is likely to be short-lived. Even in the case that an energy bust does not cause a negative labour demand shift, at least not one of the same magnitude as the outward shift, employment and wages could still adjust to the new equilibrium over time, thereby eliminating any existing shortage.

2.2. Shortage of Albertan Labour over the Previous Boom?

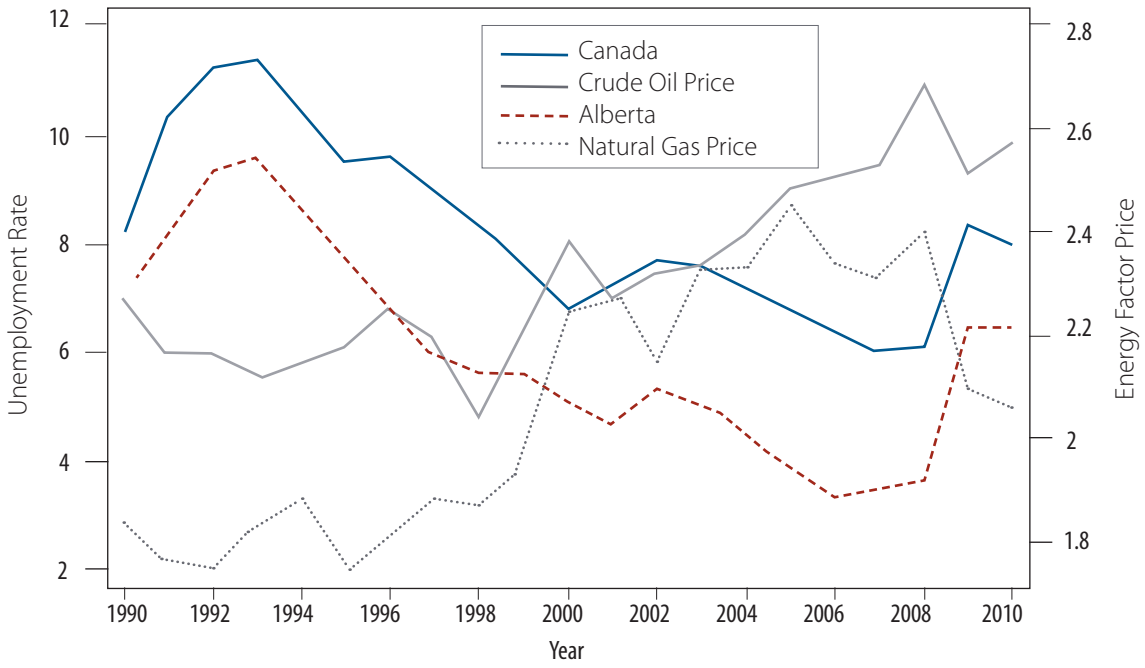
The motivation for this study originates from the polarizing views of whether or not a labour shortage exists in Alberta's future. Alberta Human Resources and Employment made a gloomy prediction of a labour shortage which would increase from 22,000 workers in 2012, to 70,000 workers in 2018, and 114,000 workers by 2021 (Government of Alberta/Human Resources and Employment, July 25, 2006). The Alberta Federation of Labour then challenged these findings, arguing that the labour shortage problem was not looking as bleak as previously suggested (Alberta Federation of Labour, July 25, 2012). The Canadian Auto Worker union also attempted to debunk the existence of a labour shortage by arguing that any observed shortages were caused by the fact that Canada was underutilizing the surplus labour supply (Canadian Auto Workers, 2012). In their view, as soon as the country becomes more efficient in the utilization of its workers, the myth of the labour shortage phenomenon would be exposed.

Given the uncertainty associated with these predictions, the best way to speculate about what will happen in the future is to understand what has happened in the past, namely during the previous energy boom from the mid-1990s to the mid-2000s. The volatile fluctuation of energy prices over the last two decades can be classified into different time periods as follows. During the early 1990s, energy commodity prices were relatively stable, which can be characterized as a stagnation period. From the mid-1990s to the mid-2000s, the energy prices began to increase, marked by impressive jumps in the prices of these commodities, defining the boom period. This was followed by sharp decreases in these prices once the Great Recession began in 2008.

In order to identify the possible existence of a labour shortage in this previous boom, it is imperative to first identify how the labour shortage is defined. While indicators of a potential shortage could span from existing job positions or salaries offered, to employers' expectations, there is not a generally accepted way of defining such a shortage. In this study, the benchmark from the Alberta government's Labour Force Planning Committee is used as the definition (Government of Alberta/Labour Force Planning Committee, 2001). This committee interprets an unemployment rate of 5 per cent to signify a balanced labour market, whereas any unemployment rate less than 4.5 per cent is an indicator of a labour shortage. This definition is appropriate as it is tailored specifically for the Albertan labour market and used during the period of interest.

Both the energy price trends, in crude oil and natural gas, and the unemployment rate trends, for Alberta and Canada, are shown in Figure 2.2.1. The first finding is that Alberta has consistently been experiencing an unemployment rate below the national average. While the national average never fell below 6 per cent during the entire 20-year period, the unemployment rate for Alberta was as low as 3.4 per cent in 2006. Second, the difference between the unemployment rates of Alberta and Canada grew during the energy boom period, from roughly a one per cent difference in the mid-1990s to an almost three per cent difference by the mid-2000s. Third, as the energy prices for crude oil and natural gas increased during the boom, the unemployment rate trends for both Alberta and Canada, perhaps unsurprisingly, decreased.

FIGURE 2.2.1. Energy Price and Unemployment Rate Trends



Notes: Authors' comparison of Labour Force Survey data from CANSIM Table 282-0086 of Statistics Canada and Western Canada Average Prices of Crude Oil & Natural Gas of the Canadian Association of Petroleum Producers**.** The unemployment rate is the annual unemployment rate of both sexes, aged 15 and over**.** The energy factor price is the natural log of the real price.

The finding that is perhaps most important, however, relates to the use of the benchmark definition of a 4.5 per cent unemployment rate as the shortage threshold. According to this definition, labour shortages for the province of Alberta only prevailed towards the tail end of the previous energy boom, at near peak energy prices. During the stagnation period, the Albertan unemployment rate was consistently above this cut off point, suggesting that there was no shortage of labour. As the labour market entered the energy boom period, however, a continued decline of the unemployment rate is observed, until it finally dipped below 4.5 per cent in 2005. It remained below 4.5 per cent unemployment for several years, implying that these shortages persisted until the arrival of the Great Recession in 2008, which sharply lifted the unemployment rates above the shortage threshold.

2.3. Impacts of the Previous Energy Boom on Albertan Labour

Alberta's potential labour shortage problem is a unique and interesting case for a more in-depth labour market investigation. As noted by the Government of Alberta, shortages in the province could be economy wide, as in the previous analysis, or limited to particular occupations or skill sets, which is investigated in the forthcoming analysis (Government of Alberta/Human Resources and Employment, 2005). This is particularly true for Albertan labour in the previous energy boom, where the labour demand shock was clearly shown to directly impact a specific industry, which may demand certain tasks be completed by workers with certain skills. For example, the positive labour demand shock of this energy boom may exert a higher demand for middle-skilled workers who can perform the tasks demanded in the energy extraction industry, such as those performed by equipment operators, welders, or cutters. If the supply of these middle-skilled workers is stagnant or decreasing while their demand is increasing, a labour shortage may prevail for this particular group of workers.

The main analysis of this report examines the evolution of employment changes along the occupational and educational distributions. Each of these distributions is then matched to one another and to the changes in wages within their respective categorization. Theoretically, the extent to which these potential shortages exist depends on how much the needs of firms, in terms of the tasks demanded, match up with the readiness of workers, in terms of their skills supplied. The occupational evidence focuses on the task-content of the jobs demanded, and the educational evidence focuses on the skill-content of the available supply of workers. If the observed employment changes are not consistent with the observed wage changes for these groups over time, the existence and severity of any group-specific shortages could be determined. The advantage of this method is that it allows for a more detailed examination that pinpoints the specific labour groups that are most impacted by the energy boom, thus providing additional insight beyond the aggregate analysis.

The Restricted Data Centre (RDC) version of the Canadian Census of Population, administered by Statistics Canada, is used to construct the labour market outcomes for the main analysis. The advantages of this restricted-access Census data include the larger samples of individuals and a richer selection of the necessary education and occupation variables. The sample focuses on civilian, male workers between the ages of 15 to 64 years old, who are employed full-time (working at least 30 hours weekly) and full-year (working at least 40 weeks per year), with positive wages. These exclusive criteria are followed to remove any unnecessary noise that is unrelated to the current study, such as the effects of part-time or seasonal work, as well as any gender-related issues.

Given that the focus of this study is on the historical impact of the previous energy boom from the mid-1990s to the mid-2000s, the 1996 and 2006 Census waves are used, representing responses for the previous years of 1995 and 2005, respectively. These waves are consolidated into a 10-year change between the two years, in order to coincide with the boom period of interest. The sampling weights are also applied to achieve a full representation of the Canadian population for each 20 per cent sample. In terms of the geographical variation, all ten provinces of Canada are analyzed together, and the province of Alberta is analyzed separately. The labour outcomes for Alberta, which are used to represent the cyclical changes associated with the energy boom, are compared to the same labour outcomes for all of Canada, which are used to represent any secular changes taking place in the overall economy.

Two labour market outcomes are examined in this analysis. The average employment share is calculated as the aggregate amount of hours worked accruing to a group of workers as a share of all aggregate hours worked across all workers. Though both the total employment count and the total hours worked could be used to represent this employment share, the results do not vary greatly between the definitions. Average hourly wages are calculated by dividing annual earnings by the aggregate number of hours worked for each group, which is obtained by multiplying the number of hours worked in the response week by the number of weeks worked. These wages are set in real terms by deflating their nominal values by the Canadian consumer price index, so that all wages are represented in 2005 dollars.

2.4. Occupational Distribution and Wages

The occupational distribution is formed from ten occupation groups constructed from the approximately 500 occupations available in the data, while maintaining consistency between the two waves.[1] These occupation groups are then ranked from the more cognitive to the more manual task-content, where the middle of the distribution represents the relatively more routine tasks and the tails of the distribution represent the relatively more non-routine tasks. The details of the occupational categorization are as follows: Managers include any workers in managerial positions, legislators, and supervisors. Professionals include financiers and scientists. Technicians include any professional technicians. The sales category includes all of those working in the sales business. The office and administration group includes all secretaries and office support personnel. The production category includes jobs such as gas fitter, carpenters, and cabinet makers. The operators and labourers category includes vehicle and machine operators and other labourers. The food preparation and cleaning category includes cooks and maids. And, the personal care and services category includes occupations such as hair stylists and pet groomers.

1 These occupational definitions are similar to those used in Acemoglu, D., and Autor, D. (2011). Skills, tasks and technologies: Implications for employment and earnings. In Handbook of Labour Economics, Vol. 4B, eds., O. Ashenfelter and D. Card, Elsevier, 1043–1171.

TABLE 2.4.1. Employment Shares and Percentage Point Changes over the Occupational Distribution for Canada and Alberta, 1995 to 2005

	Canada			Alberta		
Employment Share by Occupation	1995	2005	Δ%P	1995	2005	Δ%P
Managers	15.7	15.2	-0.5	15.4	14.8	-0.6
Professionals	16.7	19.2	+2.5	17.1	17.5	+0.4
Technicians	5.1	4.9	-0.2	5.3	5.5	+0.2
Sales	7.5	5.9	-1.6	8.2	5.6	-2.6
Office, administration	8.0	7.2	-0.8	7.0	5.9	-1.1
Production, craft, repair	13.9	15.5	+1.6	15.2	18.7	+3.5
Operators, labourers	22.0	21.6	-0.4	21.8	23.4	+1.6
Protective services	2.5	2.4	-0.1	2.2	1.8	-0.4
Food prep, cleaning	7.3	6.7	-0.6	6.6	5.7	-0.9
Personal care & services	0.8	0.9	+0.1	0.7	0.7	0.0

Notes: Authors' calculations of the 1996 and 2006 waves of Canadian Census individual-level data. Occupation groups are kept consistent across waves.

Table 2.4.1 displays the employment shares for the pre-boom year of 1995 and the post-boom year of 2005, with the per centage point change from 1995 to 2005 in these employment shares. The effect of the previous energy boom is represented by comparing the changes along the occupational distribution for the Albertan market containing the vast amounts of energy resources to the changes at the national level in Canada. Again, the employment shares and per centage point changes for Canada are used as a representation of the secular changes taking place to the overall labour market over these ten years. The occupational distributions for Alberta and Canada are shown to be remarkably similar in 1995. The only notable exception is that there are more workers employed in production, craft, and repair, as well as in sales, in Alberta relative to Canada. For Canada, there are more employed in office and administration, as well as in food preparation and cleaning.

Moving from 1995 to 2005, the energy boom affected the Albertan occupational distribution differently than the secular changes occurring across the country. One of the largest changes to Albertan labour occurred in the 3.5 percentage point increase in the employment share for production, craft, and repair versus only a 1.6 percentage point increase in this group for Canada. The operators and labourers category also experienced a 1.6 percentage point increase in their employment share in Alberta over this period, while the share of this group actually decreased by 0.4 percentage points in Canada.

Both of these groups are concentrated in the lower middle portion of the occupational distribution, corresponding to the routine manual tasks. At the national level, the largest movement was towards a greater share of professionals, a 2.5 percentage point change, while this share for Alberta only increased by 0.4 percentage points over the period. Also, while both Alberta and Canada decreased their employment share for the sales occupation, this loss was 1.6 percentage points nationally and 2.6 percentage points provincially.

TABLE 2.4.2. Hourly Wage and Dollar Changes over the Occupational Distribution for Canada and Alberta, 1995 to 2005

Hourly Wage by Occupation	Canada			Alberta			AB v. CA
	1995	2005	Δ$	1995	2005	Δ$	Δ$/Δ$
Managers	29.90	38.91	+9.01	30.81	48.05	+17.24	1.91
Professionals	28.72	31.69	+2.97	28.95	38.79	+9.84	3.31
Technicians	24.22	25.49	+1.27	23.83	27.87	+4.04	3.18
Sales	20.71	22.84	+2.13	20.46	26.22	+5.76	2.70
Office, admin	19.96	21.25	+1.29	19.42	23.64	+4.22	3.27
Production, craft, repair	21.58	22.49	+0.91	20.45	23.62	+3.17	3.48
Operators, labourers	19.62	19.87	+0.25	19.24	21.25	+2.01	8.04
Protective services	23.79	25.54	+1.75	23.48	25.94	+2.46	1.40
Food prep, cleaning	13.60	13.59	-0.01	12.17	13.79	+1.62	.
Personal care & services	15.53	16.52	+0.99	13.42	15.00	+1.58	1.59

Notes: Authors' calculations of the 1996 and 2006 waves of Canadian Census individual-level data. Occupation groups are kept consistent across waves. Hourly wages are in real 2005 dollars.

Table 2.4.2 shows the hourly wages for the ten occupational groups for Canada and Alberta, with these wages represented in 2005 dollars. The last column displays the ratio of the change in the hourly wage for Alberta relative to the change in Canada for each occupational group, in only the cases where the changes are of the same sign. In the pre-boom year of 1995, hourly wages are distributed relatively similar between Canada and Alberta across occupational groups. These wages are skewed towards the top of the occupational distribution and away from the bottom for both the province and the nation, with some exceptions occurring in the middle to lower end of the distribution, especially for protective services. In addition, while Albertan wages are slightly higher per hour relative to the national level for managers and professionals, it is slightly lower for all of the other occupations, and much lower for food preparation and cleaning, and personal care and services.

When examining the dollar changes in hourly wages across the occupational distribution from 1995 to 2005 for both Canada and Alberta, the largest increases are found at the top for managers by a large margin, followed by professionals and sales further down in the distribution. These wage increases begin to taper off when moving to the bottom of the distribution. Comparing the provincial and national trends, these wage gains are much higher in Alberta across all occupations than for Canada. This indicates that the energy boom leads to gains across the entire occupational distribution. But, a better comparison of these relative gains is displayed in the last column with the dollar change ratios between Alberta and Canada. This ratio shows that the two largest relative gains for Alberta were found in the lower middle section of the occupational distribution, with a gain of 8 times higher for operators and labourers, and a gain that is 3.5 times higher in production, craft, and repair. While the tails of the occupational distribution only experienced relative gains which were 1.4 to 1.9 times higher, the upper middle portion of the distribution experienced gains which were 2.7 to 3.3 times higher, with the exception of managers at the very top of the distribution.

2.5. Educational Distribution and Wages

The educational distribution is now examined using a similar approach followed for the occupational distribution. While the labour demand is deriving most if not all of the changes in the wage and employment outcomes, it is imperative to examine the labour supply side in detail in order to fully comprehend the Albertan labour market during the previous boom. Once the educational groups are defined, these categories are matched with the aggregate occupation categories, in order to understand which education groups correspond to which occupations. The employment shares across education groups and their changes over time are then examined to show what type of education is supplied to the market and how these groups may be changing. Lastly, the wages paid to each of these education credentials and their changes are presented, as well as the premium paid to workers for each credential and their changes.

On the supply side, six education categories are constructed: individuals with less than a high school graduation certificate; individuals with a high school graduation certificate; individuals who achieved a trades certificate or diploma, including registered apprenticeship certificates; individuals who earned a non-university or university certificate or diploma below the bachelor's degree; individuals with a bachelor's degree as their highest credential; and all of the post-graduates, including those with a university certificate above a bachelor's degree, a degree in medicine, dentistry, veterinary medicine, or optometry, a Master's degree, or a doctorate degree.

These six education groups can be thought of as representing the distribution of skills that are supplied to the labour market. Low-skilled workers are considered as those with a high school diploma or less, middle-skilled workers have a trades and apprenticeship

certificate or less than a university degree, and high-skilled workers have a bachelor's or graduate degree from a university. Only the middle-skilled definition differs from those commonly used in labour economics studies, as this grouping usually contains all of these workers together. For the current study, the trades and apprenticeship group is differentiated from the aggregated middle-skilled category, as this group presumably plays a relatively important role during the energy boom.

TABLE 2.5.1. Occupational Shares of Education Groups for Alberta in 1995

Occupational share by education	Managers; professionals; technicians	Sales; office, admin.	Production, craft, repair; operators, labourers	Protect. service.; food prep., cleaning; personal service
< High school graduate	16.4	15.6	54.6	13.3
High school graduate	25.6	23.0	37.2	14.1
Trades and apprenticeships	21.1	10.4	59.9	8.3
< 4-year university graduate	48.3	17.2	25.3	9.0
4-year university graduate	76.9	13.5	5.3	4.1
> 4-year university graduate	91.4	5.3	1.9	1.2

Notes: Authors' calculations of the 1996 and 2006 waves of Canadian Census individual-level data. Occupation and education groups are kept consistent across waves.

Table 2.5.1 displays the overlap between the occupation and education categories for the province of Alberta in the pre-boom year of 1995. Although these occupational shares of workers are only presented for Alberta, they are fairly similar for Canada in the same year. These education categories are matched using four aggregate task groups of occupations, which are obtained by grouping sets of the ten occupation groups of the previous section. In this table, each row of occupational shares adds up to 100 per cent of all graduates within an education category. Looking within each column designating an occupation, the share employed in the managers, professionals, and technicians grouping increases when moving up the educational distribution, while the share employed in the protective/personal services grouping decreases when moving up the educational distribution. Therefore, managers, professionals, and technicians are considered to be the occupations that require the highest level of education, while the protective/personal services occupations require the least amount of education. The two middle occupational groupings have more of a mix of graduates across the varying education groups.

Splitting the educational distribution into two halves, it can be seen that the majority of workers in two of the education categories in the lower half are concentrated in the aggregate occupation of production, craft, repair, operators, and labourers, with 54.6 per cent for less than high school graduates and 59.9 pe rcent for trades and apprenticeships.

High school graduates are spread more uniformly across the four aggregate occupations, although the largest concentration still remains in the same occupation as the other two lower half education groups, with a 37.2 per cent share. The top half of the education distribution has almost all of its graduates employed in the managerial, professional, and technical occupation category, with a 91.4 per cent share for more than 4-year university graduates and a 76.9 pe rcent share for 4-year university graduates. Less than 4-year university graduates also have their largest concentration in this occupation category, but its share is slightly less than a majority at 48.3 percent.

TABLE 2.5.2. Employment Shares and Percentage Point Changes over the Educational Distribution for Canada and Alberta, 1995 to 2005

	Canada			Alberta		
Employment Share by Education	1995	2005	Δ%P	1995	2005	Δ%P
< High school graduate	21.7	12.4	-9.3	22.4	14.3	-8.1
High school graduate	22.4	24.2	+1.8	19.5	24.6	+5.1
Trades and apprenticeships	16.4	16.0	-0.4	20.5	18.0	-2.5
< 4-year university graduate	18.5	23.8	+5.3	17.2	22.4	+5.2
4-year university graduate	12.9	14.6	+1.7	13.3	13.7	+0.4
> 4-year university graduate	7.8	8.7	+0.9	6.7	6.7	0.0

Notes: Authors' calculations of the 1996 and 2006 waves of Canadian Census individual-level data. Education groups are kept consistent across waves.

Similar to the occupational distribution analysis, the educational distribution can also be examined by employment shares and hourly wage rates, the results of which are presented in Table 2.5.2 and Table 2.5.3, respectively. The employment shares in Table 2.5.2 show that Alberta differed in its distribution of skills from Canada in the pre-boom year of 1995. While the shares of those with less than a high school diploma and those with a 4-year university degree were slightly higher in Alberta, and the shares of those with less than and more than a 4-year university degree were slightly higher for Canada, some major differences were observed in the employment shares of high school graduates, as well as for trades and apprenticeships graduates. High school graduates made up 22.4 per cent of the educational distribution in Canada in 1995, while this group only made up 19.5 per cent of workers in Alberta. For trades and apprenticeships graduates, the employment share was 20.5 pe rcent in Alberta, while it was only 16.4 per cent nationally in 1995.

Over the energy boom from 1995 to 2005, the share of workers with less than a high school diploma decreased substantially for both Alberta and Canada, although it was a slightly larger percentage point decrease for Canada, leaving the overall percentage

slightly higher for Alberta in 2005. The share of high school graduates rapidly increased in Alberta, and caught up to that of Canada by 2005, to a share of about 24 percent. The large difference in the percentage of trades and apprenticeship graduates converged over the 1995 to 2005 period between Alberta and Canada, with only a slight decrease for Canada but a rather large decrease for Alberta, leaving a 2 percentage point difference by 2005 from a 4 percentage point difference in 1995. Workers with less than a 4-year university degree increased by the same amount in percentage terms for Alberta and Canada, with an increase of just over 5 per cent points for each. For 4-year university graduates and above, their employment shares increased slightly more in Canada than in Alberta over time, thereby increasing the differences between them by 2005.

TABLE 2.5.3. Hourly Wage and Dollar Changes over the Educational Distribution for Canada and Alberta, 1995 to 2005

	Canada			Alberta			AB v. CA
Hourly Wage by Education	1995	2005	Δ$	1995	2005	Δ$	Δ$/Δ$
< High school graduate	18.52	18.40	-0.12	17.94	20.32	+2.38	.
High school graduate	20.08	20.68	+0.60	19.44	22.22	+2.78	4.63
Trades and apprenticeships	21.89	22.74	+0.85	21.79	26.90	+5.11	6.01
< 4-year university graduate	23.60	25.57	+1.97	23.28	28.87	+5.59	2.83
4-year university graduate	28.77	34.43	+5.66	30.21	43.35	+13.14	2.32
> 4-year university graduate	34.26	39.29	+5.03	34.06	48.91	+14.85	2.95

Notes: Authors' calculations of the 1996 and 2006 waves of Canadian Census individual-level data. Education groups are kept consistent across waves. Hourly wages are in real 2005 dollars.

As shown in Table 2.5.3, the hourly wage rates were only slightly higher for Canada than for Alberta in 1995 across all education groups, with the one exception of 4-year university graduates, which had a higher wage rate in Alberta. The period from 1995 to 2005 brought about large changes to these educational wage distributions. Though these changes were regressive for both Alberta and Canada, as the gains monotonically increased when moving up the educational distribution, they were much larger for the Albertan labour market compared to the national labour market. These changes made the wage rates much higher in Alberta across the entire educational distribution by 2005. Specifically, the relative wage gains between Alberta and Canada were the largest for trade and apprenticeship graduates at six times higher, followed by high school graduates at roughly four and a half times higher. The wage increases in the upper half of the education distribution were lower at 2 to 3 times higher in Alberta relative to Canada.

Table 2.5.4 presents the wage premiums for one education group relative to another between every two education groups moving up the education distribution. Each

number represents the extra percentage increase in wages with each respect to an increase in each education credential. For example, the 8.4 for high school graduates to less than high school graduates for Canada in 1995 means that high school graduates earned 8.4 per cent more in wages than if they did not graduate from high school. This premium is remarkably similar for Alberta as well, at a 8.3 perc ent premium. That said, the initial wage premium for trades and apprenticeships to high school graduates was much higher in Alberta than for Canada, as is the premium for 4-year university graduates to less than 4-year university graduates. Canada offers a much larger premium for more than 4-year university graduates to 4-year university graduates and a slightly larger premium for less than university graduates to trades and apprenticeship graduates, as compared to Alberta.

TABLE 2.5.4. Hourly Wage Premium and Percentage Point Changes for Canada and Alberta, 1995 to 2005

	Canada			Alberta		
Hourly Wage Premium	1995	2005	Δ%P	1995	2005	Δ%P
HSG to <HSG	8.4	12.3	+3.9	8.3	9.3	+1.0
TAA to HSG	8.9	9.9	+1.0	12.1	21.0	+8.9
<UNG to TAA	7.8	12.4	+4.6	6.7	7.3	+0.6
UNG to <UNG	21.9	34.6	+12.7	29.7	50.1	+20.1
>UNG to UNG	19.0	14.0	-5.0	12.7	12.8	+0.1

Notes: Authors' calculations of the 1996 and 2006 waves of Canadian Census individual-level data. Education groups are kept consistent across waves. Hourly wage premiums are in real 2005 dollars. HSG is high school graduates, TAA is trade and apprenticeship graduates, and UNG is 4-year university graduates.

Over the energy boom, the hourly wage premium for those with a high school diploma with respect to those without it increased substantially more for Canada than it did for Alberta. The main reason behind this result is that less than high school graduates had fairly large wage gains in Alberta relative to Canada over the boom, as seen in the previous table. The same is true for less than 4-year university graduates to trades and apprenticeship graduates, as the premium is again much higher for Canada than it is for Alberta. This can also be similarly explained, as those with trades and apprenticeships did relatively better in Alberta over the boom period than they did nationally. The wage premium rose substantially more in Alberta compared to Canada for trades and apprenticeship with respect to high school graduates and for 4-year university graduates with respect to less than 4-year university graduates. Lastly, the premium for those workers with more than a 4-year university degree decreased nationally over this period, but remained the same provincially, though the premium was still higher for Canada than for Alberta by 2005.

2.6. Discussion

Labour demand shocks can positively shift the labour demand curve along the labour supply curve, resulting in increased employment and wages for workers in the affected economy. Several different instances of these shocks have been documented in the literature, from gold rushes to energy booms. The energy-rich province of Alberta has experienced two such booms in its recent history. During this time, remarkable growth in wages and employment were documented, being largely concentrated within the energy extraction industry, but also spilling over into other local industries as well. Given the conflicting views of whether or not the province will experience labour shortages in its future as a result, there is a need for more detailed provincial-level evidence in order to fully understand the effects of a boom upon Albertan labour. The methodology of this study compares the labour markets of Alberta to the nation of Canada, with the provincial changes representing the cyclical movements associated with the energy boom and the national changes representing any secular movements in the overall economy. Instead of making predictions about future labour market movements, this study uses historical data representing the previous energy boom which most recently occurred from the mid-1990s to the mid-2000s. Through this comparison, the effect of the energy boom can be differentiated from the overall trends in the economy. While the labour markets of Alberta and Canada appear to be fairly similar at the beginning of the period, important deviations emerge between the two over this previous boom.

The empirical analysis begins by comparing the trends in energy prices and unemployment rates over this period, showing that the two trends are negatively correlated with one another. Then, a shortage definition is applied using a particular unemployment rate threshold, highlighting the fact that a potential labour shortage may have arisen in Alberta during this time, but only during the tail end of the previous boom. On the one hand, this evidence supports the idea that labour shortages should not be much of a concern, as the cyclical nature of the Albertan economy seemed to correct itself from a shortage situation in a relatively short amount of time. On the other hand, the current provincial unemployment rate is well below where it was at the start of the previous boom, implying that if a new energy boom were to begin today, there is not much flexibility in the market to accommodate a sudden increase in demand. This also suggests that, regardless of whether a shortage in the aggregate labour market was dire or non-existent, shortages might be more of an issue for specific tasks or skills. It is this last argument which yields the main analysis of the report. By looking through the lens of the occupational and educational distributions of workers using Census data, more insight is brought forward on what types of workers are most likely to experience these shortages.

The occupational distribution is constructed across ten different categories ranked by their task-content. In 1995, Alberta had slightly more workers employed in production, craft, and repair and in sales relative to Canada, while Canada had slightly more

employed in office and administration and in food preparation and cleaning. The Albertan labour market then experienced the differential effects of the energy boom all along the occupational distribution, significantly raising both the employment shares and wages of the groups that perform certain tasks over others. This boom-related upswing of labour demand in the provincial labour market reshaped its occupational distribution towards more employment in the lower middle portion of the distribution, specifically favoring those workers in production, craft, and repair, and operators and labourers. This lower middle portion of the occupational distribution received not only the largest increases in demand in terms of their relative employment, but also the largest hourly wage gains as well. More importantly, these hourly wage gains during the boom were spread out further across the greater middle portion of the occupational distribution and away from the tails containing managers at the very top and all of the non-routine manual jobs in services at the bottom. Given this demand-side evidence, if a labour shortage were occurring due to the labour demand shock in the province of Alberta during the boom, it would likely be taking place for the routine manual occupations.

The educational distribution is then investigated over six education categories ranked by the highest credential achieved, representing the distribution of skills supplied to the economy. The majority of trades and apprenticeship graduates and less than high school graduates worked in the aggregate routine manual occupation of production, craft, repair, operators, and labourers, with over a third of high school graduates additionally employed in this aggregate occupation. Therefore, those education groups that are most likely to be demanded by the energy boom, given the evidence from the demand side. In terms of the changes in employment shares over the boom, however, there was a larger movement towards more high school graduates and less than four year university graduates in Alberta, and away from less than high school graduates and trades and apprenticeship graduates. This supply movement seems to be the opposite of what is demanded given the occupational and educational overlap. In terms of the hourly wages, the relative wages gains were highest for trades and apprenticeship graduates, followed by high school graduates, while there were equal gains in the education groups in the top half of the distribution. And, the wage premiums rose more for trades and apprenticeship graduates relative to high school graduates in Alberta, while the high school graduation premium and the less than four year university graduation premium rose by less, due to less than high school graduates and trades and apprenticeship graduates having fairly high wage gains in Alberta relative to Canada over the boom. So, although there was a substantial increase in the wages of workers with trades and apprenticeship certificates, their employment share actually decreased over this time, even while they were the most likely of the respective education categories to fill the occupational need. Therefore, the trades and apprenticeship graduates are most likely to experience a shortage in an energy boom. But, given that the need for trades and apprenticeship graduates is not being met, less than high school graduates and high school graduates may be partially filling in for these types of jobs in demand, at least during the period of the energy boom.

CHAPTER 3

EXISTING MODELS AND THEIR CHARACTERISTICS

3.1. The Systems used to Classify Occupations in Canada and Other Jurisdictions

The National Occupational Classification (NOC) system, managed by Statistics Canada and Human Resources and Skills Development Canada (HRSDC) is the national standard for categorizing labour occupations in Canada (July 2012). It is used to collect and report occupational statistics and to provide understandable labour market information by organizing over 40,000 job titles into 500 occupational group descriptions. In addition to modeling, HRSDC provides hundreds of sample, standardized job descriptions, organized by NOC, which employers can use in recruitment efforts. This standardized approach helps improve labour mobility across the country and forms the basis for all supply and demand modeling.

The NOC structure starts with 10 broad occupational categories, with each then divided into more detailed categories at what is referred to as the 3 and 4 digit levels. Parallel to this system is a classification involving four broad 'skill' levels (A to D, with A being the highest level) which describe requirements for nine essential skills such reading, writing, numeracy and communication skills.

It must be noted that the NOC is not an international system. Other countries use their own systems with varying degrees of comparability to the NOC. For example, the United States uses the Standard Occupational Classification (SOC) system and European Countries use the International Occupational Classification (IOC) system which are similar to the NOC but require adjustments to be strictly comparable. The result is that there is no single database that can be used to directly compare the supply and demand of various occupations in Canada to other international jurisdictions.

Another issue, according to oil and gas industry associations and employers, is that the NOC does not adequately reflect employer needs nor does it recognize positions where skills have been acquired through on-the-job training, as opposed to through post-secondary education or trade certification. These on-the-job skills often receive no paper credentials. There are also instances where the definitions are so broad that the category includes occupations with a range of skill levels. The result is that many NOC titles and descriptions must be 'mapped' to the titles and descriptions used in the energy sector for the information to be understood. This is especially relevant in supply and demand modeling, where the NOC system is the standard, and in the international recruitment and immigration process, where workers who want to come to Canada must choose a NOC category that represents their skill set in order to be evaluated by Citizenship and Immigration Canada.

The 'range of skill levels' issue extends beyond the energy sector. For example, an unemployed residential finishing carpenter and an industrial rough carpenter both fall with the definition of 'carpenter' (NOC 7271), yet they would not likely be directly interchangeable. Another frequent example concerns the demand in several sectors (including energy) for 'transport truck drivers' (NOC 7511). The category includes short-haul drivers who might be reluctant or incapable of working in the long-haul situations required by the energy sector.

3.2. How Shortages or Surpluses are Forecast and the Accuracy of Forecasting

Labour market modeling, also known as occupational modeling, involves forecasting the demand and supply of labour and using the results to predict shortages or surpluses. Occupational models generally generate projections from two to 10 years or more. Forecasters often supplement their model results with shorter term projections in the one to two year range, which utilize employer surveys or other shorter-term information sources.

At the national level, HRSDC runs the Canadian Occupational Projection System (COPS) which projects labour demand and labour supply by skill level and by occupation over a 10-year span for the entire country but not for individual provinces. In addition, some Sector Councils, which are Canadian industry-led partnerships that address sectoral skills issues, run occupational models for their sectors at the national or provincial levels.

When the modeling activities of sectoral groups such as the Petroleum Human Resources Council of Canada (PHRCC), the Construction Sector Council (CSC), and the private sector are taken into account, the conclusion is that Alberta is currently ahead of other provinces in creating and using labour force information, although British

Columbia and Saskatchewan are increasing their efforts significantly. A comparison of labour market activities by selected provinces is provided in Appendix 3.1. Following are brief descriptions of the three Alberta models examined.

The Government of Alberta

The Government of Alberta runs well-documented occupational supply and demand models and, every two years, publishes 10-year projections for supply, demand and labour market imbalances, as in *Alberta's Occupational Demand and Supply Outlook, 2011-2021*. The publication describes the structure, input assumptions and outputs of the Alberta Occupational Supply Outlook Model (AOSOM) and the Alberta Occupational Demand Outlook Model (AODOM), which generate projections for 129 occupations at the 3-digit NOC level, and 280 occupations at the 4-digit NOC level. For example, the model's results – frequently quoted in the media – forecast a possible labour shortage of 114,000 workers over the next 10 years. In addition to the Occupational Demand and Supply Outlook, Enterprise and Advanced Education provides a Short-Term Employment Forecasting Tool for 2011-2013, occupational demand projections for eight economic regions, and a wide variety of other labour market products.

The Petroleum Human Resources Council of Canada (PHRCC)

The PHRCC forecast is developed in conjunction with Prism Economics and Analysis, a well-known source of labour modeling expertise in Canada. The May 2013 PHRCC outlook provides demand and hiring projections up to 2022 under low and high growth scenarios for all of Canada, the four western provinces, and the four core sectors of oil and gas services, exploration and production, pipelines, and oils sands. The forecast covers 38 core 4-digit NOC occupations, which are also 'mapped' to standard oil and gas industry work descriptions. The outlook also predicts annual shortages for each occupational category based on anticipated unemployment rates. The PHRCC provides an additional detailed outlook for the oil sands industry and numerous other reports related to labour markets and energy.

The Construction Sector Council (CSC)

The CSC uses a scenario-based forecasting model to assess future labour market conditions. It consults with industry, including owners, contractors and labour groups, to validate the scenario assumptions, and seeks input from governments on related analysis and construction project lists. The CSC labour market information system tracks labour market conditions for 33 trades and occupations, which exclude the approximately 25 per cent of the construction workforce that does not work on job sites (e.g. office support, engineers and office managers) (Construction Sector Council, 2012).

The Accuracy of Forecasting

In addressing the accuracy of the forecasts, part of the challenge lies in the lack of consistency in the occupational models. The Centre for the Study of Living Standards (CSLS) has developed guides to "achieve a greater consistency and coordination in labour supply and demand modeling in Canada" (2012, p.1). Importantly, the CSLS notes some limitations of occupational modeling including: the accuracy of the underlying macroeconomic forecasts, the impact of technological change on labour markets, and the difficulty of accounting for inter-occupational mobility. The CSLS notes:

> the purpose of occupational forecasting…is to inform key stakeholders whether actions to correct imbalances *should* be undertaken rather than to anticipate whether these interventions *will* take place (2012, p14).

The Certified General Accountants Association of Canada recently examined modeling techniques with an emphasis on analyzing trends in five skilled trades (Lefebvre, Simonova & Wang, 2012): carpenters and cabinet makers; electrical and telecommunications; metal forming, shaping and erecting; machinery and transportation equipment mechanics; and motor vehicle mechanics. The report concludes that employers' surveys (used in short-term forecasts) tend to overestimate the tightness of labour markets and that regional analysis of labour shortages is seriously limited by the availability of information on unemployment at the occupational level. With respect to projected shortages in skilled trades, it notes that a large proportion of skilled trades workers enjoy a younger age structure than other occupations, and that the Red Seal Program[2] and the Agreement on Internal Trade facilitate increased mobility. While they do not state outright that labour shortages in skilled trades are overestimated, they suggest that encouraging greater participation in skilled trades is not necessarily the answer to forecast shortages.

In summary, occupational models are a vital tool in helping policy makers, employers and employees make relevant labour market decisions. To paraphrase the CSLS, the models help government in its dual role of identifying the skills that will be in high demand in the future and in subsidizing education. However, the results must be taken in the context of the limitations described above.

2 Established in 1959, the Red Seal Program is managed by HRSDC with provinces and territories and the Canadian Council of Directors of Apprenticeship. Experienced trades people and apprentices who pass the interprovincial Red Seal examination can work in any province or territory without writing additional exams. 52 trades are included in the program.
From – HRSDC, Pan-Canadian Activities:
www.hrsdc.gc.ca/eng/employment/ei/reports/eimar_2011/chapter 4_3.shtml

3.3 Comparing the Results of the Models for the Top Shortage Occupations

This section compares the outputs from the three Alberta models described above. While the Alberta models share the similar conceptual frameworks of forecasting supply and demand, and then calculating the difference, each model reports its findings differently and uses different forecasting periods. This is demonstrated in the following Table 3.3.1.

TABLE 3.3.1 Comparison of Alberta Supply and Demand Model Outputs

Model	Years forecast	Classification System & Number of Occupations	Output description
Government of Alberta	10 (2011 to 2021)	NOC-S* 129 at 3-digit 280 at 4-digit	Tables showing, for each year, demand, supply, and cumulative shortage in thousands of workers.
Construction Sector Council	8 (2012 to 2020)	NOC 33 at 4-digit	Table showing, for each year, a 'market' ranking from 1 (high availability) to 5 (lowest availability) of workers.
Petroleum Human Resource Council	10 (2012 to 2022)	NOC 38 at 4-digit	Tables showing employment levels in 2012, hiring to 2022 due to industry activity and age related attrition, and net hiring for: all of Canada, the 4 western provinces, the rest of Canada, and the 4 industry sectors. It also provides anticipated shortages for all 38 categories, by year, based on projected unemployment rates for each category.

Source: Based on Government of Alberta/Employment and Immigration (2011c), Appendix D; Construction Sector Council (February 2010); and Petroleum Human Resource Council (May 2013).

*Referred to as the National Occupational Classification for Statistics, NOC-S was a parallel system to NOC for many years with variations in some occupational classification descriptions. In 2011, HRSDC combined the NOC and NOC-S into a single system, now referred to as NOC.

The differences in outputs notwithstanding, Table 3.3.2 (below), offers a comparison of the highest shortage occupations generated by each model. While the methodology does not result in a direct comparison of findings, it does allow an indication of whether the models are predicting shortages and, if so, in which occupations. Due to the differences in model time frames, the basis for comparison is cumulative shortages in the time frames identified for each model.

TABLE 3.3.2. Comparison of Cumulative Alberta Labour Shortages

Top 10 Categories from Each Model Presented in the same order as in the source documents. The data and definitions used from each model are described below*		
2011 to 2021	2011 to 2020	2012 to 2022
Government of Alberta – absolute number of shortages	CSC – shortage ranking 4 or 5 and absolute shortage as indicated by GoA Forecast	PHRSC – net hiring requirements (not the same as absolute shortages – see footnote for explanation) under low (L) and high (H) scenarios
Retail salespersons and sales clerks 5,713	Boilermakers 4, GoA Not Provided	Power engineers (steam ticketed operators) L2,925 H4,075
Registered nurses 4,437	Crane operators 4, GoA 110	Heavy equipment operators (except crane) L2,110 H3,575
Construction trades helpers and labourers 3,094	Electricians (including industrial and power system) 4, GoA 651	Drilling coordinators and production managers L2,585 H3,350
Cashiers 3,054	Gasfitters 4, GoA Not Provided	Oil and gas well drillers, servicers and related testers L2,305 H3,065
Retail trade managers 2,787	Industrial instrument technicians and mechanics 4, GoA Not Provided	Supervisors, oil and gas drilling and service L2,320 H2,865
Truck drivers 2,635	Insulators 4, GoA 101	Oil and gas drilling, service and related labourers L1,920 H2,700
Receptionists and switchboard operators 2,151	Ironworkers and structural metal fabricators and fitters 4, GoA 32	Petroleum engineers L1,920 H2,605
Heavy equipment operators (except cranes) 2,090	Sheet metal workers 4, GoA 9	Truck drivers L1,690 H2,140
Cooks 2,056	Steamfitters, pipefitters and sprinkler system installers 4, GoA Not Provided	Geologist and geophysicists L1,510 H2,040
Accounting and Related Clerks 1,711	Note: all other occupations were ranked 3 or lower	Oil and gas well drilling workers and service operators L1,465 H2,000

*Government of Alberta – the 10 occupations at the 4-digit NOC-S with the highest numbers cumulative of shortages.

CSC – the 10 or fewer occupations at the 4-digit NOC level with a CSC ranking designation of 4 "recruiting and mobility may extend beyond traditional sources and practices" or 5 "competition is intense and recruiting reaches to remote markets". A ranking of 3 indicates "established patterns of recruiting and mobility are sufficient to meet job requirements" and is not included because of the high frequency of "3s" indicated in the model output. In the table, after the CSC ranking for each occupation, the corresponding cumulative shortage number from the Government of Alberta Model is provided. If the Government of Alberta model does not provide the occupation in question, a Not Provided designation is assigned.

PHRSC – The 10 occupations at the 4-digit NOC level with the highest, cumulative "net hiring" requirements under low and high scenarios. The PHRSC defines net hiring as: "hiring due to industry activity plus hiring required to fill vacancies due to age-related attrition but excludes turnover due to competition with other industries".

A key observation is that the Government of Alberta model indicates shortages will become much more widespread than in just construction and energy. The 'top 10' shortage occupations include a variety of service and other sectors, and if the list was expanded, the next 10 highest shortages demonstrate the same broad pattern which are noted below for reference.[3] Importantly, the top 20 shortages are dominated by low to medium skill level occupations and represent jobs which are often filled by younger workers (often while pursuing further education), recent immigrants or temporary foreign workers. As the population ages and immigration policy shifts toward attracting higher skilled immigrants, the question arises as to who will fill the shortages forecast in lower skilled jobs, and where these workers will be found if the forecast proves accurate. But it is also important to note that the supply model does not account for changes in productivity and technology, which will almost certainly be brought to bear as shortages in occupations materialize. Some examples include automated checkouts and altered retailing models requiring fewer staff. It can, therefore, be concluded that the shortages are likely to be overstated to some degree.

The second observation relates to the construction sector. The CSC designations for the top shortages for the period shown above are all level 4, indicating, 'recruiting and mobility may extend beyond traditional sources and practices'. There are no level 5 designations, indicating 'competition is intense and recruiting reaches to remote markets'. There are no level 5 designations in the extended forecast to 2020, and most of the occupations in the forecast are designated level 3 indicating 'established patterns of recruiting and mobility are sufficient to meet job requirements'. The conclusion is that, according to CSC projections, labour markets in the construction sector appear to be tightening in some designated occupations, but should be manageable.

The third observation relates to the Alberta energy sector projections by the PHRCC model which shows that there will be some reduction in the number of jobs in exploration and production segment as a result of low gas prices. This contraction notwithstanding, age-related attrition combined with some degree of industry expansion is forecast to result in net hiring requirements in the oil and gas services, oil sands, and pipeline segments of the industry. Further, in the oil sands, labour requirements for maintenance and overhaul activities in existing and new plants are forecast to rival the requirements for new construction labour by the end of the forecast period. The conclusion by the PHRCC is that Alberta's current labour market will not fully support the oil and gas industry's projected net hiring requirements over the forecast period.

The conclusion, based on the models, is that labour markets in Alberta are tightening and some occupations show shortages which are requiring employers to look further afield for the required workers.

3 The next ten highest shortages forecast by the GoA model (again in order presented in the source document) are: receptionists and switchboard operators – 619, shippers and receivers – 501, nurses aids, orderlies and patient services associates – 485, program leaders and instructors in recreation, sport and fitness – 496, food and beverage servers – 618, operators and attendants in amusement, recreation and sport – 465, grocery clerks and store shelf stockers – 566, material handlers – 498, other trades helpers and labourers – 581, landscaping and grounds maintenance labourers – 549.

3.4. Comparing Short- and Long-Term Shortages

To address the requirement to compare short-term to long-term shortages, the investigators utilize a straightforward approach by comparing the top shortages forecast by the Government of Alberta's Short-Term Employment Forecast Tool (STEF),[4] to the top cumulative shortages generated by the Government of Alberta's Occupational Demand and Supply Outlook 2011 to 2021. The results are presented in Table 3.4.1 (below) according to occupational category; absolute numbers are not shown because the STEF does not provide them.

The short-term forecast indicates a variety of shortage occupations but many tend to be in higher-skilled occupations such as engineers and nurses and medium-skilled occupations such as millwrights and mechanics. In contrast, the long-term forecast shows significantly more lower-skilled occupations such as construction trades helpers, cashiers, cooks and janitors. It supports the observation that the demographic profile will affect all areas of the labour market, but it also raises the question of where the necessary workers will come from – particularly in jobs where productivity enhancements cannot offset the potential shortages.

4 The Alberta Government's Short Term Employment Forecast (STEF) Tool uses quantitative information such as employment growth rates, unemployment rates, number of labour market opinions issues, participation rates, as well as qualitative evidence such as industry environmental scans and JOBBANK postings to identify occupations which are likely to face short term shortages. This comparison was based on the occupations which were assigned the highest predictive power (i.e. likelihood to occur) according to the STEP methodology.

TABLE 3.4.1. Comparison of Short-Term and Long-Term Occupational Shortages

Short-Term Employment Forecasting Tool Results 2011 to 2013	Long-Term Cumulative Shortages ,2011 to 2021 highest to lowest absolute shortage
Retail trade managers	Retail salespersons and sales clerks
Restaurant and food service managers	Registered nurses
Mechanical engineers	Construction trades helpers and labourers
Petroleum engineers	Cashiers
Computer programmers and interactive media developers	Janitors, caretakers and building superintendents
Web designers and developers	Retail trade managers
General practitioners and family physicians	Truck drivers
Registered nurses	Receptionists and switchboard operators
Retail trade supervisors	Cooks
Food service supervisors	Accounting and related clerks
Technical sales specialists, wholesale trade	Customer service information and related clerks
Hairstylists and barbers	Shippers and receivers
Estheticians, electrologists and related occupations	Food and beverage servers
Construction millwrights and independent mechanics	Nurses aides, orderlies and patient service associates
Heavy duty equipment mechanics	Welders and related machine operators
Motor vehicle body repairers	Program leaders in instructors in recreation, sport and fitness

3.5. Labour Markets Capable of Providing Workers to Alberta

Tracking the geographic areas providing workers to Alberta in the past and identifying sources of future workers, particularly outside the country, is where labour market forecasting becomes extremely difficult. Existing models account for most of the factors affecting the supply side, including the use of historical mobility patterns to estimate interprovincial and international migration. However, when it comes to identifying potential new markets and modeling how entrants from those markets assimilate within Alberta's market, the models begin to break down.

As noted previously, there is no database that reconciles shortages and surpluses at the international level, and models do not predict where employers should look for new labour sources beyond traditional sources. Having said that, two methodologies exist to identify new sources of workers to fill current and anticipated shortages at the

occupational level. The first was employed by RDA Global (2012) to identify geographic markets where workers are available to fill shortages in the 25 highest-demand occupations in Calgary as determined by the Calgary Labour Demand Model.

The methodology involved using metro-level labour data from Canada (outside Alberta), the United States, the United Kingdom and Ireland that identified the size, wage levels, and propensity to relocate (based on survey data) of the occupational labour force in each market. The output includes a summary table (displayed in Appendix 3.2) showing, for each of the 25 shortage occupations, the cities most likely to provide a source of workers. The summary table is supported by a series of detailed tables denoting, for each of the 25 occupations, the top 10 cities in Canada and the top 10 cities from the other countries most likely to supply the workers, as well as employment levels, wage rates, out migration probability index and several other factors. Calgary Economic Development (2012b) has also published similar information produced by RDA Global for shortages specifically in the oil and gas driller occupational category. As can be observed from the table, the Calgary–determined shortage occupations are generally reflective but broader in scope than the shortages in the higher-skilled occupations identified by the Alberta models.

The second methodology is more experimental and does not exist in the public realm. It involves using Labour Force Survey data to calculate the unemployment rates for specific occupations in other provinces. The results can then be used to target employment drives to provinces with the highest unemployment rate in the sought-for occupations. The problem is that below the provincial level, much of the data is suppressed due to confidentiality requirements and therefore lacks the specificity of the RDA Global approach.

Calgary Economic Development and the Edmonton Economic Development Corporation, among others, have been active in sending missions to the US to promote Alberta employment opportunities, and companies such as ATCO advertise international recruitment drives on their websites. But for competitive reasons, individual firms are reluctant to share recruitment strategies, and no studies were found on the success that employers or economic development authorities have had in using such information sources in their recruitment efforts.

Further, organizations such as the PHRSCC (2012a July) have undertaken surveys to identify best practices in recruitment activities. However, the absence of any data indicating the success of those missions, or any databases tracking the actual movement of workers at specific occupational levels from those destinations to Alberta, precludes further analysis.

3.6. Academic Research on Labour Mobility

To further address the issue of recruiting workers from outside Alberta it is informative to briefly review some academic findings on labour mobility. Labour mobility most broadly covers spatial or geographic movements of individuals, mobility within organizations, and mobility across occupations. This section focuses on spatial and geographic movements of individuals.

Certain findings are clear from the many studies of spatial mobility addressing experience in Canada, the United States, Europe and other parts of the world.[5] Finnie provides a concise summary of the substantial empirical research when he states that migration results from a combination of situational factors and personal attributes. Put simply, income and a number of other elements surround a decision to migrate, indicating that migration decisions are the result of complex and difficult trade-offs.

In the case of income, it is frequently suggested that individuals migrate from areas of lower to those of higher per capita incomes. Of course, it is also observed that individuals migrate in the opposite direction as well. A recent Canadian study (Bernard 2011) using longitudinal data indicates that changes in regional economic conditions (income or unemployment levels) have no significant effect on the decision to relocate.[6] The meaning is that the income determinant is very much a personal factor representing a change in one's personal income circumstances. The study noted that an improvement of 30 per cent in an individual's earnings at the target destination, or a decline of 20 per cent or more resulting from staying in the current location, significantly increases the likelihood of migration.

The nuances that surround the income variable are numerous. All studies indicate that age is a factor; younger age cohorts are more likely to migrate; it is easier for professionals and highly-skilled trades people to relocate than the semi-skilled and unskilled; family attachment and social networks are significant; and people migrate from rural to urban areas. To consider some of the exhaustive research on geographic mobility, Finnie finds in the Canadian case – covering the years 1982 to 1995 – that rates of out-migration vary significantly across provinces, with higher migration rates for smaller provinces exclusive of income differences and unemployment rates (an exception being Alberta). Finnie finds that relative to being single and having no children, being married and/or having children has a significant negative effect on interprovincial mobility. This is also true in the case of single parent families (Finnie 2004).

5 The studies are many and, for example, include: J Vanderkamp (1971), Migration flows: their determinants and the effects of return migration, *Journal of Political Economy*, 79; J. Mincer (1978), Family Migration Decisions, *Journal of Political Economy*, 86; C. Robinson and N. Tomes (1982), Self-selection and Inter-provincial Migration in Canada, *Canadian journal of Economics*, 15; T. Vandenbrande, L. Coppin and P. van der Hallen, *Mobility in Europe*, (Brussels, Eurofound, 2006); M. Greenwood (1969), An Analysis of the Determinants of Geographic Labor Mobility in the United States, *Review of Economics and Statistics*, 51; R. Finnie (2004), Who Moves? A Logic Model Analysis of Interprovincial Migration in Canada, *Applied Economics*, 36; A. Bernard (2011), Regional economic shocks and migration, *Perspectives on Labour and Income*, November.

6 The only exception to this generalization is in the case of recent immigrants.

Further, Mincer (1978) in his landmark studies of migration in America finds married persons less likely to move while, in contrast, the mobility of singles and divorced or separated singles is the most probable. Having said that, mobility may be lowered in the case of singles by ties to members of households headed by parents or other close relatives. In European studies, the findings include evidence that migration is not always the result of individual choice but rather, is characteristic of the more vulnerable groups in society. These studies also find that when a long distance move is considered, there is a fear of loss of contact and support from family and relatives; essentially the loss of an established social network.[7]

Climatic considerations are notably absent from Canadian mobility studies, though it is not clear why since there are differences in seasonal conditions across the regions of the country. American studies have noted the effect of climate on mobility choices (Greenwood 1969). The finding is that temperature differences are highly significant and in favour of those areas with higher average annual temperatures. This clearly has a bearing on Alberta when it is competing with other jurisdictions, such as Western Australia, for international pools of labour such as those identified by RDA Global.

3.7. Concluding Observations and Recommendations

Following are key observations and recommendations based on the information provided in this chapter.

1. The Province of Alberta leads all provinces in the scope of its labour market development activities and its occupational modeling products. However, consideration should be given to combining regional efforts into a single national forecasting consortium and generating more frequent forecasts, such as in the Australian approach described in Appendix 3.3.
2. In the energy sector, many NOC titles and descriptions must be 'mapped' to the titles and descriptions used by oil and gas companies for the information to be understood. This has implications for modeling, as well as for international recruitment efforts where workers who want to come to Canada must choose a NOC category that represents their skill set in order to be evaluated by Citizenship and Immigration Canada. Discussions with Statistics Canada should be undertaken to resolve these issues.

7 This raises an interesting question with regard to fly in – fly out arrangements. Perhaps for attached individuals impediments to mobility are dampened because the spouse who remains sustains the household within its existing social network.

3. Labour market forecasting is an inexact science and should be used to determine whether actions to correct imbalances are necessary rather than to anticipate whether interventions will take place.
4. The different output formats used by the Alberta Government, CSC, and PHRSCC models make their respective results difficult to compare. Recognizing that forecasts are produced for different target audiences, consideration could be given to standardizing the methodologies (see number 1 above).
5. The Alberta long-term model shows the highest shortages in many lower-skilled occupations, and in some health care occupations. However, the model does not account for technological and productivity enhancements which are capable of mitigating shortages in lower skilled occupations (such as sales clerks and cashiers).
6. A comparison of the Government of Alberta's short- and long-term forecasts indicates shorter-term shortages in medium and higher skilled occupations (such as engineers, nurses, millwrights and mechanics). Longer-term shortages are more pronounced in lower skilled occupations such as construction helpers, cashiers, cooks and janitors, although some higher-skilled occupations such as nursing assistants will also experience shortages.
7. Two methodologies were found capable of defining geographic markets in Canada, the U.S., Ireland and Great Britain where occupations in demand can be found (one is experimental and public results are not available). With respect to the publicly available data, no studies were discovered indicating the success employers have in attracting workers from identified areas. Further, beyond the general identification of best practices, no evidence or case studies were found regarding employers' methods of attracting workers, or their relative success levels.
8. Academic studies reviewed on labour mobility indicate that many factors in addition to wage levels, impact mobility-related decisions and, implicitly, should be taken into consideration in attraction and retention activities.

Appendix 3.1. Labour Market Activity Comparison

Table A1 (below) offers a comparison of government-supported labour market activity in British Columbia, Alberta, Saskatchewan, Manitoba and Ontario. Two time periods were used, 2005-2008 and 2009-2012, to help capture the increase in activity since 2009.

The intent of the comparison is to gain a sense of which provinces have been the most active in developing provincial strategies and models and tools for employers and employees in the area of labour shortages and demand.

The data collected was Internet-based and was limited to documents that were publicly available, which possibly excludes the activities of some provinces. The types of activities were then divided into nine categories and these categories acted as a base for comparison.

From 2005-2008, few provinces other than Alberta were heavily involved in workforce strategies. Only Alberta appears to have developed provincial, regional and industry strategies and labour projections and models. From 2009-2012, British Columbia became active in almost all of the same areas as Alberta except Short-Term Labour Force Models. To a lesser extent, from 2009-2012, Saskatchewan and Ontario increased their activity. The main conclusion drawn is that Alberta has been the most involved over both time periods and the national leader in terms of labour market activity.

TABLE A1. Cross Canada Labour Market Activity Comparison

2005-2008					
Government Initiatives (definitions below)	**British Columbia**	**Alberta**	**Saskatchewan**	**Manitoba**	**Ontario**
Provincial Strategy		Yes			
Provincial Strategy performance measures		Yes			
Strategy progress reports/updates (i.e. annual)		Yes			
Regional Strategy					Yes
Industry Strategy	Yes	Yes	Yes		
Government Forums					
Occupational demand projections		Yes	Yes		
Labour force Model, long-term		Yes			
Labour force Model, short-term (2 years or less)					
2009-2012					
Government Initiatives	**British Columbia**	**Alberta**	**Saskatchewan**	**Manitoba**	**Ontario**
Provincial Strategy	Yes	Yes	Yes		
Provincial Strategy performance measures	Yes	Yes			
Strategy progress reports/updates (i.e. annual)	Yes	Yes			Yes
Regional Strategy	Yes	Yes	Yes		Yes
Industry Strategy	Yes	Yes			
Government Forums	Yes	Yes	Yes		
Occupational demand projections	Yes	Yes	Yes		Yes
Labour force Model, long-term	Yes	Yes			
Labour force Model, short-term (2 years or less)		Yes			

Definitions of the categories appearing Table A1

Provincial Strategy:

A government strategy that addresses the province as a whole, such as *Alberta: Building and Educating Tomorrow's Workforce* (BETW) and BC: Canada Starts Here.

Provincial Strategy Performance Measures:

Identifiable measurable targets/performance measures included in the strategy.

Regional Strategy:

Specific strategies for regions (Ontario's approach is entirely based on regional strategies).

Industry Strategy:

Strategies for specific industries which may or may not be part of the province's overarching strategy, and can be done by Industry Associations.

Government Forums:

Group forums on labour issues such as Alberta's 'Minister's Workforce Forum: What we Heard' reports; or the Saskatchewan Forum 'Investing in the Future Workforce', Public Survey on development of a Labour Market Strategy.

Occupational Demand Projections:

Either by province, region or occupation.

Labour Force Model, long-term:

Occupational supply/demand/shortage projections within a two-to-ten year time frame.

Labour Force Model, short-term:

Occupational supply/demand/shortage projections within a time frame under two years.

Appendix 3.2. Global Geographic Labour Supply

TABLE F1. RDA Global Geographic Labour Supply for Occupations

NOC	Occupation	Top Recommended Countries	Top Recommended Cities			
			Canada	US	UK	Ireland
0013	Senior Managers – Financial, Communications and Other Business Services	US, UK, Ireland	Vancouver, Toronto, St. John's NL	Los Angeles, Atlanta, Chicago, Phoenix, and Denver	Greater London, Brighton, Manchester	Dublin, Cork
1111	Financial Auditors and Accountants	Ireland	St. John's NL, Toronto, Montreal, Vancouver	Los Angeles, Washington DC, Chicago	Leeds, Greater London, Brighton	Dublin, Cork
1122	Professional Occupations in Business Services to Management	US, UK, Ireland	Toronto, Vancouver, Kitchener-Cambridge-Waterloo	Los Angeles, Chicago, Atlanta, Minneapolis-St. Paul	Greater London, Leeds, Brighton	Dublin, Cork
2113	Geologists, Geochemists and Geophysicists	UK	Vancouver, Toronto, St. John's NL, Halifax	Seattle, Austin, Sacramento, Los Angeles, Houston	Birmingham, London	Dublin, Cork
2131	Civil Engineers	UK	St. John's NL, Halifax, Toronto, Vancouver	Phoenix, Denver, Dallas, Atlanta	Greater London, Brighton, Glasgow	Dublin, Cork
2132	Mechanical Engineers	UK, Ireland	Toronto, Vancouver	Los Angeles, Houston, Denver, Seattle	Greater London, Brighton, Cambridge	Dublin, Cork
2133	Electrical and Electronics Engineers	Ireland	Toronto, Vancouver, Kitchener-Cambridge-Waterloo, Halifax	Los Angeles, San Jose, Chicago, Denver, Houston, Dallas	Greater London, Brighton, Birmingham, Bristol	Dublin, Cork
2134	Chemical Engineers	UK	St. John's NL, Halifax, Toronto	Los Angeles, Chicago, Denver, Houston, Dallas	Greater London, Brighton, Birmingham, Bristol	Dublin, Cork
2145	Petroleum Engineers	UK, Ireland	St. John's, Edmonton, Toronto	Houston, New Orleans	London, Brighton, Manchester	Dublin, Cork
2151	Architects	UK, Ireland	Toronto, Vancouver, Halifax	Lois Angeles, Chicago, Washington DC	London, Manchester, Brighton	Dublin, Cork
2154	Land Surveyors	US, UK	Toronto, Vancouver, Edmonton, Halifax, St. John's NL	Phoenix, Salt Lake City, Denver, Los Angeles	London, Brighton, Bristol	Dublin, Cork

TABLE F1 continued

NOC	Occupation	Top Recommended Countries	Top Recommended Cities			
			Canada	US	UK	Ireland
2171	Information Systems Analysts and Consultants	US, UK	Toronto, Montreal, Quebec, Ottawa, Vancouver	Phoenix, Seattle, Houston, Los Angeles, Chicago	London, Brighton, Manchester	Dublin, Cork
2173	Software Engineers	UK, Ireland	Kitchener-Cambridge-Waterloo, Toronto, Vancouver	Seattle, Denver, San Jose	Greater London, Brighton, Oxford	Dublin, Cork
2174	Computer Programmers and Interactive Media Developers	UK, Canada	Toronto, Vancouver, Kitchener-Cambridge-Waterloo	Phoenix, Los Angeles, Chicago, Seattle	London, Bristol, Manchester, Liverpool	Dublin, Cork
2281	Computer and Network Operators and Web Technicians	UK, Canada	Halifax, Kitchener-Cambridge-Waterloo, Hamilton, Winnipeg	Los Angeles, Seattle, Denver, San Diego	Greater London, Brighton, Bristol	Dublin, Cork
2282	User Support Technicians	UK	Toronto, Saint John NB, Halifax	Los Angeles, Phoenix, Denver	Greater London, Brighton	Dublin, Cork
3142	Physiotherapists	UK	Toronto, Vancouver	Los Angeles, Chicago, Phoenix	Greater London, Brighton, Manchester	Dublin, Cork
3152	Registered Nurses	Ireland	Toronto, Vancouver, Halifax	Los Angeles, Phoenix, Houston, Atlanta	Greater London, Brighton, Manchester, Liverpool	Dublin, Cork
7251	Plumbers	US, UK, Canada, Ireland	Toronto, Halifax, Hamilton, Oshawa, Ottawa, Quebec City, Montreal	Los Angeles, Houston, Phoenix, Dallas	Manchester, Bristol, Leeds	Dublin, Cork
7271	Carpenters	US, UK, Canada, Ireland	St John's NL, Halifax	Phoenix, Las Vegas, Houston, Dallas, Denver	London, Bristol, Brighton, Glasgow	Dublin, Cork
7411	Truck Drivers	US, UK, Canada, Ireland	Toronto, Vancouver, Edmonton, Kitchener-Cambridge-Waterloo, Hamilton, St. Catharines-Niagara, London	Riverside-San Bernardino, Los Angeles, Chicago	Manchester, Greater London, Brighton	Dublin, Cork
7611	Construction Trades Helpers and Labourers	US, UK, Canada, Ireland	Halifax, Hamilton, London, Ottawa, Kitchener	Las Vegas, Houston, Dallas, Los Angeles	London, Bristol, Manchester, Liverpool	Dublin, Cork
8232	Oil and Gas Well Drillers, Servicers, Testers and Related Workers	US	Edmonton, Saskatoon, St. John's NL	Houston, Dallas, Bakersfield CA, Longview-Marshall TX, Tulsa	Aberdeen, Edinburgh, Glasgow	Cork

Appendix 3.3. Government of Australia's Labour Market Modeling

The following quotation from the work of Richardson and Tan at Australia's National Centre for Vocational Education Research, is a useful summary of the Australian position on labour market modeling.

> …It is extremely difficult, in both theory and practice, to forecast how the demand for labour is going to evolve – beyond a few years into the future. Economies are complex and dynamic and are affected by many forces that cannot be predicted with any confidence… Even the best of the forecasting models do only a moderate job of projecting total output and employment for a number of years into the future. Their accuracy falls rapidly as the projection horizon extends, as the types of skills become more disaggregated, and as projections are made by region.
>
> ...It is difficult to evaluate the accuracy and reliability of the forecasts of such models, because such evaluations can only occur sometime after the forecasts are made. Where there have been evaluations, they generally conclude that the models are of some value, but mainly as indicators of overall trends and interdependencies. When they are used to forecast the growth in occupations in any detail, they are often out by 10 or 20 per cent within a few years. Our own comparisons of projections with outcomes for the MONASH (Australian) model confirm that, over a nine-year period, its projections diverged substantially from the actual outcomes for a number of occupations. Indeed, even at the major occupational group level, the direction of change was in some cases incorrect – projecting growth when there was decline and vice versa. This inaccuracy is a reflection of the difficulty of the task (Richardson and Tan, 2007, p. 9).

These caveats are conveyed precisely in the government document.

The projections included in this document are best considered as a guide to what the future labour market may look like and are best used to inform public and industry policy towards a range of potential future labour market scenarios" (Government of Western Australia Department of Training and Workforce Development, 2010, p.7).

The fact that projection revisions are taken very seriously is shown in the quotation below from a letter of May 9, 2012 by Ruth Shean, Director General of the Department of Training and Workforce Development:

> Latest employment projections from the Monash University Centre for Policy Studies show that Western Australia's workforce is expected to grow by an additional 170,000 jobs by 2015, representing an annual average growth rate of 2.3 percent. The latest projections from Monash (and based on an update to other

data sources) suggest that Western Australia now faces a potential shortfall of 76,000 workers by 2015, compared to the previous estimated shortfall of 150,000 workers by 2017.

The Department has reduced this particular forecast time frame of employment projections from seven years to four years (that is to 2015) to further improve the accuracy of our analysis.

CHAPTER 4

OPPORTUNITY COST OF LABOUR SHORTAGES

Applications Management Consultants (AMC) Ltd. and the Conference Board of Canada (CBoC) provided estimates of the opportunity cost of labour shortages.

The primary goal of the chapter analysis is to identify the effect of a labour shortage on the Alberta economy using a timeline through 2016. To do this, a Base Scenario was constructed to largely follow the Government of Alberta (GoA) projections of economic activity over the next five years as outlined in the *Economic Outlook: Budget 2013*. While economic growth has been moderating, the budget forecast is projecting relatively strong economic growth for Alberta. Real gross domestic product is forecasted to grow at an annual rate of between 2.8 and 2.9 per cent per year to the end of the forecast period. This is taken as the growth in the potential output of the economy, and we estimate the reduction of potential output and the opportunity cost should labour shortages occur.

The estimate of potential output growth is based on the following set of projected conditions. Oil sands and other energy sector development are expected to continue to lead economic growth in Alberta. Economic growth in the United States is expected to remain modest, while advancing at a moderate pace. Other advanced economies are expected to continue to struggle to maintain growth. Eurozone debt and other international finance risks continue to hold worldwide economic recovery in check. This poses some limits for Alberta's growth as demand and prices for energy and other commodities are projected to remain moderate over the forecast period.

Oil prices are projected to range between US$93.00 and US$95.50/bbl between 2013 and 2016. This forecast is generally more conservative than other projections of West Texas Intermediate (WTI) oil prices over the same period. As noted by the GoA, the oil price differentials paid to Alberta producers compared to the WTI price has increased, resulting in both less revenues to producers and lower royalty revenues to the province. As well, the proportion of total oil production in Alberta is increasingly coming from non-conventional sources.

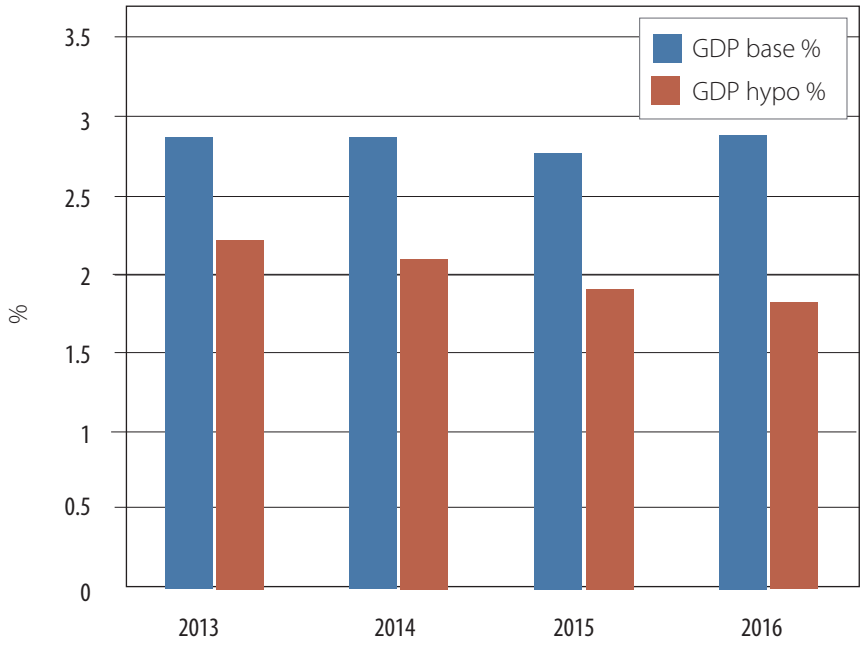
Natural gas prices are projected to increase modestly over the forecast period from US$3.70 to US$4.80/MMBTU. This forecast is also relatively conservative when compared to most forecasting agencies.

Other key forecasting assumptions involve the U.S. exchange rate, inflation and short-term interest rates. The value of the Canadian dollar is projected to hold roughly at par relative to the U.S. dollar over the forecast period. This means that Alberta's exports to the U.S. will remain roughly at their current competitive position. Inflation is expected to remain relatively subdued over the forecast period, ranging between 2 and 2.5 per cent per year to 2016. Finally, short-term borrowing rates (three-month Government of Canada Treasury Bills) are projected to increase from the current rate of 1 per cent to approximately 2.75 per cent by the end of the forecast period.

Labour shortages are estimated based on the assumptions regarding the available labour supply and skills of that labour supply to meet projected demand. Net in-migration from immigration and inter-provincial migration has been forecast incorporating reasonable assumptions on the ability of Alberta employers to attract skilled workers from outside the province. Within the provincial supply of workers, the available supply of skilled workers to meet demand has incorporated both mobility assumptions as well as the wage competitiveness of industry.

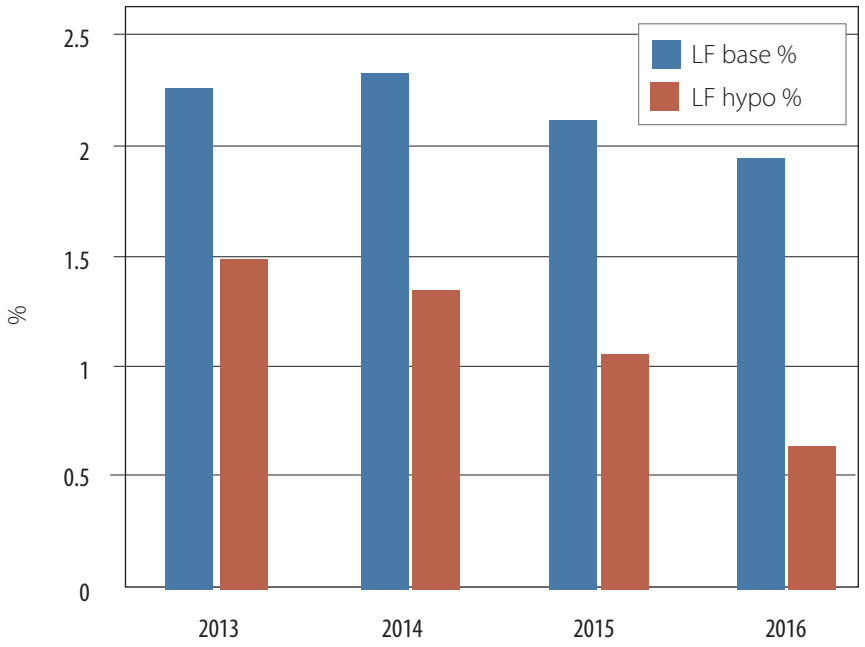
Typically, the pressure for higher wages would result in greater in-migration to Alberta, which in turn would help to alleviate the labour shortage. A wage differential that is acceptable to prospective workers is an enticement to migrate, but it must be large enough to overcome the explicit and implicit costs of such a move. This analysis assumes that increases in interprovincial migration will not be sufficient to stem labour shortages. Therefore, the shock values truly represent business' reaction to the inability to find the necessary skilled labour to match employment opportunities – that is, investment intentions are curtailed and economic activity is weaker province-wide than would otherwise have been the case. The analysis must also assume that private firms have no means to alleviate the labour shortage and, under these assumptions, the difference between the baseline and shock or hypothetical (labour-constrained) values truly represents foregone opportunities. Effectively, potential output is not realized and a gap between the latter and recorded output occurs because of the labour supply constraints. Differences in potential output and shock, or hypothetical GDP and labour force growth rates are shown in Figures 4.1 and 4.2, below.

FIGURE 4.1. Potential and Constrained Growth in GDP: 2013 to 2016



Source: Applications Management Consulting Ltd.

FIGURE 4.2. Potential and Constrained Labour Force Growth Rates: 2013 to 2016



Source: Applications Management Consulting Ltd.

In the baseline shock scenario, assumptions provided by AMC indicate that real GDP is cumulatively reduced by $20.4 billion ($2002) over the outlook, while employment is lowered by a cumulative 267,000 person-years of employment over the four-year simulation horizon. Table 4.1 below highlights the economic losses of labour shortages, on an industry basis, as produced by AMC for the Base Scenario.

TABLE 4.1. Real GDP by Industry and Labour Market: Alberta*

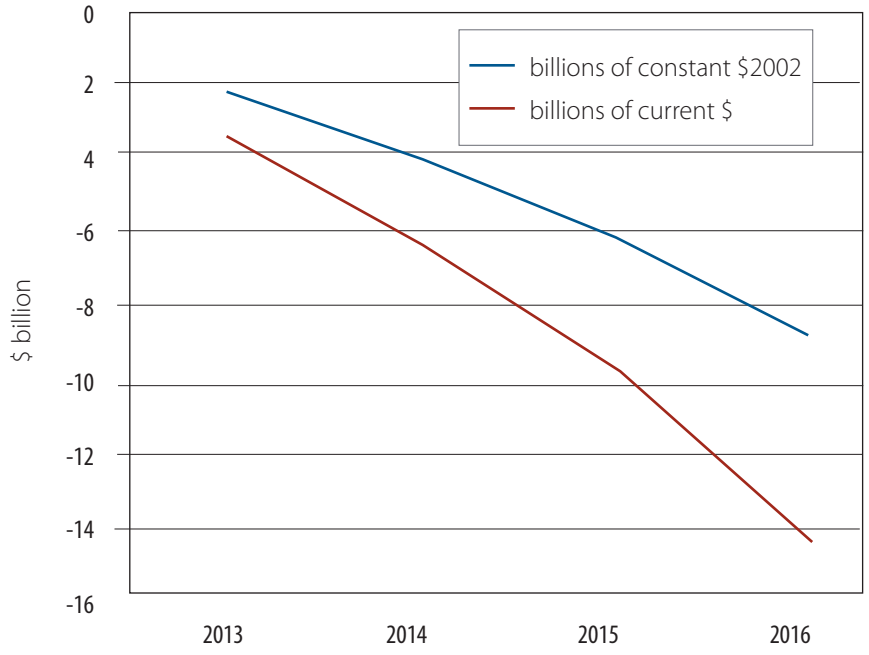
	2013	2014	2015	2016	Total
Real GDP at basic prices (millions of $2002)	-2,174	-3,904	-5,898	-8,422	-20,398
Primary sector	-236	-427	-651	-943	-2,257
Manufacturing	-201	-377	-585	-840	-2,003
Construction	-111	-220	-343	-456	-1,130
Mining	-232	-419	-637	-923	-2,211
Utilities	-43	-80	-122	-176	-421
Transportation, storage and communication	-116	-209	-319	-460	-1,104
Wholesale and retail trade	-423	-725	-1,061	-1,480	-3,689
Finance, insurance and real estate	-352	-627	-942	-1,348	-3,269
Community, business and personal services	-314	-566	-861	-1,256	-2,997
Public administration and defence	-74	-131	-196	-283	-684
Total employment (000s)	-30	-52	-77	-109	-267
Other primary sector	-1	-2	-3	-4	-10
Manufacturing	-1	-3	-4	-6	-15
Construction	-2	-4	-6	-8	-21
Utilities	0	0	-1	-1	-2
Transportation, storage and communication	-1	-3	-4	-5	-13
Wholesale and retail trade	-7	-12	-17	-23	-59
Finance, insurance and real estate	-1	-2	-3	-5	-11
Community, business and personal services	-8	-14	-21	-30	-74
Public administration and defence	-1	-2	-3	-4	-9
Unemployment	10	18	27	37	92

*Level difference shock minus control except where otherwise indicated
Source: The Conference Board of Canada

The Conference Board was tasked with determining the related impacts on expenditure-based GDP, income and government revenues. To that end, it was necessary to determine what expenditure-based categories were most closely associated with the real GDP losses in the specific industry assumptions provided by AMC. First, utilizing the Conference Board's proprietary model of Alberta's economy, real GDP losses were adjusted to reflect the current price level in a labour-constrained world. Second, the total nominal value of the shock was then distributed across the range of expenditure categories in a manner that is consistent with the input-output structure of Alberta's economy, as determined by Statistics Canada. Subsequent simulations of the forecasting model ensure the impacts are then appropriately allocated to income variables, such as total labour income, corporate profits, personal federal and provincial income tax collections, and indirect taxes.

Figure 4.3, below, displays the annual losses on real and nominal GDP (or income) in Alberta. By 2016, real income is down by $8.7 billion compared to the unconstrained scenario. Despite the negative effects of the shock on prices, the impact is greater in nominal dollars. Governments tend to pay attention to nominal GDP as it is the best representation of their tax bases. By 2016, nominal GDP is down by $14.2 billion, representing a cumulative income loss of $33.5 billion over the four-year simulation horizon.

FIGURE 4.3. Real and Nominal GDP Losses: Basic Scenario figure



Source: Conference Board of Canada

Table 4.2 highlights the economic impacts to GDP on an expenditure basis. Consumer spending accounts for more than 40 per cent of total output lost – down a cumulative $14.1 billion over the reference period. Business investment is reduced by $9.3 billion, with more than half of that loss originating in the non-residential construction sector. And while exports are down a cumulative $19.5 billion, imports are also weaker as consumer spending slows and the cumulative loss in net trade is therefore just $5.2 billion. The remaining losses are attributed to government.

TABLE 4.2. GDP Expenditure Based: Alberta*

Millions $ (Market Prices)	2013	2014	2015	2016	Total
Consumer expenditures	-1,429	-2,601	-4,061	-5,974	-14,065
Government spending on goods and services	-491	-900	-1,401	-2,060	-4,851
Business gross fixed capital formation, residential construction	-156	-288	-450	-648	-1,542
Business gross fixed capital formation, non-residential construction	-607	-1,001	-1,478	-2,168	-5,254
Business gross fixed capital formation, machinery and equipment	-183	-442	-770	-1,158	-2,552
Exports	-1,948	-3,623	-5,661	-8,254	-19,486
Imports	-1,420	-2,650	-4,155	-6,036	-14,261
Gross domestic product at market prices	-3,394	-6,205	-9,666	-14,226	-33,490

*Level difference shock minus control except where otherwise indicated
Source: Conference Board of Canada, Statistics Canada

The results show that, for every job foregone in the analysis, nominal GDP (the broadest measure of a state's tax base) is reduced on average by $125,300 per year. This results in an average reduction in income tax collections (federal and provincial) of $850 million per year (or $12,700 per job), while an additional $470 million ($8,500 per job) per year is lost in indirect taxes. Finally, corporate profits are naturally weaker and corporate income tax collections drop by an average of $275 million per year as a result. Thus, the total drop in tax collections averages $1.7 billion a year or $25,300 per job lost. Annual results and cumulative totals are presented in Table 4.3, below.

TABLE 4.3. Key Economic Indicators: Alberta

	2013	2014	2015	2016	Total
Real GDP at market prices (millions of constant $2002)	-2,257	-4,053	-6,123	-8,744	-21,177
GDP at market prices (millions of current $)	-3,394	-6,205	-9,666	-14,226	-33,490
Real GDP at basic prices (millions of constant $2002)	-2,174	-3,904	-5,898	-8,422	-20,398
Personal income (millions of current $)	-1,948	-3,288	-5,147	-7,956	-18,338
Personal disposable income (millions of current $)	-1,516	-2,505	-3,895	-6,038	-13,954
Population of labour force age (thousands of persons)	-4	-12	-23	-38	-78
Labour force (thousands of persons)	-20	-34	-51	-71	-176
Employment (thousands of persons)	-30	-52	-77	-109	-267
Retail sales (millions of current $)	-764	-1,365	-2,028	-3,032	-7,189
Housing starts	-3,778	-5,591	-6,888	-8,909	-25,166
Corporate profits (millions of current $)	-82	-574	-943	-947	-2,546
Total indirect taxes (millions of current $)	-224	-424	-657	-961	-2,266
Federal personal income tax collection (millions of current $)	-241	-431	-693	-1,072	-2,438
Provincial personal income tax collection (millions of current $)	-95	-168	-271	-423	-956
Corporate income tax collection (millions of current $)	-36	-251	-406	-407	-1,100

*Level difference shock minus control except where otherwise indicated
Source: Conference Board of Canada, Statistics Canada

Overall, labour constraints lead to lost opportunities totalling $33.5 billion over the four-year simulation horizon. The losses are reflected in household income and corporate profits. Federal and provincial governments also suffer lost opportunities in terms of their tax revenues – cumulatively about $6.8 billion is lost to federal and provincial coffers over the four-year simulation horizon.

CHAPTER 5

ISSUES AND RECOMMENDATIONS FOR ALBERTA LABOUR MARKETS

Introduction

In previous sections we have considered the character of the Alberta economy, its place on the national and the international stage, and its sensitivity not only to changing market conditions but also to the impact of technological change. The research has assessed the impact of the province's economic boom in the decade ending in 2006 on labour market conditions including jobs and wages, and in doing so, drew comparisons with the national experience. Models of labour demand and supply incorporating projections of needs over the coming decade have been introduced. Estimates of the loss to the economy should labour shortage prevail in terms of output, jobs and tax revenues under reasonable growth assumptions are presented.

The purpose of this chapter is to consider the ways in which projected labour market demands can be met. In doing so the research team selected six specific areas identified through consultation and literature review as of special significance. These are: apprenticeships, aboriginals, rethinking demographics (mature and disabled workers), fly in – fly out, the impact of productivity growth on labour demand, and immigration and temporary foreign workers.

These six offer the keys to improving Alberta's labour market performance. Much of what follows addresses the questions surrounding how Alberta can make more effective use of the human resources presently at its disposal, and the actions necessary to realize those goals. That is the first and priority line of attack and the principal way of building a highly skilled workforce for the long haul, and for the welfare of future generations. Consideration is given to the ways in which a targeted approach to immigration may assist.

5.1. The Apprenticeship Program

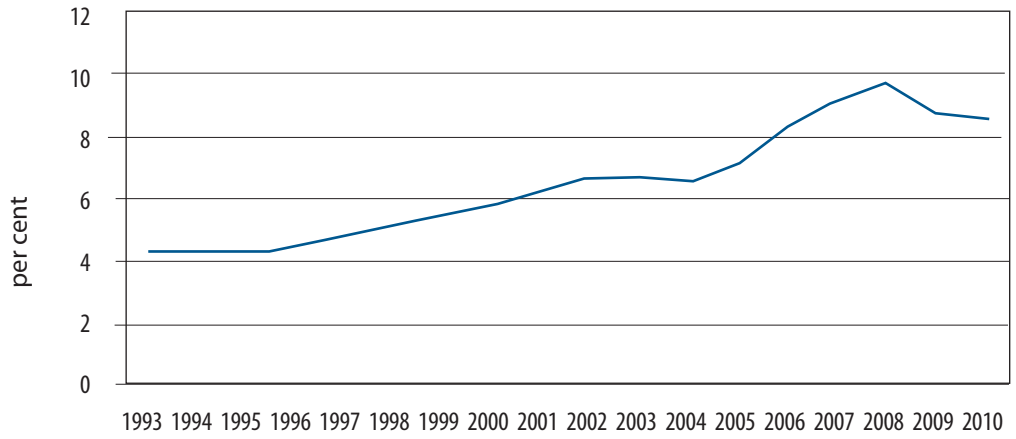
The apprenticeship program, which emphasizes, though is not limited to, the acquisition of tacit knowledge, is by any criteria the primary source to meet Alberta's demand for skilled trades workers. This avenue is also the opportunity for new generations of Albertans to maintain and expand the supply of skilled labour. Apprenticeships present an occupational path for young people raised in the province, familiar with its culture and likely to commit their working lives to its economy. It is therefore essential to consider factors that influence the outcome of apprenticeship programs.

There have been a number of studies at the national level in recent years that have sought to describe apprenticeship programs, to identify those who enter, those who drop out and those who complete certification. These studies include Sharpe and Gibson (2005), Menard, Walker and Chan (2008), Laporte and Mueller (2011), Meredith (2010), Dostie (2010), Coe (2011), and Gunderson and Krashinsky (2012). They are more current examples of many analyses that extend back over a century, including the federal government's 1913 Royal Commission on Industrial Training and Technical Education. [8]

To get a sense of where apprenticeships sit as an alternative to other post-secondary educational options, Alberta data reveal that over the past 20 years apprenticeship enrollment has increased at an annual rate of 5.8 per cent, compared to a rate of 4.3 per cent for university and college enrollments. The proportion of Alberta's 20-29 year olds enrolled in apprenticeship programs rose from about 4.3 per cent to 8.7 per cent over this period. Figure 5.1.1 below shows the proportion of the 20 to 29 year old cohort in apprenticeship programs.

8 See The Royal Commission on Industrial Training and Technical Education (1913). Report of the Commissioners, Government of Canada, Ottawa.

Figure 5.1.1: Per Cent of Alberta 20- to 29-Year-Olds in Apprenticeship Programs



Source: Government of Canada/Statistics Canada (December 2011)

As a beginning point for an evaluation of the provincial apprenticeship program, it is essential to recognize the dissimilarity across countries in apprenticeship systems. Failure to do so can confuse discussions about how to introduce improvements in their operation. Broadly speaking, the two major alternatives are the systems prevalent in English speaking countries and north European societies. These differences, summarized by Bertrand (1998), are shown in Table 5.1.2, below. The system that exists in Canada, and in Alberta, is a version of the Anglo stream.

Table 5.1.2: Classification of Apprenticeship Systems

Characteristics	Anglo System	North European System
Balance of general and vocational education	Toward general education	Toward vocational education
Certification	'Market' plays a large role	Based on industry consensus
Customization of program	Emphasis on modules	Well-defined, long-term courses with limited possibility for modification
Entry requirements	Considerable flexibility	Clear requirements
Subsequent employment possibilities	Relatively wide range of job opportunities	Well-defined 'good' possibilities but in a narrowly defined area
Company involvement and location of training	Largely in public and private educational agencies; weak company involvement	Strong company involvement and company-based training

Source: Adapted from O. Bertrand, 1998

On the question of possible adaption of the North European system in Canada, Sharpe and Gibson (2005) have rendered a blunt judgment:

> One implication of this typology is that the practices of the Northern European model are far removed from those of Canada. Policy-makers have often looked to the German apprenticeship system as an inspiration for reform. But the reality that the German system exists in a particular context of social and labour market institutions that are unlikely to arise in Canada cannot be ignored. The question remains whether the institutions and mechanisms employed in Northern European models are applicable in the Canadian case without the context of social partnership and regulated labour markets (p.39).

So how can the Anglo-Saxon based apprenticeship system in Alberta be described? It is largely market based with industry providing both the openings (a prospective apprentice must find an employer) and responsible for delivering some four-fifths of the required program in the workplace; small establishments with up to 20 trades people account for approximately half of all placements in the province. The pathway to certification is a complex one, characterized by a number of closely connected parts. Many researchers, including Sharpe and Gibson, point to this involved apprenticeship structure in which multiple stakeholders are actively involved at the intersection of employment, training, funding and governance.

The following circumstances illustrate the issue:

- as part of the educational system, apprenticeship is in provincial jurisdiction but, at the same time, the federal government participates through a variety of grant programs;
- apprenticeships involve a process of extensive interaction necessitating a high degree of coordination between the apprentice who must find employment, the employer who must establish apprenticeship positions, educational institutions who deliver off-site module components and the responsible public agency who regulate the programs;
- apprentices may have their on-the-job training interrupted by employer downsizing in response to deteriorating market conditions;
- in entering apprentice programs, there are a number of non-trivial transitions that must take place – from school to job search and from job search to employment, from employment to apprenticing, each possibly interrupted by spells of unemployment;
- secondary institutions are more encouraging of student access to university and college rather than apprenticeship options; the younger the apprentice entrant the more likely he/she will drop out of the program; and finally,
- older age entrants have a higher labour market opportunity cost that, coupled with greater personal commitments, acts to abort completion.

The important facts are that this primary source of skilled trade labour is not only industry driven in Alberta and therefore dependent on the provision by employers of apprentice placements, but also has a complicated structure that for the prospective apprentice is not a simple one to navigate successfully, one where the outcome may be quite uncertain (Menard, Chan & Walker, 2008).[9]

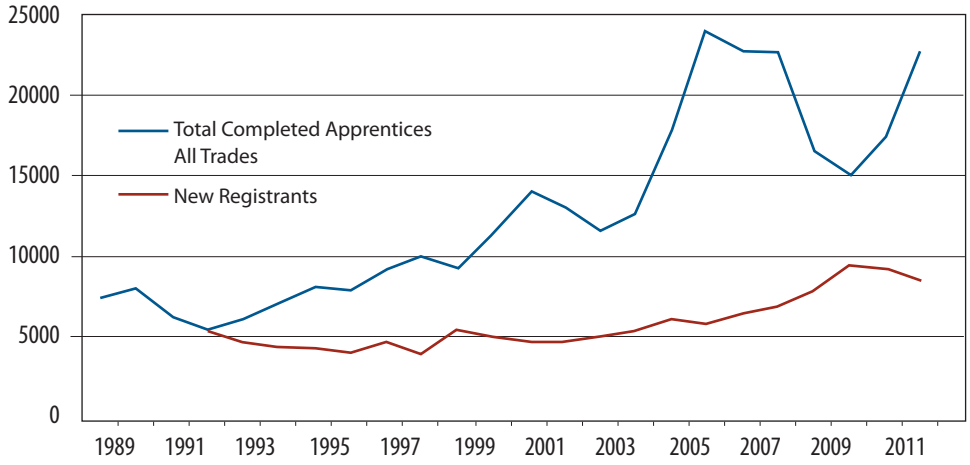
We want to turn now to combine Alberta-specific evidence on these questions with the broader research findings. Alberta's proportion of the national apprentice total is twice its contribution to the national population. Apprentices at entry in this province tend to be younger than the national average, though still typically older than those starting at university or community college. In Alberta, the median age is 23 (i.e. half of entrants younger than that age and half older). The average age is 26. Laporte and Mueller (2001), based on the 2007 National Apprentice Survey (NAS), suggest that, because apprentices are typically older than other postsecondary students, they are not subject to the same school-to-work transition, and likely have some work experience before they enter an apprenticeship program. This is emphasized by O'Grady (1997) who states that the chief purpose of apprenticeship in Canada is to provide a re-entry into the training system for workers in their mid to late twenties; it is not a transition from school-to-work for those in the 16-18 age cohort. In his view, the older comparative age of incoming apprentices represents the preferences of employers who want more mature individuals with experience and focus. These programs therefore provide an opportunity for many 'older' younger cohorts to use time in employment acquiring upgraded skills through a structure that offers the satisfaction of completing a task, raises future earnings flow and enhances the workplace productivity of employers.

The data used for the following analysis come mainly from statistical supplements to the annual reports of the Alberta Apprentice and Industry Training Board (AITB) and consider only those who have registered in apprenticeship programs (i.e. the analysis excludes the relatively small numbers who may have received certification through the challenge option). Alberta data count apprentices on an individual basis and for as long as they remain in the program. This means that if an apprentice is pursuing certification in more than one trade, the individual is counted only once in the data. Statistics Canada also collects apprenticeship data at the provincial level (Government of Canada/Statistics Canada 2012, February 2011). Alberta registrants, as reported by Statistics Canada, differ significantly from that of the AITB, by up to 50 per cent in the case of total registrants. In correspondence with the authors, Statistics Canada suggests the difference is that in their Registered Apprentice Information System (RAIS), apprentices are counted throughout the year rather than as of a given date, and valid duplicate registrations are also included.

9 In the 2007 NAS, half of the respondents revealed that personal relationships with other trades people. Counselors, or teachers encouraged them to enter apprenticeships. Next in importance were knowledge of the trade acquired from previous job experience, and practicing trade-like work as a hobby (Menard *et al*., 2008).

Figure 5.1.3 below shows annual entry apprentice registrations in Alberta compared with annual certificate completions from 1988 to 2012 for entries and from 1992 for completions. One notable feature is the widening gap between entries and completions, with entries more than tripling compared with a doubling of completions. This gap is not unique to Alberta but is also apparent nationally and is discussed below.

FIGURE 5.1.3: Alberta – All Trade New Registrations and Completions by Year, 1988 to 2012



Source: Annual Reports of the AITB

Figure 5.1.3 also displays a clear difference in volatility between new registrations and completions, suggesting that the former series is more sensitive to changing economic conditions. Studies at the WCER over these time intervals identify Alberta business recessions from late 1990 until the spring of 1992 and from the late summer of 2008 through the fall of 2009. New registrations fell by one-third between 1990 and 1992. The boom period of 2004 through 2007 displays a sharp rise in registrations followed by the fall from 2008 through 2010 when new registrations again declined by one-third. New registrations during these years are positively related to provincial economic conditions: when business expands, new registrations increase; and when business declines, new registrations fall. Further supporting evidence is found in historical series in a 1996 Report of the Apprentice Board (October 1996). During the recession of late 1981 through 1984, new registrations fell following burgeoning new registrations in the boom years of 1977-1980. New registrations fell again slightly during the short recession of 1986 (associated with the collapse in energy prices). These findings are consistent with the work of Sharpe and Gibson (2005) and Skof (2006).

Table 5.1.4 below, showing the per cent growth in new registrations for major apprenticeship categories, provides further evidence on the cyclical nature of new registrations. Results are provided for the boom period of 2004 to 2007 and for the

subsequent recession years here identified as the change between 2007 and 2010. New registrations for all five categories rose during the expansion period and fell during the recession years. This cyclicality is to be expected in an employer-based system sensitive to general economic conditions. Annual reports of the AITB indicate that between 2004 and 2007 the number of Alberta establishments offering apprenticeship grew by 25 per cent from 11,600 to 14,500 and fell in 2010 and 2011. It is also clear that those participating were offering fewer number of apprentice positions.

TABLE 5.1.4: Per Cent Change in New Registrations for Apprentice Groups – 2004 to 2007 and 2007 to 2010

Category	2004 to 2007	Change 2007 to 2010
Metal group	87.9	-51.5
Electrical	95.2	-15.1
Mechanical	79.2	-14.3
Construction	42.7	-30.5
Vehicle	24.5	-21.7

Source: Basic data from Annual Reports of the Alberta Apprentice and Industry Training Board

In Table 5.1.5 below, completions display a different profile of which one feature is lesser volatility. The fall in completions in the early and middle 1990s reflects the lower intake of the prior recessionary period, while in the present century a rising number of completions characterize the 2007 to 2010 years. This might suggest completions, at least in these years, were counter-cyclical; but the rise is also an echo effect of the burgeoning increase in registrations between 2004 and 2007. The echo experience is also apparent in falling completions in the first half of the 1990s, following the fall in new registrations during the 1990 to 1992 downturn. The 1995-1996 Report of the AITB indicates that completions rose during 1982 and 1983 in the wake of a large upsurge in new registrations from 1978 to 1980, but declined from 1984 through 1988 with the exception of an upturn in the recession year of 1986 (p.20). Putting all these episodes together, the conclusion is that completions are not simply an echo effect of prior new registration levels but also show pro-cyclical tendencies.

Additional evidence on completions during recent years, 2004 to 2007 and 2007 to 2010, for apprenticeship categories are found in Table 5.1.5, below, which reveals completions increasing in both periods but most strongly in the latter years. These results reinforce the notion that completions in the recent periods represented both an echo and counter-cyclical tendency. These findings are counter to those in Laporte and Mueller (2011) who suggest completions are neutral with respect to changes in the unemployment rate, and to Coe (2011) and Bilginsoy (2003) who find deteriorating labour markets do not provide an incentive to complete certification.

TABLE 5.1.5: Change in Completions for Alberta Apprentice Groups, 2004 to 2007 and 2007 to 2010

Category	2004 to 2007	2007 to 2010
Metal group	0%	57.4%
Electrical	40.8%	37.8%
Mechanical	18.2%	58.5%
Construction	24.7%	38.3%
Vehicle	37.3%	37.6%

Source: Basic data from Annual Reports of the Alberta Apprentice and Industry Training Board

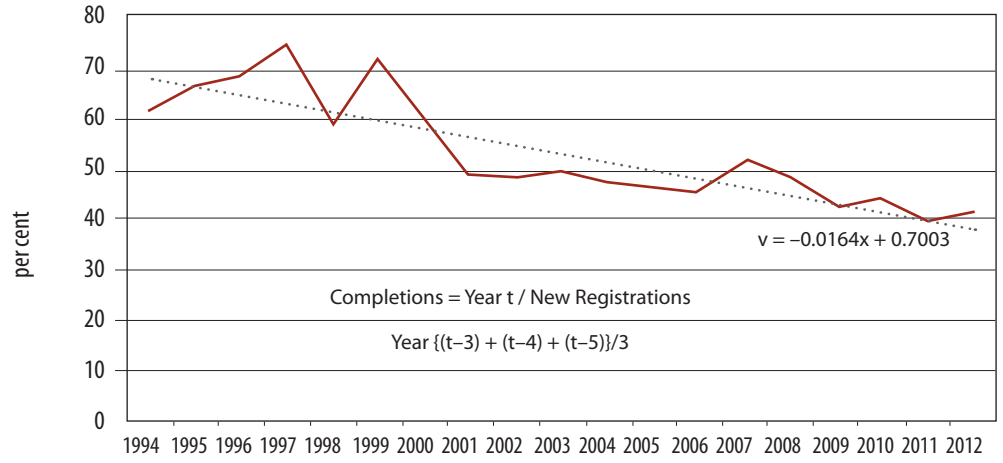
Before considering more Alberta evidence on completions, a summary of findings undertaken in national studies of completion will provide some context. Laporte and Mueller (2011, p.6) find a number of demographic and occupational variables help explain the completion gap. Completion rates increase by being married and having fewer children. Completion rates also increase when the individual has high school graduation or a higher level of education before entering the apprenticeship program. They also find that the probability of completion peaks at four years, the length of many apprenticeship programs. Trade group, type of technical training and having a journeyperson present are also important correlates of program completion.

Dostie's (2010) specific concern, similar to other researchers, is the gap nationally between entry and completion rates in the Canadian apprenticeship system. His findings include the following:

- apprentices are less likely to achieve completion after age 28;
- the probability of completion increases the longer one stays in the program;
- apprentices with disabilities, aboriginals, immigrants and those with children under 18 are less likely to complete;
- apprentices in building and construction trades are less likely to complete;
- those who enter with a high school diploma are more likely to complete; and
- block learning is more likely to increase completion rates.

The growing gap in Alberta between new registrations and completions indicates a declining rate of completion. It is striking that data from a statistical summary of the 2007 NAS (Menard, Chan and Walker, 2008, p.39) revealed that Alberta accounted for a disproportionate share of discontinuers amounting to almost one-third (30.6 per cent) nationally of those dropping out of apprentice programs (Quebecers accounted for another 27.6 per cent). Figure 5.1.6, below, is an estimation of annual rates of completion. A linear trend line summarizes the record since 1995. Improvements in the completion rate serve to increase the supply of Alberta-based skilled trades labour, first and foremost on the list of meeting shortages and advancing provincial skills.

FIGURE 5.1.6: Alberta Apprenticeship Completions, 1994 to 2012



Source: Completions and new registrations from Annual Reports of the Apprentice Board

The completion rate, following the approach of Sharpe and Gibson (2005), expresses the average of completions in years three, four and five to new registrations in the first year. The formula is as follows:

$$CR_t = 100(C_t / \{ [NR_{t-3} + NR_{t-4} + NR_{t-5}] / 3 \})$$

C=completions

CR=completion rate

NR=new registrations

This formula must be taken as an approximation in view of the fact that most are three or four year programs. The inclusion in the average of a fifth year allows for some flexibility in estimating the completion experience.

How applicable to different apprenticeship categories are these aggregate results? In order to answer this we again employ the AITB five group classification: metal; electrical; mechanical; construction; and vehicle. Each of these groups tends to be dominated by a particular apprentice program. For example, the metal program of choice is welding, followed by machinists and millwrights; the electrical group by electricians; the mechanical group by plumbers and sheet metal workers; the construction group by carpenters and crane operators; and the vehicle group by heavy equipment and automotive service technicians.

Figures 5.1.7 (a) through (e) below indicate results similar to aggregate experience with declining completion rates in all groups, an exception being the electrical category.

FIGURE 5.1.7: Alberta Apprenticeship Completions by Group, 1992 to 2012

Figure 5.1.7a: Metal Trade Group

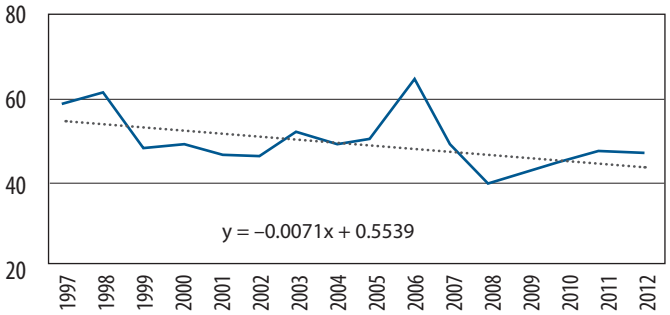


Figure 5.1.7b: Electrical Trade Group

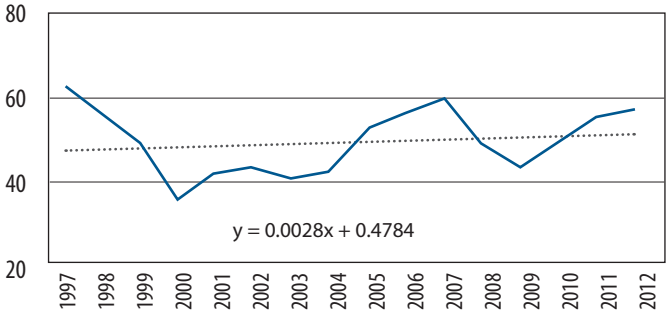


Figure 5.1.7c: Mechanical Trade Group

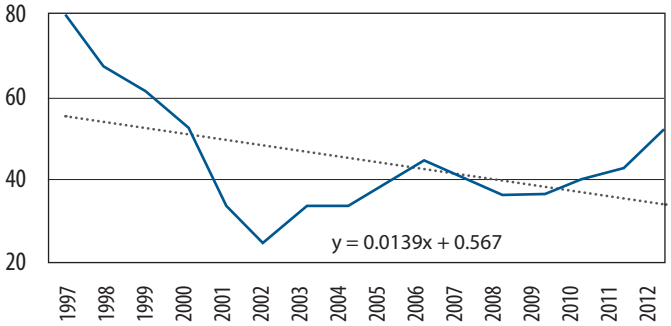


Figure 5.1.7d: Construction Trade Group

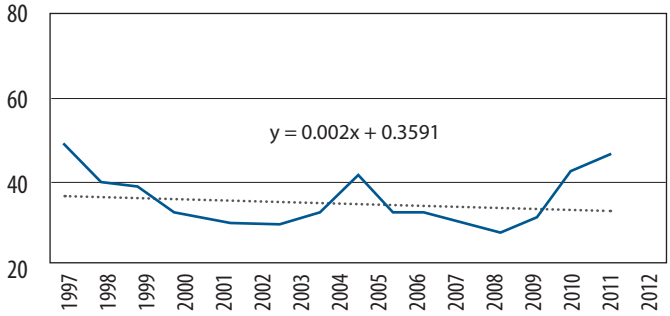
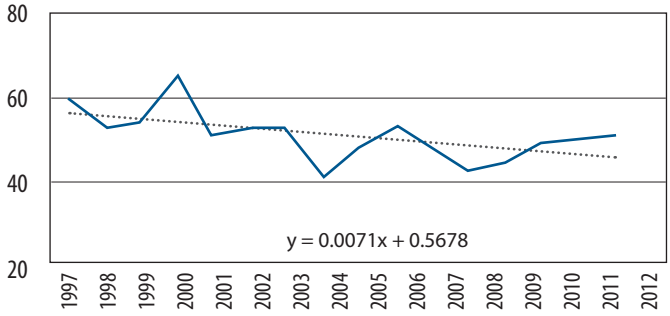


Figure 5.1.7e: Vehicle Trade Group



Source: Government of Alberta/Apprenticeship and Industry Training Board, 1997-2012.

These completion rate estimates, which show a decline, differ in their method of calculation from estimates carried out by the AITB which excludes those who drop out during the first year of a program. This enables the AITB to state in their Annual Reports that slightly more than three of four registrants attain certification.

The difference in these two measures raises questions that go beyond methodological niceties. One justification for excluding first year discontinuations is that they are made up primarily of those who are the youngest entrants. Entrant modal age (the most frequent age) is 19, a group making an immediate transition from high school, likely to be engaged in a trial and error search to identify occupational choices that satisfy their interests. For this age, dropping out simply reflects that search process. However, there is no data on the age distribution of Alberta discontinuers, but the 2007 NAS does indicate that as in Alberta, the majority of national dropouts have been in a program for one year or less. The national data also report that the mean age (32 years) of dropouts is only one year younger than those who complete programs or are in a continuing status (Laporte and Mueller, 2011, p.17). A reasonable inference based on this evidence is that age and experience do not justify a method of calculating completion rates that excludes first year discontinuers. We believe completion rates must take into account first year dropouts.

Mid-decadal surveys of the reasons for dropping out are available both nationally and for Alberta. Nationally, the 2007 NAS lists the following set of leading reasons (Table 5.1.8 below) which are among many reported:

TABLE 5.1.8: Leading Reasons for Dropping Out of Apprenticeship Programs

Other reasons	30%
Not enough work or income	16%
Better job offer	10%
Disliked work	8%
Change of plans	7%

Source: Menard et al (2008, p.23)

The fact that 'other reasons' are foremost suggests that dropping out is a very personal matter that include all kinds of considerations such as dependent responsibilities, problems with journeyperson supervisors and a decision to relocate.

Alberta conducted a study of all apprentices who discontinued their programs between December 2005 and December 2006. The following reasons (Table 5.1.9, below) were the principal, but not mutually exclusive reasons given for dropping out:

TABLE 5.1.9: Alberta – Leading Reasons for Dropping Out of Apprenticeship Programs

Personal/family related	53%
Employment related	46%
Financial related	16%
Technical training related	17%

Source: Annual Report of the Alberta Apprenticeship and Industry Training Board, 2007-2008

This survey was taken during a period of economic boom in Alberta so it is not surprising that the combined financial and employment related reasons, 'finding a job in an unrelated field', 'adequacy of wages and/or benefits' and 'greater incentive to work than complete an apprenticeship program', play a larger role provincially than nationally (In Alberta, four-year program apprentices typically earn 60 per cent of a journeyman's wage in their first year, 70 per cent, 80 per cent and 90 per cent respectively in the second through fourth year). Personal reasons, which represent a multitude of considerations including those related to workplace supervision and culture, together with the demands of dependents, are also of great importance provincially.

Figure 5.1.10 below provides the WCER's quantitative estimates of dropouts since no consistent series is provided in the official apprenticeship statistics. What one would like to have is a longitudinal record of those entering Alberta apprenticeship programs, noting their educational qualifications, their experience, the number of employers they have, who continues, who discontinues and who completes so that we can more fully comprehend the apprenticeship experience in the province. In the absence of such knowledge, we estimate discontinuers following a two-step process. First we calculate a hypothetical total apprentice registration for each year as follows:

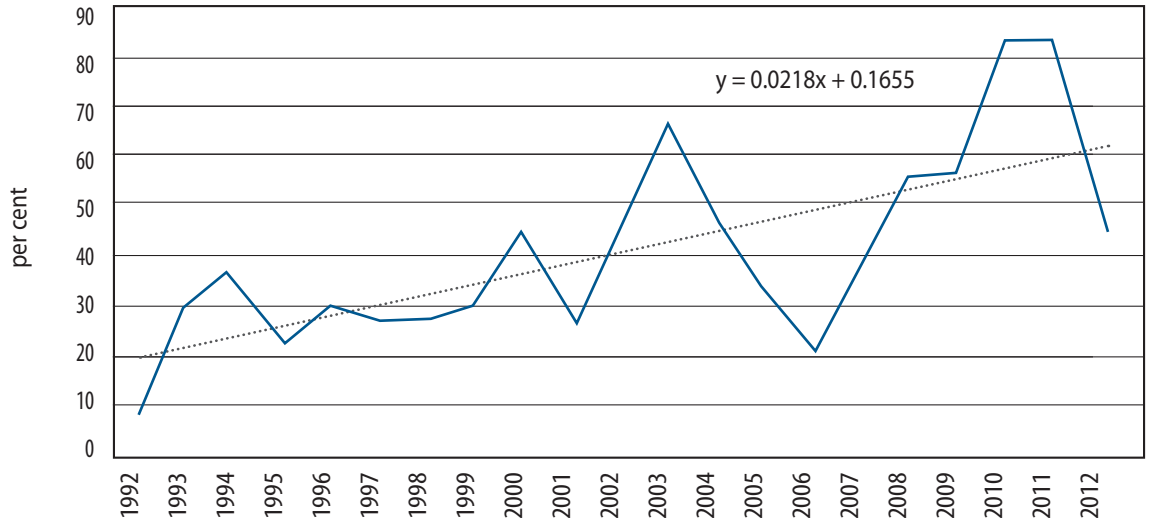
$$HTR_t = TR_{t-1} + NR_t - C_t$$

HTR_t = Hypothetical Total Registrations in year t
TR_{t-1} = Actual Total Registrations in year t-1
NR_t = New Registrations in year t
C_t = Completions in year t

The Hypothetical Total Registration considers only last year's actual total registrations together with new registrations and completions in the current year. We then take the difference between actual total registrations and the calculated hypothetical total registrations as an estimate of annual dropouts.

In Figure 5.1.10 below, estimated dropouts (which rose at a 13 per cent annual rate) are related to new registrations. The chart indicates considerably more volatility in recent years but what stands out is the rising trend in dropouts from less than three of ten new registrants in the earlier years to up to six of ten in the recent period.

FIGURE 5.1.10: Ratio of Estimated Dropouts to New Registrants, 1992 to 2012



Source: WCER and Annual Reports of the AITB

Looking at the Alberta evidence, the larger question to be asked is whether these reasons for leaving represent a considered assessment by the individual of long-term potential, or opportunism whose consequence is a less probable enhanced future earnings stream. The evidence is clear that a certified trades person has a brighter employment future than one who has not completed the necessary mastering of knowledge and application through an objective assessment structure. In recent research, Gunderson and Krashinsky (2012), using data from the 2006 census, are particularly interested in the earnings profile of apprenticeship trades relative to other trades and to both high school and community college graduates. With respect to male apprenticeship-based trades, he finds earnings premiums of 24.1 per cent, 15.5 per cent, and 2.3 per cent relative to those with high school graduation, other trades and community college grads.

It is also a safe bet that an employer with certified journeymen is a more productive organization. Beyond that, high attrition rates are a costly burden on the employer. Why hire a beginning apprentice when there is a high chance she will quit? This may discourage firms from participating and is an incentive to poach within the apprentice system. In this set of circumstances, there is every reason for concern about a declining completion rate and a need to reverse the trend and ratchet up completion rates. Even a modest reversal to restore completion rates to those of 15 years ago would significantly improve Alberta's own source of needed trade skills. To make the point clear, if completion rates had remained at the levels of 1995 and 1996 throughout subsequent years, the supply of Alberta-trained and certificated skilled trades people would be 38,000 higher than it is today.

We believe that raising completion rates includes an appropriate role for a government initiative. This role should recognize the high dropout rate in the first year, which cannot be isolated from how the new apprentice adjusts to, and becomes comfortable in, the work situation. It should also recognize that business establishments provide apprentice placements and deliver on-the-job training through journeyman supervision and skill transfer. In doing so, the employer incurs uncompensated training costs. Thus, Alberta should introduce an Apprentice Mentorship Program.

The high frequency of first-year dropouts is clear evidence that the transition into the apprenticeship structure is a difficult one for many. There are hurdles to be overcome (recognizing the commitment to an enhanced future earnings stream, adapting to the journeyman/apprentice relationship, the cost of acquiring needed work tools, the tuition costs of training modules) that can be daunting when taken together. The question is whether dropping out is entirely a personal responsibility or whether there are some inadequacies in the structure, and if so, how to address them. No one can deny the importance of attitude and personal responsibility but at the same time, there are positive initiatives that can be taken to facilitate adaptation to a complex and, at times, confusing apprenticeship structure. These dropouts are costly. They generate a sense of failure in the individual, they are a source of frustration to the employer and a disincentive to participation in the apprenticeship programs. For the province, they represent likely loss of a home-grown, skilled member of the workforce. We believe there is a role for the provincial government in acting to reduce these costs.

One simple and straightforward approach is for Alberta to follow the lead of Australia where large first-year apprentice dropout rates also plague the program. That country has elected to deal with the problem through an Apprentice Mentorship Program specifically aimed at the retention of those in the first year of their training. It provides funding support to employers or supervisors to encourage a positive employment relationship and better support for apprentices. The initiative encourages industry-led applications for support, on the assumption that industry-wide consortia are more likely to possess the required delivery expertise.

Recommendations

1. Adopt a provincially-funded mentorship initiative with particular emphasis on reducing the dropout rate of first-year apprentices. The preference is for this program to be implemented through industry associations.
2. Apply resources to establishing an advanced database for the apprenticeship programs to eliminate existing serious knowledge gaps. For example, there is a need to know the demographics of those who drop out of the program and their reasons for doing so, how many employers the apprentice works for and the duration of that employment, the spells of unemployment the apprentice experiences, and the apprentice completion rate when employed by smaller as opposed to larger businesses.
3. Alberta should pursue apprentice eligibility for the student loan program. This eligibility will assist with overcoming the financial impediments many face to tuition and tool acquisition.

5.2. The Labour Force Involvement of the Aboriginal Community

Alberta accounts for just over one-tenth (10.6 per cent) of the Canadian population but is home to almost one-fifth (18.1 per cent) of Canada's Aboriginal society. This drives home the fact that, in a period of great concern about labour shortages, every piece should be in place to guarantee the most effective possible use of this workforce.

The Aboriginal population is:

- slightly more than four per cent of working age people;
- growing more rapidly than the non-Aboriginal population; and
- composed of off-reserve and on-reserve First Nations and Metis, which constitute almost all of the province's Aboriginals, as well as Inuit, whose presence in Alberta is minimal.

More than one-third of off-reserve Aboriginals live in the Edmonton area, about one-fifth in the Calgary region and 16 per cent in the Athabasca/Grande Prairie/Peace River economic region. Off-reserve First Nations and Metis are self-identified in the surveys from which data regarding their labour market involvement (participation, employment rate, unemployment, industry of work and occupation) are systematically available monthly. However, data about on-reserve First Nations come primarily from the census with large time intervals between information points. Consequently, the analysis that follows emphasizes off-reserve First Nations peoples and Metis.

Table 5.2.1 below reveals that Aboriginal employment rates are lower (by up to 10 per cent) and unemployment rates are higher than non-Aboriginal unemployment rates. The statistics also reveal that Aboriginals bore the brunt of the economic difficulties following the employment peaks of 2007 and 2008. The Aboriginal participation rate declined by almost five per cent and the employment rate dropped by 6.6 per cent in this period; these declines compare with declines for non-Aboriginals of 0.4 and 1.8 per cent respectively. The industry mix of Aboriginal employment is still largely in services though it is more heavily weighted toward goods production than non-Aboriginal employment.

TABLE 5.2.1: Aboriginal Employment Data and Experience during the Recent Recession Years

	Aboriginal Population				Non-Aboriginal Population			
	2008	2009	2010	2008-2010	2008	2009	2010	2008-2010
	Per cent			Per cent Change	Per cent			Per cent Change
Employment Rate								
Canada	70.8	68.5	65.8	-5.0	82.6	80.6	80.9	-1.7
Alberta	75.2	70.0	69.7	-5.5	86.2	83.7	82.9	-3.3
Unemployment Rate								
Canada	9.3	11.6	12.3	3.0	5.0	7.0	6.8	1.8
Alberta	7.2	12.6	12.1	4.9	2.6	5.3	5.4	2.8
Participation Rate								
Canada	78.0	77.5	75.0	-3.0	86.9	86.6	86.7	-0.2
Alberta	81.0	80.1	79.3	-1.7	88.6	88.4	87.7	-0.9

Source: Statistics Canada, Labour Force Survey

In Alberta, 32 per cent of Aboriginal employment, compared to 27 per cent of non-Aboriginal, is in goods production (farming, forestry, mining, oil and gas, construction, utilities and manufacturing).[10] Half of the employed Aboriginal labour force works in four industries: retail and wholesale trade (17 per cent); construction (12 per cent); forestry, fishing, mining, oil and gas (11 per cent); and health care and social assistance (10 per cent). Aboriginal people are concentrated in three occupations that account for about two-thirds of total employment: sales and service (27 per cent); trades, transport and equipment operators (24 per cent); and business, finance and administration (15 per cent).

10 A major difference in the industry distribution of on-reserve employment is the heavy concentration in three sectors: public administration; education; and health and social assistance.

At current participation rates of 67 per cent, off-reserve Aboriginals will add 160,000 people to the available workforce in 2021.[11] The primary reason for the difference between Aboriginal and non-Aboriginal participation is the substantially lower Aboriginal female involvement in the workforce, differing from non-Aboriginal females by about 18 per cent. If it were possible to raise Aboriginal to non-Aboriginal rates over the next decade, an additional 10,000 workers would be added to the provincial labour supply.

How can we make certain a high Aboriginal participation rate occurs over the next decade? What are the challenges that need to be addressed if the potential is to be realized? Begin with literacy. The evidence from literacy tests is that nationally, urban Aboriginals have lower levels of literacy than the non-Aboriginal population.[12] In Saskatchewan, where overall literacy is similar to that in Alberta, the prevalence of Level 3 or above literacy among Aboriginals was three-fifths of that for non-Aboriginals. That is a substantial impediment to broader participation in the workforce where the vast majority of jobs depend upon at least Level 3 literacy.[13] If literacy is the key to greater labour force involvement, what is the most effective way of opening up more opportunity for those who will be coming of eligible workforce age in the coming decade? The most obvious strategy with the greatest benefits for all concerned is to raise the high school completion rate. Not only is this the simplest and most direct avenue to Level 3 literacy but it is also the path that opens up post-secondary educational attainment and, beyond that, a whole spectrum of wider, better paying employment possibilities. There is nothing new in this, it has been acknowledged for a long time. To take a recent example, the Government of Alberta 2011 *Shaping Alberta's Future: Report of the Premier's Council for Economic Strategy* has stated the issue quite forthrightly in speaking of Aboriginals under 18 years of age:

> These young people have the potential to make a tremendous contribution to Alberta's economy and to society, given opportunity and a good foundational education. Too few are getting either and too many are trapped in a cycle of poverty and ill health (p.71).

Currently, the high school completion rate in Alberta for Aboriginals is 20 per cent lower than for non-Aboriginals, according to the Premier's Council Report, and Richards (2009)

11 This is based on an estimated 15 and over off-reserve Aboriginal 2021 population of 240,000 (Government of Alberta/Human Services 2011d).

12 Government of Canada/Statistics Canada, 2005. See Tables 3.3 and 3.4.

13 Literacy levels are:
Level 1 – poor skills that may not permit a person to read simple instructions;
Level 2 – can only deal with material that is simple and clearly laid out where the task is not too complex. There is particular difficulty facing novel demands such as learning new work skills;
Level 3 – a skill level sufficient to dealing with the everyday problems of life including what would be required for secondary school completion and college entry;
Levels 4 &5 – skills for high order information processing.

using Statistics Canada data. In 2006, for the prime workforce age of 25-34, almost one-half (48 per cent) of First Nation males and 27 per cent of male Metis did not have a high school diploma. The percentages are somewhat better for females (Richards, 2009, p.6). The situation is more distressing for on-reserve First Nations. The 2006 Census indicates that only 39 per cent of the 20-24 age cohort have completed high school or obtained an equivalent diploma.

Alberta Education undertook a major longitudinal study of high school completions, the results of which were published in 2009 (Government of Alberta/Education, 2009a). This important study covered more than 32,000 students who started Grade 3 in Alberta in 1995-96 and entered Grade 10 in this province in 2002-03. For this group, high school completion rates were 73.8 per cent three years after entering Grade 10 (i.e. complete 'on time') and 79.2 per cent four years after Grade 10 entry (delayed completion). Surprisingly, and unfortunately, the study does not distinguish between the experience of Aboriginal and non-Aboriginal students; evidence from the census and elsewhere suggests a disproportionate share of 'failures to complete' for Aboriginal students. However, the study does identify factors associated with failure to complete high school.

These factors are not the same for those who complete on time and those in the delayed completion group. For those in the 'on time' group, several factors of importance in understanding Aboriginal educational issues are apparent. Most significant among these is the negative impact of student mobility on completions – changing school registrations, both in earlier grades and in high school, works against high school graduation. We know from census data and from the studies of Norris and Clatworthy (2003) and Beavon, Winger, and White (2009) that Aboriginals change residence more frequently than non-Aboriginals. This is particularly the case for lower-income, frequently single-parent families, where employment is less stable. For on-reserve children who may transfer to urban schools, the relocation may be even more difficult, perhaps because of academic requirements, cultural differences including lack of support for their cultural identity, low expectations or outright discrimination. In 2010-11, of the 16,000 students ordinarily resident on reserves, 42 per cent were attending off-reserve schools, almost all at provincial schools (Richards, 2009).

Another factor negatively impacting the completion rate is academic achievement. On provincial achievement tests (PATs) given to the overall student population of grades three, six and nine in 2007-08, one-half of Aboriginal students compared to three-quarters of *all* students attained acceptable levels (Government of Alberta/Education, 2009b). That result reflects quite closely high school graduation rates. Another significant factor that negatively affects completion rates is the presence of special needs; students with special needs are more likely to drop out. On this matter, a British Columbia study of special needs found that behavioural disorders were four times more likely in Aboriginal than non-Aboriginal students (Government of British Columbia/ Education, 2001, Table 3).

This general situation is reflected in the efforts of the Alberta Apprenticeship and Industry Training Board (AITB) which, in 2006, initiated an Apprenticeship Preparation for Aboriginal People. The program began in response to the fact that many applicants for apprenticeship projects lacked the necessary basic skills. This further underlines the need to address education issues.

With this extensive evidence, what actions can be taken to fully acknowledge the role Aboriginal peoples can play in meeting the province's workforce needs? The following proposed initiatives to raise the high school completion rate are not new, but they are recommendations that cry out for action.

- Early Learning Centres (ELCs) in neighbourhoods with large concentrations of Aboriginal families should receive compensatory funding to support additional educational activities and family outreach.
- Because the educational attainment issue is multifaceted, where one policy is unlikely to fit all circumstances, supplementary funding should be available to school districts to allow them to pursue discretionary Aboriginal educational initiatives.
- When student numbers warrant, Aboriginal organizations should be able to participate in school governance at the community level.
- Data should be assembled on Aboriginal and non-Aboriginal performance on academic competency tests and that data made publicly available at the school level.
- Aboriginals are under-represented in both teaching and educational leadership. This warrants aggressive action to encourage Aboriginal students to become teachers.

These actions are directed at coming generations of the Aboriginal workforce. What actions can be taken for those younger, prime working-age cohorts who have not completed high school? To reiterate, high school completion is the foundation not simply of access to higher levels of training and educational attainment, but to almost all available jobs. Quite frankly, without that qualification, the individual is at an enormous labour market disadvantage. An obvious action would be to raise the age at which school districts can accept those returning to obtain a high school diploma from 19 years of age to 25. This removes a substantial financial disincentive to those seeking a diploma.

Renewed efforts to have those who may have been school dropouts complete their high school would be an important step in widening future opportunities. These should be linked to the AITB's Aboriginal Apprenticeship Initiative so that one clear transition to the job market is readily apparent. Beyond these specific actions, the province can engage in a sustained effort to build an employer culture of the Aboriginal workforce.

Recommendations

These recommendations are designed to significantly reduce the obstacles for fuller Aboriginal participation in the many transition and workforce opportunities that are available.

1. Early Learning Centres (ELCs) in neighbourhoods with large concentrations of Aboriginal families should receive compensatory funding to support additional educational activities and family outreach.
2. Because the educational attainment issue is multifaceted, where one policy is unlikely to fit all circumstances, supplementary funding should be available to school districts to allow them to pursue discretionary Aboriginal educational initiatives.
3. When student numbers warrant, Aboriginal organizations should be able to participate in school governance at the community level.
4. Data should be assembled on Aboriginal and non-Aboriginal performance on academic competency tests and that data made publicly available at the school level.
5. Aboriginals are under-represented in both teaching and educational leadership. This warrants aggressive action to encourage Aboriginal students to become teachers.
6. Abolish tuition fees for all those 19-25 years old, including aboriginals, attempting to achieve a high school diploma.

5.3. Rethinking Demographics: Mature Workers, Workers with Disabilities and the Labour Force

Mature Workers

Demographic changes have had a tremendous impact on the labour force. In all developed countries, the share of middle- and older-age cohorts in the total population is steadily growing. Further, labour force participation of those 55 and over – the number of persons in the labour force relative to the total population of that cohort – has increased markedly in recent years, evidence that the notion of a universal move to early retirement is simply incorrect. With increased life expectancy and the wide-scale elimination of mandatory retirement, many in older age cohorts choose to continue working.

No longer is retirement a fixed point in time – it is better described as a gradual period of transition. Increased choice about whether to work or retire is the key factor. Perceived adequacy of financial readiness for retirement influences these decisions. Shifts in pension plans from a 'defined benefits' to a 'defined contribution base' move the risk of future income flows to the individual who may, as a result, view the opportunity for retirement more cautiously. This can be of particular concern to the individual when interest returns on relatively secure investments are under four per cent compared with the market rates of a generation ago. These reasons, coupled with non-financial considerations, are clear in results from scores of work-retirement intention surveys. Non-financial factors include: the desire to remain a contributor expressed as a desire to be productive; satisfaction in work and enjoyment of a career; the need to stay mentally engaged; a sense of purpose; and the opportunity for social interaction.

There is extensive literature that addresses the impact of these changes both on public policy and on required adaptation within the workplace. This work includes studies by the National Seniors Council, American Association for Retired Persons, the OECD, Statistics Canada, the Canadian Centre for Policy Alternatives, the US Bureau of Labor Statistics, the British-North American Committee, the Parliamentary Library, the Brookings Institution, private consulting groups, investment houses and many others. Academic work on the subject is extensive. A few relevant papers include: Schellenberg, Turcotte, and Ram (2005); Schellenberg and Ostrovsky (2008); Denton and Spencer (2009); Beach (2008); Park (2011); Filer and Petri (1988); Thorp, Hulley, McKibbin and Pedersen (2009); Patrickson and Ranzijn (2006); and Robson (2001). What falls out from the assessments in this literature is the developed country reality of an aging workforce, and the implication that those jurisdictions that can make necessary adaptations in public policy and in the private sector will have a clear competitive advantage.

The Alberta reality is that, by 2020, two-fifths of our population will be 45 and older, almost double the share in 1980. This change contrasts with those 15 to 24 whose 1980 share at 21 per cent will decline to an estimated 11 per cent in 2020. To assume that these trends can be reversed by increased immigration is a delusion. The numbers involved are too large to be absorbed without social dysfunction and, most significantly, since all countries face the same problem, competition for a limited pool of younger trained workers is fierce.

Table 5.3.1 below shows the mature population (defined as 55 and older) in Alberta from 2001 and projected to 2021.

TABLE 5.3.1: Mature Population in Alberta 2001 to 2021

Aged	2001	2006	2011	2012	2013	2014	2015	2016	2021
55-59	137,651	191,302	236,988	248,005	257,110	263,960	270,010	274,920	280,865
60-64	106,860	136,037	185,558	190,645	198,025	208,435	219,405	230,950	268,665
65+	311,046	355,022	409,117	428,050	447,210	465,775	485,360	505,685	633,990
Total 55+	555,557	682,361	831,663	866,700	902,345	938,170	974,775	1,011,555	1,183,520

Source: Alberta Treasury Board and Finance, June 27 2012

Table 5.3.2, below, shows the change in participation rates for male and female mature workers (defined as 55 and older) in selected years since 1980.

TABLE 5.3.2: Annual Participation Rates for Mature Workers by Gender, Selected Years, 1980-2012

Aged	1980		1990		2000		2012	
	M	F	M	F	M	F	M	F
55-59	86.5	46.1	77.7	51.9	80.3	61.0	85.2	75.8
60-64	65.4	27.7	57.5	31.7	60.6	32.7	70.5	53.7
65+	16.5	3.9	18.0	5.3	16.5	5.0	26.7	12.7

Source: Statistics Canada, Cansim II

The table reveals the dramatic increase in participation rates for females 55 and older over this 30-year period. Male rates show less growth with the exception of the 65 and older cohort. These shifts in work preference among mature workers are not unique to Alberta but are found throughout North America and elsewhere in the developed world. The shifts reflect the increased willingness, within the beginning wave of the boomer generation, to add to the available supply of labour. Increased participation rates reduce the overall impact of demographic change – the aging population – by delaying shrinkage in the workforce and taking advantage of imbedded industry and firm-specific expertise, leadership and experience.

At 2012 participation rates, mature workers will add an additional 40,000 to the provincial workforce over the next decade. Should these rates move up by a reasonable assumption of two per cent, the number of additional workers would be 53,000. Many of these additional workers would be part-time and, if past experience is a guide, would be concentrated in business services, professions and construction. Whether this materializes depends, in large measure, on consistent supportive actions by the public sector and by employers.

In public policy, it is necessary for governments to remove disincentives to continued workforce participation. These disincentives have been reduced through recent federal legislation allowing contributions to the Canada Pension Plan for 65 and older employees that will increase benefits; and employment income up to $35,000 is now free from the Guaranteed Income Supplement penalty. To remove any employment income penalty would seem the next step, and would be of special importance in retaining low-income seniors in the workforce. Public pension systems need to be designed to provide work incentives rather than disincentives.

In the private sector – the primary source of potential demand for mature workers – there is a realization that the workforce is aging. Realization and acceptance of the evidence is a first step; the second step is action to transform human resource policies so that they appropriately reflect the changing conditions. That will be a major undertaking since, over many decades, resource management has emphasized the acquisition and development of younger workers, and has considered retirement at a fixed date to be an integral part of the planning process. Now, in the altered workforce world, some employees may wish to retire at a fixed date; others may wish a gradual transition. The employer will have to distinguish between those it needs to retain, those it may need to reassign, those who may need some retraining, and those who it wishes to retire. The change is to a retirement system where one size does not fit all; a system demanding adaptation to meet individual needs and, by doing so, increasing company capabilities through the retention of desired employees.

Recent studies of Canadian business (Thorp 2009) reveal that firms are having difficulty in translating realization into personnel policy, indicating that necessary changes will not be simple

and are unlikely to come about easily. Behaviour and attitude linked to the stereotyping of older workers are obstacles to transition and a serious impediment to the retention of older workers. Stereotypes underlie workplace perceptions that, for example, treat age as an indicator of aptitude with the older worker seen as reliable, stable and experienced but lacking in attributes considered important in knowledge-based industry such as adaptability, new ideas and flexibility.[14]

Once perceptions become better aligned with evidence, there is the task of redesigning functions and practices within the organization so that acceptable adjustments to the increased relative importance of the mature worker occur. To illustrate, that will mean monitoring the age profile of employees for comparison with the population as a whole and with the profile of client firms; developing recruiting practices to attract older workers; overcoming a reluctance to make training opportunities readily available to older workers; establishing flexible work schedules so that potential care-giving activities of older workers are accommodated; redesigning jobs so that the best use is made of older worker expertise; and identifying how older workers, through their assignment as trainers or mentors, can complement younger workers.

Recommendations

1. The Government of Alberta should remove all disincentives to workforce involvement beyond age 65, and by doing so recognize that retirement should be a matter of individual choice.
2. The Alberta Government should actively engage with employers about the changing demographics that make the utilization of mature workers ever more compelling.

Workers with Disabilities

The Survey on Labour and Income Dynamics (SLID)[15] estimates there were 430,000 disabled Albertans in 2010 between 16 and 64 years of age. Disabilities range from mild to severe with the degree of severity affecting the degree of workforce participation – from total inability to work, to limitations on the amount and kind of work, to full participation in the labour force. Surveys of the disabled identify a variety of types of disability encompassing those affecting the senses such as sight, hearing and speaking; those involving movement such as mobility, agility and pain; and those involving mental capacity such as learning, memory, developmental limitations, and emotional and psychological conditions. There is a social commitment to enable the disabled to enjoy

14 On this point see, for example, Patrickson & Ranzijn, 2006

15 Information on the disabled comes come the Survey on Labour and Income Dynamics (SLID) in which individuals may report their disabilities defined as any difficulty in doing any of the activities of daily living, and those who report a physical, mental or health problem that reduces the kind of activity they can do in a work, home, school, leisure or transport situation. Data are also available from the 2006 Participation and Activity Limitation Survey (PALS) – data from the 2011 survey are not yet available. Differing methodologies in the two sources lead to alternative estimates of the number of disabled persons.

a full and productive life including actions that encourage and facilitate, wherever possible, their participation in the workforce. Those commitments are given expression in the Canada-Alberta Labour Market Agreement for Persons with Disabilities, under which the province cost shares with the federal government labour market programs for those with disabilities.

Alberta disabled workforce participation and employment ratios are the best in the country.[16] The most recent Alberta data (2010) indicate that the employment rate for those with disabilities aged 16 to 64 was 56.3 per cent compared with 69.8 per cent for those without disabilities. For the disabled that represents an increase over the 52.2 per cent rate recorded in 2001.

Should the number of disabled people increase at the rate of two per cent annually, as estimated by Alberta Human Services, the disabled 16 to 64 years of age will number 525,000 by 2020-21, an increase of 95,000 over 2010. Should the employment rate remain at the 2010 rate of 56.3 per cent, there will be an additional 53,000 disabled in the workforce. However, if the employment rate for the disabled were to increase by another seven percentage points due to technical advances of benefit to the disabled and to changes in workplace circumstances, this number would grow to 60,000, or an additional 7,000 workers.

These advances in disabled participation necessitate engagement and action that increase investment both in educational attainment and in workplace adaptation. Educationally, we have evidence that the disabled have lower high school completion rates, higher apprentice dropout rates, and fall short of the non-disabled in acquiring post-secondary degrees. The challenge here is to assure that the disabled possess the capacity to succeed in the workplace, and this will almost certainly require additional public resources.[17]

The hard fact is that, given two equally-trained members of the workforce, one disabled and the other non-disabled, to enhance employability the disabled person will require more capital equipment to carry out duties. The types of modifications involving capital outlays that may be necessary include: an ergonomic work station; supporting equipment; an accessible elevator; accessible washrooms; technical aids; handrails or ramps; computer modifications; communication aids; job redesign; accessible parking; and modified hours or days of work (Government of Canada/Statistics Canada, 2008, Table 6). Some of these modifications involve adjustments in the organization of work, similar to what is required with mature workers, while others involve hardware. Under existing programs, there is 50/50 sharing on these outlays between government and the prospective employer up to a maximum public contribution (Government of Alberta/

16 For employment see Chart 6 in Statistics Canada (2008), Participation and Activity Limitation Survey of 2006: Labour Force Experience of People with Disabilities in Canada, 89-628-X No. 7

17 On the matter of high school completion, see Figure 14, page 19 in Government of Alberta/Education (2009). On apprenticeship dropouts, see Dostie, 2010. On post-secondary education, see Government of Alberta/Human Services, 2012, Figure 1, p. 2.

Human Services, 2013, July 31). Such an arrangement, though well intentioned, may be a discouragement for small and medium sized enterprises and serve as a disincentive to hiring the disabled. This is not in the public interest when policy and its implementation should be set to provide every opportunity for the disabled to participate fully in the workforce. It seems entirely reasonable that the additional capital costs to the prospective employer should be borne by the public agency, with the government deriving the benefit of the disabled moving from social assistance to the workforce.

Recommendation

The reality is that fuller participation of the disabled in workforce opportunities likely requires enabling capital expenditures above those necessary for the non-disabled. Under present matching arrangement funding, the employer must bear at least 50 per cent of this added capital cost.

1. The federal and Alberta governments should assume 100 per cent of enabling capital expenditure costs, thereby eliminating a significant disincentive to hiring the disabled.

5.4. Northern Alberta's Temporary Workforce Population

This section presents the available evidence on the fly in – fly out (FIFO) and drive-in/drive-out (DIDO) workforce in Northern Alberta, and pursues the resulting labour market and some broader social implications. While traditionally camps were relied upon to house workers during the construction phase of oil sands projects, they are now becoming used by maintenance and operational personnel working on a FIFO and DIDO basis.

The Data

The Municipality of Wood Buffalo Census of 2012 (*Census 2012 Count Yourself In*) is the most recent data source on the work camp population. As 5.4.1 shows, this population exceeded 39,000 in 2012 compared to 5,900 in 2000 (reported by the Oil Sands Developers Group).

TABLE 5.4.1: The Rapid Rise of the Temporary Workforce, Wood Buffalo

Year	Camp Population	Alberta Labour Force	Work Camp Population as % of AB-LF
2000	5,903	1,638,400	0.36
2012	39,271	2,177,200	1.8

Source: Regional Municipality of Wood Buffalo, 2012.

The more than six-fold increase in camp-based workers under-represents the FIFO and DIDO workforce inasmuch as it does not include the 'shadow population' of such workers who share houses, apartments, or tents and therefore were not captured by the census.

Relative to the increase in Alberta's labour force, the Wood Buffalo region has seen significant growth in the camp-based population to the point that it exceeded 50 per cent of Wood Buffalo's total 2012 population of 77,136. It is worth mentioning that the temporary workforce is overwhelmingly male.

A few other demographic characteristics of the FIFO/DIDO population can be gleaned from a special survey of 1,800 camp workers that was included in the 2012 Wood Buffalo census. Table 5.4.2 below presents a selection of information from this survey and supplements it with data for 2007 from a consultant's report on construction workers.

The major sources of camp labour were British Columbia (25 per cent), Newfoundland and Labrador (16 per cent), New Brunswick (15 per cent), Ontario (15 per cent), and Nova Scotia (12 per cent), with foreign workers making up a low proportion.

The skill level of the temporary workers can only be roughly inferred from the census data. The 31 per cent of the sample who have a high school diploma as their highest educational qualification compares to 24 per cent for the Alberta labour force as a whole (i.e. the camp population contains a greater proportion of workers who have not received education beyond the high school level).

TABLE 5.4.2: Demographic and Other Data on Camp Workers

Characteristic	2007	2012
Single, separated, divorce or widowed	49%	46%
Married or common law relationship	51%	54%
>3 years in oil sands	53%	
<1 year in oil sands	24%	
Primary residence outside Alberta	50%	
Primary residence elsewhere in Alberta	43%	
Primary residence abroad	1.5%	

Source: Regional Municipality of Wood Buffalo, 2012.

Of the camp workers, 26 per cent held apprenticeship registrations, trade certificates or diplomas. A comparable figure for the entire Alberta labour force is not readily available. Twenty-three per cent had college or other non-university degrees, compared to 32 per cent for the entire Alberta labour force. Not unexpectedly, the camp-based population consisted predominantly of English-speaking, Caucasian males between 25 and 59 years of age.

The Implications

The available data on FIFO/DIDO workers are surprisingly sparse. The information on their skill level, age profile and experience is very sketchy, yet the FIFO/DIDO phenomenon has implications for the future of Alberta's labour force and for local community development. The following findings are the most noteworthy.

First, the rapid growth and the large number of FIFO/DIDO workers present a serious challenge for the continuity in the mentorship of apprentices. If experienced journeymen – and there may not be many, the data are just not available – are in and out of work sites, consistent supervision and training of younger workers will be jeopardized. The facts that 50 per cent of camp workers reside primarily outside of Alberta, and that 47 per cent have less than three years of oil sands experience add to this concern.

Second, for employers, the provision of camps and attendant amenities are, of course, deductible expenses that substitute for higher monetary compensation, with ripple effects on labour markets elsewhere in the province and beyond. Repercussions are observed even in the local housing market. In a *Rental Market Report*, released in the Spring of 2012, the Canada Mortgage and Housing Corporation (CMHC) reports:

> In Wood Buffalo…the increasing use of work camps (rather than) purpose-built apartments continued to impact the rental market. As a result, Wood Buffalo's vacancy rate increased to 10.8 per cent in April 2012, up from 6.2 per cent in April 2011 (p. 2).

The use of attractive work camps as a recruiting tool appears to have an adverse effect in the near- and medium-term on the local real estate market.

When the Australian House of Commons studied the Wood Buffalo situation it concluded that for resource communities, "… FIFO/DIDO is a cancer." The Australians concluded that work camps should be used solely for construction periods (Commonwealth of Australia, 2013).

Third, broader implications result from the tension between workers' desire to live in metropolitan areas and be close to family on one hand, and the local municipality's need to permanently include the construction and operational labour force in planning its infrastructure, social services, educational and medical facilities on the other.

The Government of Alberta's Comprehensive Regional Infrastructure Sustainability Plan (CRISP) for the Athabasca oil-sands area is advocating alternatives to work camps in the form of permanent residence in nodal communities with transportation access from Fort McMurray. This vision appears to be in conflict with companies' current hiring practices. While CRISP would place restrictions on the development of work camps other than for construction, workers' preferences for residing in metropolitan areas may make the CRISP vision difficult to implement.

Fourth, the 2012 Wood Buffalo census survey of camp workers did provide a breakdown in 14 wage categories that ranged from <$20,000 to >$250,000. Utilizing the mid-point of each of these income groups and applying Alberta's 10 per cent flat income tax rate to the 50 per cent of camp workers who are not primary residents of Alberta, there is an estimated revenue loss of $140 million per year for the Alberta Treasury. Moreover, medical and social services may be accessed in Northern Alberta during work stints, imposing costs on the community (Regional Municipality of Wood Buffalo, 2012 October, p. 129).

The lack of data regarding construction workers versus operational and maintenance workers, as well as the lack of detail on the occupations of the survey respondents, preclude a more thorough examination of the Northern Alberta Temporary Workforce. While the Australian Government report endorses FIFO/DIDO for construction purposes and for very remote operations, it recommends FIFO/DIDO be the exception rather than the rule for operational positions.

The possible adverse impact of FIFO/DIDO on the continuity of the training of apprentices and young workers is a major concern for the development of a quality

labour force. While this review of the temporary workforce population in Northern Alberta leads us to concur with the above-mentioned Australian recommendation, it is also apparent that a much more detailed information base regarding this population is needed.

Recommendation

1. Systematic data on the FIFO/DIDO workforce is almost completely lacking. To correct this, government must assemble and publish data on a regular basis regarding construction workers versus operational and maintenance workers, as well as detail on the occupational mix of the Northern Alberta Temporary Workforce.

5.5. Note on Productivity and Labour Supply

It's not about working harder for less, it's about working smarter for more (…well, working more smartly)!

Productivity is, in concept, a simple relationship: output per unit of input. This relationship underpins the economic wellbeing of a society. Fundamentally, our living standards depend upon productivity – how effectively we use the productive resources at our disposal. The relationship yields the level of productivity and is generally measured in terms of output per unit of labour input (labour productivity), or output per unit of labour and capital input (multifactor productivity). If there is a positive difference in productivity levels between two periods of time, that is, if there are improvements in productivity, we now need fewer inputs to produce the same level of output. This means increased efficiency in resource application, whereas a negative difference means the opposite. In Canada, measures of productivity at the national, provincial and industry levels are available from Statistics Canada and the Centre for the Study of Living Standards.[18]

The good news is that Alberta has the highest level of labour productivity among the provinces. The bad news, over the 1997 to 2010 period, is that productivity growth in the Alberta business sector failed to impress. In these years, business sector productivity growth ranked last among the provinces with an annual rate of 0.57 per cent compared with the Canadian average of 1.29 per cent (itself a mediocre rate in terms of OECD rankings).[19] Alberta was a serious outlier with a rate less than half that of the next lowest

18 Statistics Canada, *Labour Productivity Measures – Provinces and Territories (Annual)*, Ottawa, May 2012, and Cansim Series 383-0011; Centre for the Study of Living Standards, *Estimates of Labour and Multifactor Productivity by Province and Industry, 1997-2010,* Ottawa, March 2012. The estimates reported by the Centre are derived from published and unpublished data provided by Statistics Canada.

19 The Business Sector covers all industries excluding Health and Social Services, Education and Public Administration.

province. Alberta's multi-factor productivity performance was even worse at a negative rate of 2.22 per cent and Alberta was again, far and away, the outlier.

Poor productivity growth has consequences for labour requirements – it contributes to labour shortages. For example, if Alberta labour productivity over 1997 to 2010 had grown at the Canadian average of 1.29 per cent instead of at a rate of 0.57 per cent, and assuming 1800 hours of work annually, then 12,000 fewer workers would have produced the 2010 provincial output. There are also consequences for costs: the poor productivity growth-induced labour shortages serve to inflate costs of production and reduce profitability. This, in the example of the oil sands, is a disincentive to capital formation.

There is substantial variance in the productivity performance of industry at the two digit level. The poorest productivity record over the 1997 – 2010 period is in utilities (including pipelines), oil and gas, and construction, all of which recorded negative productivity growth. These are the very industries in which labour shortage is most strongly articulated and where, therefore, the incentive to improve productivity should be the most urgent.

The encouraging news is that from 2010 to 2012, productivity grew in Alberta at above the national average, though below that of Manitoba and Saskatchewan (Government of Canada/Statistics Canada, 2013, May 14).

The reasons for these different productivity growth rates have been the subject of much study going back many decades. It is readily plausible that not only generic 'labour', but also the skill level of a country's labour force matters for the resulting productivity. Since sophisticated technological equipment requires highly-skilled human resources to operate, focus has been on both the quantity and quality dimensions of the labour force.

Through better organization of existing production processes, output per hour worked can also be increased over a relatively short time horizon. That is an increase in productivity. In contrast, other actions serve to raise output and possibly profit but not output per hour; these include hiring more labour, recourse to overtime and temporary foreign workers. As additional labour becomes more costly and adds less to output, productivity declines, as may profitability. At the macro-level, productivity and the supply of labour are related in a more subtle way than simply equating higher labour supply with higher productivity. Higher labour supply does mean higher output, but not necessarily higher output/hour of work. As a result, employers search for ways to improve productivity to remain competitive. In the Alberta energy sector, a tight labour market and/or energy price declines prompt the need to increase productivity through organizational improvement.

One of the first steps in this effort is typically to identify possibilities to improve the existing operations without adding labour or machinery. At the firm or industry level, for example, the Construction Owners Association of Alberta (COAA) found:

> In an internal study of a large construction project, crews were observed and the time spent actually building was only 37%. The remaining time was spent waiting for materials and equipment, traveling to the area, taking early breaks, and planning how to do the work. When crews do not have all the necessary tools, equipment, materials, labour, drawings and information, then the productivity will suffer. This is a systems problem and not a labour issue… On a typical large oil and gas construction project 40% of the total cost is normally due to direct and indirect labour. A COAA focus group reviewed the productivity losses due to wait time, travel time, early break time, and planning time and estimated that up to 25% of the lost time could be recovered through more detailed execution planning (Construction Owners Association of Alberta, 2009)

Better and faster construction would have resulted if project management had been better, and fewer workers might have been necessary. Higher productivity was not achieved because the project organization and quality of labour ('lacking necessary tools') were not good enough. While one could ask whether project leaders were too thrifty, in too much of a hurry, or somewhat inexperienced, the example here serves as an illustration of the link between productivity, existing labour supply and quality of management.

In a pilot study contained in a report to Alberta Finance and Enterprise, George Jergeas lists 309 suggestions made by experienced professionals according to target areas. The 10 most favoured are shown in Table 5.5.1, below. This list identifies deficiencies in present operations that can be rectified relatively quickly, as well as training needs for engineers, supervisors and managers who may require some time.

TABLE 5.5.1. Suggestions for Improving Construction Productivity on Alberta Oil and Gas Capital Projects

Rank	Target Area	Number of Recommendations	%
1	Labour Management, Conditions and Relations	86	27
2	Project Front-end Planning (Loading) and Workforce Planning	40	13
3	Management of Construction and Support	31	10
4	Engineering Management	30	10
5	Effective Supervision and Leadership	29	9
6	Communication	25	8
7	Contractual Strategy and Contractor Selection	24	8
8	Constructability in Engineering Design	23	8
9	Government Influence	11	3.5
10	Modularization Prefabrication, Pre-build in Shops 10	10	3.5

Source: Jergeas, 2009, p. 12.

Beyond organizational issues, new capital or technology that would increase productivity (i.e. the output per hour worked) may be put off because the required labour skills are not available (a 'shortage') within the decision horizon, not even at higher compensation levels. In this instance, longer-run training, education or immigration needs are identified for industry and government policy makers to act upon.

From a policy point of view, the quality (skill level) of the labour force is the responsibility of government. This is because the training provided to employees by individual firms is often not fully captured by those firms when workers take their newly-acquired skill to other employers. In industries characterized by high labour turnover, as is the case in Alberta's energy sector, employers can be expected to be reluctant to invest in worker training.

Evidence on labour turnover at the provincial and national level is reported in a recent study by Morisette, Lu and Qiu (2013). The research finds that labour turnover in Alberta (defined as the sum of hiring and of separation rates) averaged – in the recent decade – roughly 55 per cent of paid employment annually. This was highest among all provinces, compared with rates of 40 to 44 per cent in Ontario and Quebec. High rates of turnover clearly make the transfer of the firm-specific knowledge component of productivity more difficult. As well, there is the potential loss of industry-based knowledge. The higher the rate of turnover, the less likely the employer is to undertake worker training and upgrading.

At the firm level, higher output with the help of temporary foreign workers or immigration explains why producers favour such solutions to complement the longer-run and costlier avenue of training local workers, especially in the face of an adverse demographic trend. These solutions are unlikely to improve productivity growth overall.

Recommendation

1. Productivity – working smarter – is the time-honoured way of dealing with labour shortages and its consequences. It is strongly recommended that business in Alberta take full advantage of the seminars and workshops offered by Productivity Alberta.

5.6. Immigration and Temporary Foreign Workers

An Overview of Immigration Policy

A prime role for government is to put in place and maintain structures that encourage Albertans to reach their potential and benefit fully from the opportunities that the economy presents. The preceding sections, therefore, concentrate on Alberta's existing human resources and what Alberta must do to increase the province's effective supply of workers and raise their skill levels. The coverage is selective. We do not explore the self-evident importance to workforce quality of an excellent set of post-secondary educational institutions, but rather focus on other keys to quality and human capital development. Those keys are: the apprenticeship structure as the prime source of the skilled trades; the needs of Aboriginals and the disabled for fuller workforce involvement; the role of mature workers in a generally aging workforce; the implications of FIFO growth; and the importance of raising the rate of productivity improvement. Our examination indicates that, exclusive of FIFO, actions on these issues would raise both the quality of Alberta's labour force and make available some 75,000 additional workers within 10 years, in addition to more than 38,000 workers who would attain journeyman certification resulting from higher retention rates in apprentice programs.

A country has a variety of reasons for encouraging immigration but the focus in this report is how immigration can contribute to the objective of a highly-skilled labour force. How can that best be achieved in a world where every developed nation is scouring the globe for skill? The international competition for skilled immigrants is extremely tough – whether the competitor is our neighbor to the south, Australia, New Zealand, Europe or the attractive opportunities in middle-income countries or the developing world – it has become necessary for countries, and employers, to sell themselves as desirable destinations to potential immigrants possessing skills in demand. When the skilled immigrant becomes a permanent resident, there is a long-term positive impact on workforce quality. Businesses in a technologically-advanced world consider an abundant supply of highly-skilled talent to be critical when making investment decisions.

If one of the objectives of immigration is to augment the highly-trained labour supply beyond levels attainable by more effective domestic human resource development, then the province should attach priority to permanent skilled immigration. The skilled immigrant who settles in the province provides a sustained commitment and a permanency in skill availability. Currently, the Alberta Enterprise and Advanced Education website states that:

> Alberta needs a strong workforce to support its growing economy. Although the province remains committed to hiring Albertans and Canadians first, attracting immigrants with the skills and talents Alberta needs is an important part of addressing labour pressures – now and in the future (Government of Alberta / Employment and Immigration, 2011d).

Immigration as a response to labour market pressures is a reactive and inferior approach to one that proactively attaches priority to the role of skilled immigrants in raising workforce quality.

Immigration is a shared jurisdiction between the federal and the provincial governments with the former having paramount responsibility. Establishing and maintaining a provincial priority of skilled immigration is possible under the provincial nominee program, so important an option for Alberta that it has accounted in recent years for two of every five immigrants. The expectation of the employer driven provincial Immigrant Nominee Programs (INP) is that a province will focus on its economic needs, and as such provides an excellent opportunity for immigration to enhance the skilled workforce. A provincial immigration strategy centered on skills acquisition is essential; it takes the long view rather than one of short-term accommodation. Immigration strategy should be forward looking, emphasizing occupational skills (as in the Federal Skilled Worker Program) rather than a short-term response to immediate labour market requirements for lower labour skills.

The present Alberta INP (AINP) eligibilities are for:

- skilled workers
- international graduates of post-secondary institutions
- semi-skilled workers in the following categories:
    - food and beverage processing workers,
    - hotel food and beverage servers,
    - room attendants,
    - front desk agents,
    - manufacturing,
    - long haul trucking, and
    - food services.

All admitted under INP must have a full-time, permanent job offer. Under the AINP, employers specify the number of nominations they intend to make, outline the job description and requirements, and specify settlement and retention plans.

The process assigns a stated number of nominations to each employer and a maximum number of allocations to each sector. Nominations are allocated to employers before they select the nominees. Lower skilled employees must be employed for six months with the nominating employer before they are eligible for nomination under the program

An important question is whether the eligibility attached to semi and lower skilled labour under AINP is consistent with the program as an instrument for skilled workforce development

Temporary Foreign Workers (TFWs)

Most developed countries have the equivalent of a Temporary Foreign Worker Program (TFWP) for skilled workers. Such programs are a means of filling short-term gaps that may emerge in the labour market with the emphasis on higher-level skills. The most serious question surrounding the use of temporary workers is whether their very availability has the effect of impeding appropriate action to deal with the domestic causes of skill shortage. As we move down the ladder to semi-skilled and unskilled labour it is increasingly difficult to muster compelling arguments to justify the use of TFWs. (Separate programs, not considered here, are available for farm workers, care givers and graduate students).

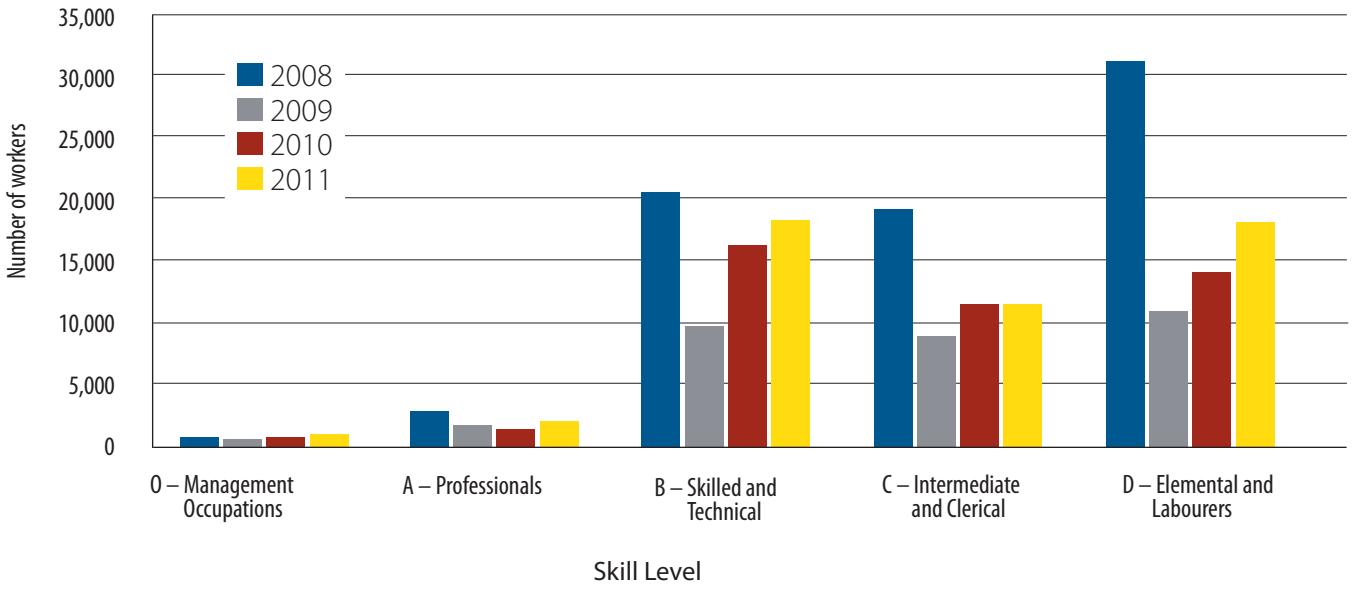
These potential difficulties are nicely summarized in The 9 Habits of Highly Effective Resource Economies, a 2012 study for the Canadian International Council authored by Madelaine Drohan, Canadian correspondent of *The Economist*:

> The overuse of temporary workers has negative long-term consequences and does not attack the root cause of skills shortages, many of which are domestic in origin. A long-term solution includes better coordination between education systems and industry, stronger outreach to Aboriginal Canadians and women, and welcoming immigrants as permanent residents, who will continue to contribute to society, rather than as temporary workers (p.77).

In Canada, unlike other developed countries, the program was expanded in 2002 to include access for semi- and unskilled labour. The result is increasing contention about the use of the program to meet short-term labour needs in lower-skill occupations.

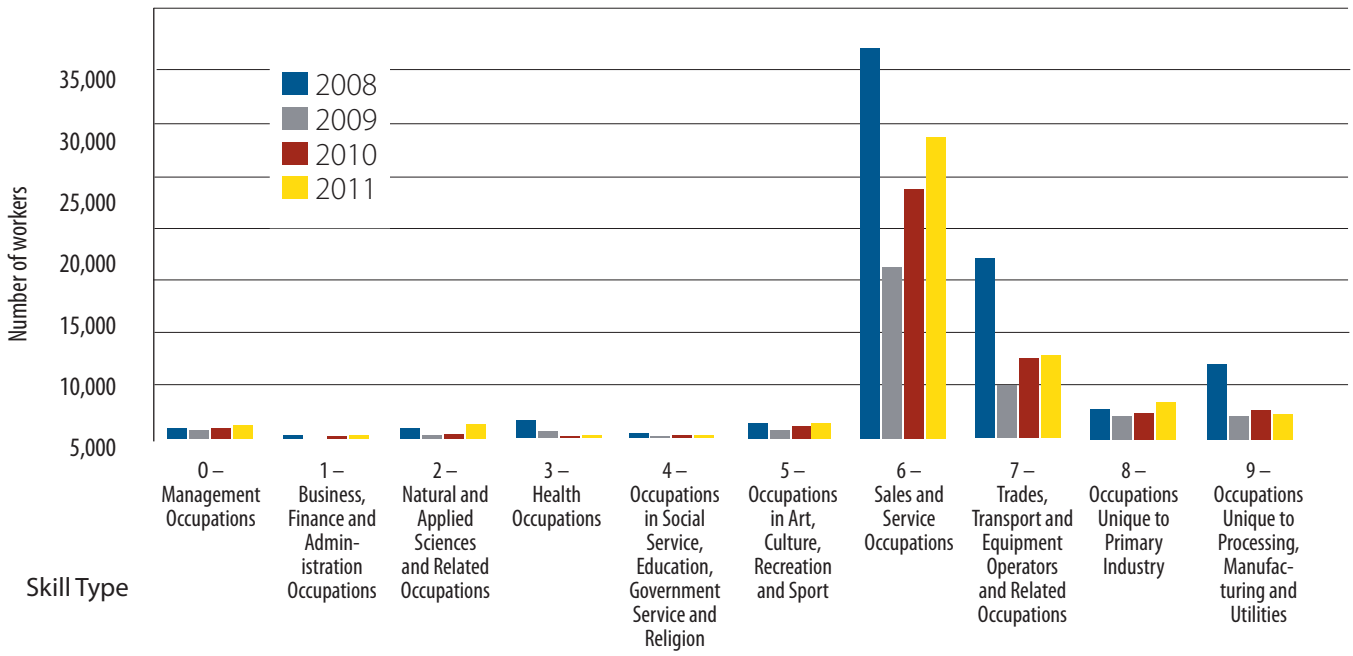
Figure 5.6.1 and 5.6.2 below – showing TFWs in Alberta on Labour Market Opinions (LMOs) for the most recently available years – reveals that the majority of entrants under the program are semi- and unskilled (Category C and D). They are primarily engaged in sales and service occupations. Lower skill TFWs, unlike those with higher level skills, under present immigration programs do not have a clear path to permanent entry. Their work stay is subject to a four year limit, and they must leave the country for four years before returning to Canada. As a result, for lower skill TFWs in Alberta the AINP, given its present specified list of immigration priorities, is the obvious available avenue to permanent residency. Here is where the AINP intersects with the TFWP.

FIGURE 5.6.1 Temporary Foreign Workers in Alberta on LMO by Skill Level



Source: Government of Canada/Human Resource Skill Development Canada, 2013

FIGURE 5.6.2. Temporary Foreign Workers in Alberta on LMO by Skill Type



Source: Government of Canada/Citizen and Immigration, 2011

Mark Carney, the retiring Governor of the Bank of Canada, together with many others have pointed out that this is a situation in which meeting the short-term needs of the lower skill labour market may impede longer term adjustments in terms of higher wage levels and working smarter – improved productivity – that need to take place. This dilemma is not an easy one for public policy to address given the day to day problems associated with low skill labour shortages. To reiterate, here it is important to step back, take stock, and ask where does the long term welfare of the province lie? With this perspective, emphasis on lower skill immigration, whether temporary or for permanent entry, is a short-term fix that does not serve the objective of a highly skilled workforce.

In the interest of Alberta's longer term workforce skill development – the primary issue here in contrast to using immigration to meet the correctible exigencies of the lower skilled labour market – it is recommended that the province phase out over a reasonable transition period the eligibility in the provincial INP of low skilled occupational categories. Linked to that change in eligibility should be a return of the TFWP to its original mandate of meeting temporary shortfalls in skilled occupations. A transition period of sufficient length, say three to five years permit markets to adjust, and avoid dysfunction in associated employer adaptations at the lower end of their workforce requirements.

Recommendations

1. Immigration policy should be forward-looking by continuing to target for admission of the highly-skilled; this should be the priority in the provincial Immigrant Nominee Program.
2. Speed up processing times for the overseas study permit application, as well as for the permanent residency applications from all international students who graduated from known accredited institutions and are currently employed in Canada.
3. The provincial government should ensure and support the development of work environments and communities that are welcoming for newcomers.
4. The provincial government should phase out, over a reasonable three to five year period the eligibility in AINP of low skilled occupational categories and should support return of the TFWP to its original purpose of meeting temporary shortfalls for skilled workers.

CHAPTER 6

RECOMMENDATIONS AND CONCLUSION

Alberta falls short in realizing the fullest potential of its present labour force. This has both private and social costs, and is a large contributor to evidence of a labour shortage. Government, through adoption of selective policies and actions, can lead in attaining the goal of a highly-skilled workforce over the coming decade. Recommendations to these ends are incremental but, taken together, provide a necessary supportive framework.

6.1. Observations and Recommendations

Modeling Labour Supply and Demand

The province of Alberta leads all provinces in the scope of its labour market development activities and its occupational modeling products. However, consideration should be given to combining efforts into a single forecasting consortium and generating more frequent forecasts, such as in the Australian approach described in Appendix 3.3.

1. In the energy sector, many NOC titles and descriptions must be 'mapped' to the titles and descriptions used by oil and gas companies for the information to be understood. This has implications for modeling and for international recruitment efforts where workers who want to come to Canada must choose a NOC category that represents their skill set in order to be evaluated by Citizenship and Immigration Canada. Discussions with Statistics Canada should be undertaken to resolve these issues.
2. Labour market forecasting is an inexact science and should be used to determine whether actions to correct imbalances are necessary rather than to anticipate whether interventions will take place.

3. The different output formats used by the Alberta government, the Construction Sector Council, and the Petroleum Human Resources Council of Canada models make their results difficult to compare. Recognizing that the forecasts are produced for different target audiences, consideration could be given to standardizing the methodologies (see 1 above).
4. The Alberta long-term model shows the highest shortages in many lower-skilled occupations, and in some health care occupations. However, the model does not account for technological and productivity enhancements which are capable of mitigating shortages in lower-skilled occupations (such as sales clerks and cashiers).

Apprenticeships

1. Adopt a provincially-funded mentorship initiative, with particular emphasis on reducing the dropout rate of first-year apprentices. The preference is for this program to be implemented through industry associations.
2. Apply resources to establishing an advanced database for the apprenticeship programs to eliminate existing serious knowledge gaps. For example, there is a need to know the demographics of those who drop out of the program and their reasons for doing so, how many employers the apprentice works for and the duration of that employment, the spells of unemployment the apprentice experiences, and the apprentice completion rate when employed by smaller as opposed to larger businesses.
3. Alberta should make apprentices eligible for the student loan program. This would assist apprentices with overcoming financial impediments to tuition and tool acquisition.

Aboriginal People

1. These recommendations are designed to significantly reduce the obstacles for Aboriginal participation in the many transition and workforce opportunities that are available.
2. Early Learning Centres (ELCs) in neighbourhoods with large concentrations of Aboriginal families should receive compensatory funding to support additional educational activities and family outreach.
3. Because the educational attainment issue is multifaceted, where one policy is unlikely to fit all circumstances, supplementary funding should be available to school districts to allow them to pursue discretionary Aboriginal educational initiatives.
4. When student numbers warrant, Aboriginal organizations should be able to participate in school governance at the community level.

5. Data should be assembled on Aboriginal and non-Aboriginal performance on academic competency tests and that data should be made publicly available at the school level.
6. Aboriginals are under-represented in both teaching and educational leadership. This warrants aggressive action to encourage Aboriginal students to become teachers.
7. Abolish tuition fees for all those 19-25 years old, including Aboriginal people, attempting to achieve a high school diploma.

Mature Workers

1. The Government of Alberta should remove all disincentives to continue workforce involvement beyond age 65 and, by doing so, recognize that retirement should be a matter of individual choice.
2. The Alberta government should actively engage with employers about the changing demographics that make the utilization of mature workers ever more compelling.

Workers with Disabilities

Enable additional capital expenditures for workers with disabilities to ensure they are able to more fully participate in workforce opportunities. Under current matching arrangement funding, the employer must bear at least 50 per cent of this added capital cost.

1. The federal and Alberta government should assume 100 per cent of enabling capital expenditure cost, thereby eliminating a significant disincentive for employers to hiring disabled workers.

Fly in – Fly out

1. Systematic data on the fly in – fly out (FIFO) workforce is insufficient.. To correct this, government must assemble and publish data on a regular basis regarding construction workers versus operational and maintenance workers, as well as detail on the occupational mix of the Northern Alberta Temporary Workforce.

Productivity

1. No business should be too busy to examine its productivity and how to improve it. We agree with Lori Schmidt, CEO of Productivity Alberta, "that there is no better time than the present to start on your productivity journey – every day you are not looking at productivity is more money left on the table." Government should give the highest possible profile to the mission of Productivity Alberta.

Immigration

1. Immigration policy should be forward-looking by continuing to target for admission of the highly-skilled. This should be the priority of the Provincial Nominee Program.
2. Speed up processing times for the overseas study permit application, as well as for the permanent residency applications from all international students who graduated from known accredited institutions and are currently employed in Canada.
3. The provincial government should ensure and support the development of work environments and communities that are welcoming to newcomers.
4. The provincial government should phase out, over a reasonable three to five year period the eligibility in AINP of low skilled occupational categories and should support return of the TFWP to its original purpose of meeting temporary shortfalls for skilled workers.

6.2. Conclusion

This report set labour market, demand and supply in Alberta against the backdrop of the province's economic experience as a producer with substantial engagement in international markets. Our workforce is Alberta's most important and most valuable resource; a viable economic future for the province is dependent not simply on maintaining, but continuously heightening the workforce's capabilities. The very mention of Alberta should bring an image of workforce quality to mind. In this technologically advanced world, expedience and reaction to circumstance is no substitute for a strategic vision of, and necessary actions to achieve sustained growth in workforce capacity.

To summarize, the report begins with an introduction to labour markets in Alberta. It reviews the volatile character of Alberta's energy sector and considers the adjustments required to accommodate the ups and downs of the economy. There is an overview of recent research on the regional employment and income effects of this volatility within Alberta. It sets the stage by noting that an uncertain economy like Alberta's requires an adaptable, well-educated labour force and the infrastructure necessary to attract highly-skilled immigrants. There follows suggestions of improvements to labour forecasting models, as well as an estimate of the opportunity cost to the economy of a shortfall in labour supply.

A prime role for government is to put in place and maintain structures that encourage Albertans to reach their potential and benefit fully from the opportunities that the economy presents. Against this backdrop, the report turns to Alberta's existing human resources and what Alberta must do to increase effective supply and raise skill levels, anchored by the foundation of a first-class educational system from pre-school to post-secondary. The focus is on selective keys to quality and human capital development: the apprenticeship structure as the prime source of the skilled trades; the needs of Aboriginal people and the disabled for fuller workforce involvement; the role of mature workers in a generally aging workforce; the implications of FIFO growth; the importance of raising the rate of productivity; and how immigration can most effectively contribute to labour force quality. The modest, incremental actions recommended for these labour force components, each addressing a piece of the puzzle and involving a number of provincial government departments, would raise both the quality and the quantity of Alberta's labour force.

What Alberta does not have, but clearly requires, is a coherent, well-articulated policy of workforce development – one creating a vision of how all these pieces fit together. Our final recommendation: develop this policy, bring it forward, and set it in place.

BIBLIOGRAPHY

Aboriginal Resource Council. (2010, November 15.) *Past partner projects*. Retrieved from www.aboriginalhr.ca/en/programs/partner/past

Aherne, M. (2007, June 26). *Heavy equipment operators in Alberta: context and key issues summary for inter-sectoral stakeholders.* Retrieved from www.equipmentcareers.com/assets/AltaHEO_Context&KeyIssues_Dec07rev.pdf

Alberta Aboriginal Apprenticeship Project. (2005, September 3). *ACR aboriginal programs project program template*. Retrieved from www.acr-aboriginalproject.org/PDF%20Files/Program_Templates/Individual_Program_Templates/2.4.8.pdf

Alberta Chamber of Resources. (2011, February). *Task force on resource development and the economy.* Retrieved from www.acr-alberta.com/LinkClick.aspx?fileticket=k%2fQXddyPBEs%3d&tabid=206

Alberta Competitiveness Council. (2010) *Report on Competitiveness Alberta, 2010*, 57-66. Retrieved from www.treasuryboard.alberta.ca/docs/EconomicDevelopment/2010-Report-on-Competitiveness.pdf

Alberta Economic Development Authority. (2004, December 10). *Mega project excellence: preparing for Alberta's legacy. An action plan*. Retrieved from https://aeda.alberta.ca/AEDA%20Public%20Document%20Library/MegaProjectExcel_Dec102004.pdf

Alberta Economic Development Authority / Productivity and Competitiveness Committee. (2011, March) *Balancing Alberta's workforce*. Retrieved from https://aeda.alberta.ca/reportsandstudies/aedastudies/Documents/Balancing%20Albertas%20Workforce.pdf

Alberta Federation of Labour. (2007, November). *Temporary foreign workers: Alberta's disposable workforce.* Retrieved from www.afl.org/index.php/View-document/19-Temporary-Foreign-Workers-Alberta-s-Disposable-Workforce.html

Alberta Federation of Labour. (2009, April 1). *Entrenching exploitation: second report of AFL temporary foreign worker advocate.* Retrieved from www.afl.org/index.php/Reports/entrenching-exploitation-second-rept-of-afl-temporary-foreign-worker-advocate.html

Alberta Federation of Labour. (2012, July 25). *Alberta relying on bogus labour shortage figures.* Retrieved from www.afl.org/index.php/Press-Release/alberta-relying-of-bogus-labour-shortage-figures.html

Alberta Federation of Labour. (2013, May 8). *From last resort to first choice: how the temporary foreign worker program is flooding the market, not filling a need.* Edmonton. Retrieved from www.afl.org

Alboim, N. & E. McIssac. (2007) Making the connection: Ottawa's role in immigration employment. *IRPP Choices* 13 (3).

Alboim, N. & Cohl. K. (2012, October). *Shaping the future: Canada's rapidly changing immigration policies*. Retrieved from http://maytree.com/wp-content/uploads/2012/10/shaping-the-future.pdf

Barnetson, B. & Foster, J. (2012, June 13). *Foreign migrant workers in Alberta.* Edmonton: Canadian Political Science Association 84th annual convention. Retrieved from www.cpsa-acsp.ca/papers-2012/Barnetson-Foster.pdf

Barnett, K. (2012, November 1). One response to "A 20-year view of the labor force". AGEnda aging and work blog. Retrieved from http://agingandwork.bc.edu

Beach, C.M. (2008). Canada's aging workforce: participation, productivity, and living standards. *A Festschrift in Honour of David Dodge.* Retrieved from www.bankofcanada.ca/wp-content/uploads/2010/09/beach.pdf

Bernard, A. (2011, November 23). Regional economic shocks and migration. In *Perspectives on labour and income, 23(4).* Statistics Canada.

Bertrand, O. (1998). *Trends and issues in vocational education and training: a perspective from Europe. Mexico City: IBERFOB.* Retrieved from www.oei.org.co/iberfop/mexico4.htm

Bilginsoy C. (2003). The hazards of training: attrition and retention in construction industry apprenticeship program. *Industrial and Labor Relations Review, 57 (1),* 53-67.

Black, D.A., Kolesnikova, N. &Taylon, L.J. (2009). Local price variation and labor supply behavior. In *Federal Bank of St. Louis Review, 91(6),* 613-625.

Black, D.A., McKinnish, T.G., and Sanders, S.G. (2005). Tight labor markets and the demand for education: evidence from the coal boom and bust. In *Industrial & Labor Relations Review, 59(1).*

Black, D., McKinnish, T.G., & Sanders, S.G. (2005). The economic impact of the coal boom and bust. *Economic Journal 115(503),* 449-476.

Blanchard, O.J., Katz, L.F., Hall, R. E. & Eichengreen, B. (1992). Regional evolutions. *Brookings Papers on Economic Activity (1),* 1-75.

Bouchard, J. & Cox, C. (2012, January 23). Energy: oil sands & producers. In *Canada Research.* Vancouver: Raymond James. Retrieved from www.raymondjames.ca/en_ca/equity_capital_markets/equity_research/sample_research/docs/Oil%20Sands%20&%20Producers%20012312.pdf

Brisbois, J. (2012, December). Employers to play bigger role in the immigration system. *Business in Edmonton Magazine, p. 10.* Retrieved from www.businessinedmonton.com

Burt, M., Crawford, T. & Arcand, A. (2012, October). *Fuel for thought: The economic benefits of oil sands investment for Canada's regions.* Ottawa: The Conference Board of Canada.

Byrne, J. J. (1975.) Occupational mobility of workers. *HeinOhnline -- 98 Monthly Labor Review. 9(2), 53-59.*

Calgary Chamber of Commerce. (2009, March 26). *Completing the circle: realities, challenges and strategies to improve aboriginal labour market outcomes in the Calgary region.* Retrieved from www.calgarychamber.com/sites/default/files/user/files/Completing%20the%20Circle%20%20Realities%2C%20challenges%20and%20strategies%20to%20improve%20Aboriginal%20labour%20market%20outcomes%20in%20the%20Calgary%20region.pdf

Calgary Economic Development. (2012, February). *Calgary labour demand forecast 2012.* Retrieved from www.calgaryeconomicdevelopment.com

Calgary Economic Development. (2012a, February). *Calgary Economic Development Data CentreRreports.* Retrieved from www.credentials.gc.ca/employers/roadmap/roadmap.pdf Reports for occupational groups may be obtained by drilling down on the group.

Calgary Economic Development. (2012b, February). *Recruiting oil & gas drillers and related workers in Canada, the United States, the United Kingdom and Ireland*. Retrieved from www.calgaryeconomicdevelopment.com/sites/default/files/pdf/research/reports/whats_new/global_demand_canada_us_uk/CED%20Labour%20Supply%20Study%202012%20-%20Recruiting%20Oil%20%26%20Gas%20Drillers%20and%20Related%20Workers%20in%20Canada_US_UK_Ireland.pdf

Calgary Herald. (2012, December 11). Plan to ease worker shortages. *Calgary Herald*. Retrieved from www.cargaryherald.com/

Canadian Apprenticeship Forum. (2011, February). *Assessing apprenticeship outcomes: building a case for pursuing and completing an apprenticeship*. Ottawa. Retrieved from www.nald.ca/library/research/caf/apprenticeship_outcomes/apprenticeship_outcomes.pdf

Canadian Association of Petroleum Producers. (2011, April). Labour training and mobility. In *Report of the Dialogues on the Oil Sand: Engaging Canadians and Americans*, p.49. Retrieved from www.capp.ca/getdoc.aspx?DocId=187181&DT=NTV

Canadian Association of Petroleum Producers. (2012, May 23). *Primer for "four corners" discussion on strategic issues*. CAPP Oil & Gas Workforce Strategy Session.

Canadian Auto Workers. (2012, May 31). *CAW economist debunks "myth" of labour shortage, says true unemployment rate is over 12 per cent*. Retrieved from www.caw.ca/en/11226.htm

Canadian Chamber of Commerce. (2012, February) Downturn, recovery and the future evolution of the labour market. *Economic Policy Series*. Retrieved from www.chamber.ca/images/uploads/Reports/2010/Labour-Market-220210.pdf

Canadian Federation of Independent Business. (2012, March). *Shortage of labour: the impacts on small business in Alberta*. Retrieved from www.cfib-fcei.ca/cfib-documents/ab0636.pdf.

Canadian International Council. (2012). *The 9 habits of highly effective resource economies: lessons for Canada*. Retrieved from www.opencanada.org/wp-content/uploads/2012/10/CIC-9-Habits-of-Highly-Effective-Resource-Economies.pdf

Canadian Labour Force Development Board. (1999, June). *Aboriginal participation in apprenticeships: making it work*. Ottawa. Retrieved from www.education.gov.yk.ca/pdf/aboriginal_apprenticeship.pdf

Capital Region Board. (2011, June 9). *Capitalize: the economic roadmap for Alberta's Capital Region 2011*. Retrieved from www.capitalregionboard.ab.ca/images/Documents/Reports/capitalize-final%20report_e.pdf

Carrington, W.J. (1996). The Alaskan labor market during the pipeline era. *Journal of Political Economy, 104(1)*, 449-476.

Central Alberta Economic Partnership. (2004, March). Prepared by Scholie Research & Consulting. *Central Alberta labour force study*. Retrieved from http://centralalberta.ab.ca/assets/documents/CALFFinalReportMar4.pdf

Chambers, E.J. (2008, May). Changing trends in the Alberta labour force. *Information Bulletin 113*. Edmonton: University of Alberta Western Centre for Economic Research.

Citizenship and Immigration Canada, Foreign Credentials Referral Office. (2010). *Employer's roadmap to hiring and retaining internationally trained workers*.

Coe, P.J. (2011). *Apprenticeship program requirements and apprenticeship completion rates in Canada. Working paper no. 71*. University of British Columbia: Canadian Labour Market and Skills Researcher Network. Retrieved from www.clsrn.econ.ubc.ca/workingpapers.php

Commonwealth of Australia / Education, Employment and workplace relations. (2010, June). *Skill shortages Western Australia*. Retrieved from www.deewr.gov.au/Employment/LMI/SkillShortages/Documents/WASkillShortages2011_06.pdf

Commonwealth of Australia / Labour. (2011). *Competing for skills: migration policies and trends in New Zealand and Australia. Retrieved from* www.immi.gov.au/media/publications/research/_pdf/migration-policies-trends-summary.pdf

Commonwealth of Australia / Standing Committee on Regional Australia. (2013, February). *Cancer of the bush or salvation for our cities?* Canberra.

Conference Board of Canada. (2012, October). *Fuel for thought: the economic benefits of oil sands investment for Canada's regions.* Retrieved from: www.conferenceboard.ca/e-library/abstract.aspx?did=5148

Conference Board of Canada. (2012, December 17. *Natural gas investment will continue to enrich Albertans.* Ottawa: Conference Board of Canada. Retrieved from www.conferenceboard.ca/press/newsrelease/12-12-17/natural_gas_investment_will_continue_to_enrich_albertans.aspx

Construction Owners of Association Alberta. (2009). *Benchmarking and the Alberta report – a government/industry partnership.* Retrieved from www.coaa.ab.ca/LinkClick.aspx?fileticket=CvRcm5xsOjg%3D&tabid=140

Construction Owners' Association of Alberta. (2011.) *Heavy industrial construction and maintenance, a position paper*. Retrieved from www.coaa.ab.ca/LinkClick.aspx?fileticket=cK5H2e6aVv0%3D&tabid=40

Construction Owners Association of Alberta. (2011, May). *Heavy industrial construction and maintenance workforce challenges in Alberta. Edmonton.*

Construction Owners Association of Alberta. (2012, July 13). *Alberta major industrial projects workforce forecast.* Retrieved from www.coaa.ab.ca/WorkforceDevelopment/WorkforceForecast.aspx

Construction Sector Council of Canada. (2010). *Construction looking forward Alberta- an assessment of construction labour markets from 2011-19-for Alberta*. Ottawa.

Construction Sector Council of Canada. (2010, February). *Construction looking forward 2012-2020 key highlights Alberta*. Retrieved from http://albertaconstruction.net/wp-content/uploads/2012/09/Market_Intelligence_Construction_forecast_reports_2012_English_ab_2012_highlights.pdf

Construction Sector Council of Canada. (2011a). *Construction employer's roadmap to hiring and retaining internationally trained workers*. Retrieved from www.csc-ca.org/en/products/construction-employers-roadmap-hiring-and-retaining-internationally-trained-workers.

Construction Sector Council. (2011b) *Meeting construction and maintenance work force Challenges-construction owners strategy 2011-16*. Retrieved from www.constructionforecasts.ca/sites/default/files/owners_strategy/Owners_Strategy_2011-2016.pdf

Construction Sector Council. (2012, February). *The state of women in construction in Canada*. Retrieved from www.csc-ca.org/en/products/state-women-construction-canada

Construction Sector Council. (2012a). *Construction looking forward, key highlights, Alberta.* Retrieved from www.csc-ca.org/en/products/2012-construction-looking-forward-forecast-report-highlights-and-powerpoint-presentations

Construction Sector Council. (2012b). *Construction looking forward, key highlights, national*. Retrieved from www.csc-ca.org/en/products/2012-construction-looking-forward-forecast-report-highlights-and-powerpoint-presentations

Construction Sector Council. (2012c). *Construction looking forward, national Summary.* Retrieved *from* www.csc-ca.org/en/products/2012-construction-looking-forward-forecast-report-highlights-and-powerpoint-presentations

Cooper, D. (2011, December 116). Resource firms scramble to find qualified staff. *Edmonton Journal*. Retrieved from www.edmontonjournal.com

Cooper, D. (2012, January 3). Petrochemicals promises growth. *Edmonton Journal*. Retrieved from www.edmontonjournal.com

Crawford, T.A. (2012). Alberta. In *Provincial outlook: spring 2012, 55-69.Ottawa:* Conference Board of Canada.

Curry, B. & Carmichael, K. (2013, April 23). Carney warns against 'overreliance' on foreign workers for low -paying jobs. *The Globe and Mail.* Retrieved from www.theglobeandmail.com/

Data Angel. (n.d.). *Literacy report card for the Federal Electoral District of Fort McMurray – Athabasca, Alberta.* Retrieved from www.dataangel.ca/_usd/edReports/242/Letters_eng_FED48001.pdf

Davis, J. (2013, January 2). Saskatchewan, Alberta battle for workers. *Edmonton Journal.* Retrieved from www.edmontonjournal.com/

Deloitte. (2011, September 20). *Gaining ground in the sands 2012.* Retrieved from www.deloitte.com/assets/Dcom-Canada/Local%20Assets/Documents/EandR/ca_en_energy_gaining_ground_in_the_sands_2012_200911.pdf

Deloitte. (n.d.). *Balancing the people equation: how enhanced collaboration can help solve labour challenges in the oil sands.* Retrieved from www.deloitte.com/assets/Dcom-Canada/Local%20Assets/Documents/EandR/OilandGas/ca_en_energy_Balancing_the_people_equation_020612.pdf

Denton, F. T. & Spencer, B.G. (2009). Population aging, older workers, and Canada's labour force. *Canadian Public Policy* 35 (4), 481-492. Retrieved from http://utpjournals.metapress.com/content/A137172356825801

Desjardins, D. & Cornelson, K. (2011, December). *Immigrant labour market outcomes in Canada: the benefits of addressing water and employment gaps.* RBC Economics. Retrieved from www.rbc.com/economics/market/pdf/immigration.pdf

Dixon, P.B. & Rimmer, M.T. (2005, July). The displacement effect of labour-market programs: estimates from the Monash model. *General Working Paper NO.G-154.* Monash University: Centre of Policy Studies.

Dostie B. (2010, October). *A competing risks analysis of the determinants of low completion rates in the Canadian apprenticeship system. Working paper no. 67*. University of British Columbia/Canadian Labour Market and Skills Researcher Network. Retrieved from http:// Retrieved from www.clsrn.econ.ubc.ca/workingpapers.php

Edmonton Journal. (2011, December 2). Alberta adds jobs as unemployment rises across Canada. *Edmonton Journal.* Retrieved from www.edmontonjournal.com/

Edmonton Journal. (2011, December 10). Employ this idea. *Edmonton Journal.* Retrieved from www.edmontonjournal.com

Edmonton Journal. (December 8, 2011). Germany looks to stave off labour shortages. *Edmonton Journal.* Retrieved from www.edmontonjournal.com/

El Achkar, S. (2010, August). *A companion guide to analyzing and projecting occupation trends.* Centre for the Study of Living Standards, Report 2010-07. Calgary. Retrieved from www.csls.ca/reports/csls2010-07.pdf

Emter, N. (2010, February). Recession in review: The Alberta economy and employment, weathering the Storm. *WCER Information Bulletin 139*. Edmonton: University of Alberta Western Centre for Economic Research.

Ernst&Young. (2011). *Human resources in Canada's oil and gas sector: a snapshot of challenges and directions*. Retrieved from www.ey.com/Publication/vwLUAssets/Human-resources-in-Canada-oil-gas-sector/$FILE/Human-resources-in-Canada-oil-gas-sector.pdf

Finnie, R. (2004). Who moves? A logit model analysis of inter-provincial migration in Canada. *Applied Economics, 36,* 1759-1779.

Foster, Jason. (2012) *Making temporary permanent: the silent transformation of the temporary foreign worker program*. Retrieved from www.justlabour.yorku.ca/volume19/pdfs/02_foster_press.pdf

F.T. Denton, F.T. & Spencer, B.G. (2009). Population aging, older workers, and Canada's labour force. *Canadian Public Policy* 35(4), 481-492.

Filer, R. K. & Petri, P.A. (1988, February). A job-characteristics theory of retirement. *The Review of Economics and Statistics* 70(1), 123-128. MIT Press. Retrieved from http://www.jstor.org/stable/1928158

Gignac, T. (2011, December 28). Boom, bust and boom again for Alberta? *Edmonton Journal*. Retrieved from www.edmontonjournal.com

Government of Alberta. (2006, September 19). *A sub-strategy for Alberta's retail industry.* Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_retail_substrategy.pdf.

Government of Alberta. (2007). *Labour market and economic indicators dashboard. Information and communication technology industry.* Edmonton.

Government of Alberta. (2007, July 07). *A workforce strategy for Alberta's energy sector.* Retrieved from http://employment.alberta.ca/documents/wia/wia-betw_energy_strategy.pdf

Government of Alberta. (2007, July 25). *Strategy for Alberta's manufacturing industry*. Retrieved April 5, 2012 http://employment.alberta.ca/documents/WIA/WIA-BETW_manufacturing_strategy.pdf

Government of Alberta. (2007, May 31). *Strategy for Alberta's tourism and hospitality industry*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_tourism_strategy.pdf

Government of Alberta. (2007, September 27). *17 priority actions*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BTW_priority_actions.pdf

Government of Alberta (2007, October 31). *A workforce strategy for Alberta's construction industry.* Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_construction_strategy.pdf_

Government of Alberta. (2007, November 28). *Building and education tomorrow's workforce performance update 2006-07*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_performance_update.pdf

Government of Alberta. (2008, April 28). *A workforce strategy for Alberta's non-profit and voluntary sector*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_nonprofit_strategy.pdf

Government of Alberta. (2008, July 30). *A workforce strategy for Alberta's forest industry*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_forestindustry_strategy.pdf

Government of Alberta. (2009, February 20). *A workforce strategy for Alberta's supply chain logistics industry*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_supply_chain_strategy.pdf

Government of Alberta. (2009, May 27). *Building and education tomorrow's workforce performance update 2008*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_performance_update08

Government of Alberta. (2009, Winter). *Building and educating tomorrow's workforce newsletter, 4(1).* Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW_news_winter09.pdf

Government of Alberta. (2010, Fall). *Building and educating tomorrow's workforce newsletter, 3(3).* Retrieved from http://eae.alberta.ca/documents/WIA/WIA-BETW-news-fall2010.pdf

Government of Alberta. (2010a, October 27). *Alberta industries workforce strategies, progress update 2006-2010*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW-industry-strategies.pdf

Government of Alberta. (2010b, October 27). *Building and education tomorrow's workforce performance update 2009*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW-performance-update09.pdf

Government of Alberta. (2011, April 27). *Engaging the mature worker: an action plan for Alberta*. Retrieved from http://employment.alberta.ca/documents/RRM/RRM-BI-mature-workers.pdf

Government of Alberta. (2011, May 6). *Connecting the dots: Aboriginal workforce and economic development in Alberta*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW-connecting-dots-report.pdf

Government of Alberta. (2011, May 6). *Response to connecting the dots*. Retrieved from http://employment.alberta.ca/documents/WIA/WIA-BETW-connecting-dots-response.pdf

Government of Alberta. (2011, July). *Industry profiles construction industry.* Retrieved from http://eae.alberta.ca/documents/profiles/industry-profile-construction.pdf

Government of Alberta. (2011a). *Alberta immigration progress report 2011.* Retrieved from http://eae.alberta.ca/documents/WIA/WIA-IM-immigration-progess-report.pdf

Government of Alberta. (2011b). *Alberta labour force profiles aged 45 and older 2011.* Retrieved from http://eae.alberta.ca/documents/LMI/LMI-LFP-profile-45older.pdf

Government of Alberta. (2012). *Alberta labour force profiles immigrants 2011.* Retrieved from http://eae.alberta.ca/documents/LMI/LMI-LFP-profile-immigrants.pdf

Government of Alberta. (2012a). *Alberta oil sands industry quarterly update summer 2012*. Retrieved from http://albertacanada.com

Government of Alberta. (2012, Summer). *Wood Buffalo update summer 2012*. Retrieved from www.woodbuffalo.net/linksRESRepo.html

Government of Alberta. (n.d.). *Alberta's supply outlook model 2011-2021 education and skills.* Retrieved from http://eae.alberta.ca/documents/occupational-demand-and-supply-outlook.pdf

Government of Alberta. (n.d.). *Building and educating tomorrow's workforce themes and priority actions*. http://employment.alberta.ca/documents/WIA/WIA-BTW_priority_actions.pdf

Government of Alberta. (n.d.) *Alberta short-term employment forecast tool, 2011-13*. Retrieved from http://employment.alberta.ca/documents/Short-term-Employment-Forecast-tool.pdf

Government of Alberta/ Finance and Enterprise. (2009, May). *Improving construction productivity in Alberta oil and gas capital projects.* Retrieved from http://albertacanada.com/files/albertacanada/Improving_Construction_Productivity.pdf

Government of Alberta/Advanced Education and Technology (2001). *Campus Alberta planning resource: profiling Alberta's advanced education system.* Retrieved from http://aet.alberta.ca

Government of Alberta/Apprenticeship and Industry Training Board. (1993, July). 1992-93 Annual report. Edmonton.

Government of Alberta/Apprenticeship and Industry Training Board. (1994, July). *1993-94 Annual report.* Edmonton.

Government of Alberta/Apprenticeship and Industry Training Board. (1995, October). *1993-94* Annual report. Edmonton.

Government of Alberta/Apprenticeship and Industry Training Board. (1996, September). *1994-95* Annual report. Edmonton.

Government of Alberta/Apprenticeship and Industry Training Board. (1997, October). *1996/97 Annual report.* Edmonton.

Government of Alberta/Apprenticeship and Industry Training Board. (1998, August). *1997/98 Annual report. Edmonton.*

Government of Alberta/Apprenticeship and Industry Training Board. (1999, September). *1998/99 Annual report. Building on the vision. Edmonton.*

Government of Alberta/Apprenticeship and Industry Training Board. (2000, June) *1999-2000 Annual report. Strengthening the Foundation. Edmonton.*

Government of Alberta / Apprenticeship and Industry Training Board. (2002). *2001-2002 Annual report. Responding to a strong economy.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2003, May). *2002-2003 Annual report. Maintaining the momentum.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2004, June). *2003-2004 Annual report. Meeting the challenges of the future.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2005, June). *2004-2005 Annual report. Going strong.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2006, September). *2005-2006 Annual report. Building opportunity.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2007, November). *2006-2007 Annual report. Managing growth and building for tomorrow.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2008, August). *2007-2008 Annual report. Building a stronger Alberta.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2009, September). *2008-2009 Annual report.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2010, June). *2009-2010 Annual report.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (2011). *Statistical profiles.*

Government of Alberta / Apprenticeship and Industry Training Board. (2012). *2011-2012 Annual report.* Edmonton.

Government of Alberta / Apprenticeship and Industry Training Board. (July, 2001). *2000-2001 Annual report. Meeting the challenge.* Edmonton.

Government of Alberta / Culture. (2005, August). *The economic impact of the arts in Alberta.* Retrieved from http://culture.alberta.ca

Government of Alberta / Education. (2009). *High school completion longitudinal study.* Retrieved from http://education.alberta.ca/media/1079006/hscdataanalysis_report_%20final.pdf

Government of Alberta / Employment and Immigration. (2008). *Beyond pay and benefits: Alberta's employers effective practices.* Retrieved from http://alis.alberta.ca/pdf/cshop/beyondpay.pdf

Government of Alberta / Employment and Immigration. (2008, August). *Mature workers in Alberta and British Columbia: understanding the issues and opportunities.* Retrieved from www.employmnet.alberta.ca

Government of Alberta / Employment and Immigration. (2009). *Education of migrants.* Retrieved from http://eae.alberta.ca/documents/LMI/LMI-LFP_migrants_education.pdf

Government of Alberta / Employment and Immigration. (2010, November). *Temporary foreign workers a guide for employees.* Retrieved from http://humanservices.alberta.ca/documents/WIA-IM-tfw-employee.pdf

Government of Alberta / Employment and Immigration. (2011). *Alberta's occupational demand and supply outlook 2009-2019.* Retrieved from www.docstoc.com/docs/71985974/Albertas-Occupational-Demand-and-Supply-Outlook#

Government of Alberta / Employment and Immigration. (2011, July 11). *Building and educating tomorrow's workforce newsletter, 4(1).* Retrieved from www.industrymailout.com/Industry/View.aspx?id=290574&q=0&qz=3e6b60

Government of Alberta / Employment and Immigration. (2011, August). *Impact of the temporary foreign worker (TFW) program on the labour market in Alberta.* Retrieved from http://employment.alberta.ca/documents/Impact-TFW-Program-on-the-Labour-Market-in-Alberta.pdf

Government of Alberta / Employment and Immigration. (2011a). *Alberta's regional occupational demand outlook, 2011-2015*. Retrieved from http://employment.alberta.ca/BI/2762.html

Government of Alberta / Employment and Immigration. (2011b). *Alberta occupational demand outlook at 3 digit NOC-S*, 2011-2015.*

Government of Alberta / Employment and Immigration. (2011c). *Alberta's regional occupational demand outlook, 2011-2021*. Retrieved from www.docstoc.com/docs/116725652/Albertas-Occupational-Demand-and-Supply-Outlook-2011-2021

Government of Alberta / Employment and Immigration. (2011d). *Immigrants*. Retrieved from http://eae.alberta.ca/documents/LMI/LMI-LFP-profile-immigrants.pdf

Government of Alberta / Employment and Immigration. (2012, April 23). *Building and educating tomorrow's workforce newsletter, 4(1)*. Retrieved from www.industrymailout.com/Industry/View.aspx?id=290574&q=0&qz=3e6b60

Government of Alberta / Employment and Immigration. (2012, July 17). *Alberta modified Canadian occupational projection system (COPS) outlook 2011-2015, Industry Employment Outlook.*

Government of Alberta / Energy. (2011). *Comprehensive regional infrastructure sustainability plan for the Athabasca oil sands area overview.* Retrieved from www.energy.gov.ab.ca/pdf/ossAOSA_CRISP_overview.pdf

Government of Alberta / Finance and Enterprise, Energy. Construction Owners Association of Alberta. (2009, February). *The Alberta report: COAA major projects benchmarking summary.*

Government of Alberta / Finance and Enterprise. (2011, March 11). *Recent migration trends in census divisions: Fort McMurray, Calgary and Edmonton*. Retrieved from www.finance.alberta.ca/aboutalberta/demographic_spotlights.html

Government of Alberta / Finance and Enterprise. (2013). *Budget 2013: Economic Outlook.* Retrieved from www.finance.alberta.ca/publications/budget/budget2013/fiscal-plan-economic-outlook.pdf

Government of Alberta / Human Resources and Employment: Labour Force Planning Committee. (2001, October). *Prepared for growth: building Alberta's labour supply*. Retrieved from www.assembly.ab.ca/lao/library/egovdocs/alhre/2001/131863.pdf

Government of Alberta / Human Resources and Employment. (2005). Alberta's skill shortages. Retrieved from www.assembly.ab.ca/lao/library/egovdocs/2005/alhre/152518.pdf

Government of Alberta / Human Resources and Employment. (2005, September). Prepared by Nichols Applied Management. *Understanding Alberta's labour force: looking to the future.*

Government of Alberta / Human Resources and Employment. (2006, March). *Labour market information for your business: a practical guide.* Retrieved from http://alis.alberta.ca/ep/careershop/showproduct.html?DisplayCode=PRODUCT&EntityKey=5795

Government of Alberta / Human Resources and Employment. (2006, July 25). *Building and educating tomorrow's workforce*. Retrieved from http://eae.alberta.ca/documents/WIA/WIA-BETW_strategy.pdf

Government of Alberta / Human Services. (2011a). *Alberta's supply outlook model 2011-2021.* Retrieved from http://eae.alberta.ca/documents/occupational-demand-and-supply-outlook.pdf

Government of Alberta / Human Services. (2011b). *Alberta's supply outlook model 2011-2021 visible minorities, Aboriginals, and people with disabilities.* Retrieved from http://eae.alberta.ca/documents/LMI/LMI-LMF_occ_supply_equity.pdf

Government of Alberta / Human Services. (2012). *Canada-Alberta labour market agreement for persons with disabilities 2011/2012 annual report*. Retrieved from http://humanservices.alberta.ca/publications/713.html

Government of Alberta / Human Services. (2012, March). *Albertal Labour market outlook.*

Government of Alberta / Human Services. (2012, April 23). *Building and educating tomorrow's workforce newsletter, 4(2)*. Retrieved from www.industrymailout.com/Industry/LandingPage.aspx?id=912476&p=1

Government of Alberta / Human Services. (2012, July 31). *Employment & training programs and services*. Retrieved from http://employment.alberta.ca/AWonline/ETS/4345.html#authority

Government of Alberta / Labour Force Planning Committee. (2001). Prepared for growth: building Alberta's labour supply. Retrieved from www.assembly.ab.ca/lao/library/egovdocs/alhre/2001/131863.pdf

Government of Alberta / Minister's Workforce Forum. (2010, October 27). *Discussion primer.* Retrieved from http://employment.alberta.ca/documents/RRM/RRM-BI-workforce-forum-primer.pdf

Government of Alberta / Learning Information Services. (2011). *2011 Alberta wage and salary survey*.

Government of Alberta / Premier's Council for Economic Strategy. (2011). *Shaping Alberta's future, report of the Premier's Council for Economic Strategy*. Retrieved from http://alberta.ca/AlbertaCode/images/ShapingABFuture_Report.pdf

Government of Alberta / Treasury and Finance. (2012, July 7). *Alberta population projection 2012-2041.* Retrieved from www.finance.alberta.ca/aboutalberta/population_reports/2012-2041-alberta-population-projections.pdf

Government of Alberta / Treasury Board / Economic Development. (2010). *Report on competitiveness*. Retrieved from www.treasuryboard.alberta.ca/docs/EconomicDevelopment/2010-Report-on-Competitiveness.pdf

Government of Alberta / Treasury Board / Economic Development. (2012, June 27). *Alberta population Projection 2012-2041.* Retrieved from www.finance.alberta.ca/aboutalberta/population_reports/2012-2041-alberta-population-projections.pdf

Government of British Columbia / Education. (2001). *Over-representation of Aboriginal students reported with behaviour disorders*. Victoria.

Government of Canada / Canada Mortgage and Housing Corporation. (2012, Spring). *Rental market report Alberta highlights.* Ottawa.

Government of Canada / Canadian Apprenticeship Forum. (2011).A*ssessing apprenticeship outcomes: building a case for pursuing and completing an apprenticeship.* Retrieved from: www.nald.ca/library/research/caf/apprenticeship_outcomes/apprenticeship_outcomes.pdf

Government of Canada / Citizenship and Immigration, Foreign Credentials Referral Office. (2010). *Employer's roadmap to hiring and retaining internationally trained workers.* Retrieved from www.credentials.gc.ca/employers/roadmap/roadmap.pdf

Government of Canada / Citizenship and Immigration. (2011). *Canada facts and figures: immigration overview – permanent and temporary residents.*

Government of Canada / Citizenship and Immigration. (2011, October 11). *Summary report: temporary foreign worker (TFW) program – consultations with stakeholders.* Retrieved from www.cic.gc.ca/english/department/consultations/tfw-consultations-stakeholders/index.asp

Government of Canada / Citizenship and Immigration. (2013, February 27) Preliminary tables – permanent and temporary residents, 2012. Retrieved from www.cic.gc.ca/english/resources/statistics/facts2012-preliminary/index.asp

Government of Canada / Citizenship and Immigration. (2013, April 18). *List of priority occupations and organization designated to conduct educational credential assessments for federal skilled worker program released.* Retrieved from www.cic.gc.ca/english/department/media/releases/2013/2013-04-18.asp

Government of Canada/Citizenship and Immigration. (n.d.) *Expression of interest consultation roundtable – background document*. Ottawa.

Government of Canada/Human Resources and Skills Development. (2012, May 5). *Pan Canadian activities*. Retrieved from www.hrsdc.gc.ca/eng/employment/ei/reports/eimar_2011/chapter4_3.shtml

Government of Canada/Human Resources and Skills Development. (2012, June 7). *EI program characteristics for the period of May 13, 2012 to June 09, 2012*. Retrieved from http://129.services.gc.ca/eiregions/eng/rates_cur.aspx

Government of Canada/Human Resources and Skills Development. (2012a, June 27). *Concordance tables for NOC 2011*. Retrieved from www5.hrsdc.gc.ca/noc/english/noc/2011/Concordance.aspx

Government of Canada/Human Resources and Skills Development. (2012b, June 27). *About the NOC 2011*. Retrieved from www5.hrsdc.gc.ca/noc/english/noc/2011/AboutNOC.aspx

Government of Canada/Human Resources and Skills Development. (2012, July 16). *Canadian occupational projection system (COPS)*. Retrieved from www23.hrsdc.gc.ca/w.2lc.4m.2@-eng.jsp

Government of Canada/Human Resources and Skills Development. (2012, October 3). *Canadian occupational projection system, imbalances between labour demand and supply, 2011-2020*. Retrieved from www23.hrsdc.gc.ca/l.3bd.2t.1ilshtml@-eng.jsp?lid=16&fid=1&lang=en

Government of Canada/Human Resources and Skills Development Canada. (2013, April 4). *Labour market opinion (LMO) statistics – annual statistics 2008-2011*. Retrieved from: www.hrsdc.gc.ca/eng/jobs/foreign_workers/lmo_statistics/annual2011.shtml

Government of Canada/Office of the Parliamentary Budget Officer. (2012, October 29). *An assessment of Canada's labour market performance*. Ottawa.

Government of Canada/Standing Committee on Finance. (April 23, 2013). *Minutes*. Retrieved from Parliamentary Business website: www.parl.gc.ca/HousePublications/Publication.aspx?DocId=6095408&Language=E&Mode=1&Parl=41&Ses=1#Int-7972273

Government of Canada/Statistics Canada. (2005). *Building on our competencies: Canadian results of the international literacy and skills survey 2003, Cat. 89-617-XIE*. Retrieved from www5.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=89-617-XIE&lang=eng

Government of Canada/Statistics Canada. (2008). *Participation and activity limitation survey of 2006: labour force experience of people with disabilities in Canada, 89-628-X-No.7*. Ottawa: Statistics Canada. Retrieved from www.statcan.gc.ca

Government of Canada/Statistics Canada. (2010). *Survey of labour and income dynamics (SLID)*. Ottawa: Statistics Canada. Retrieved from www.statcan.gc.ca

Government of Canada/Statistics Canada. (2011, February). Number of registered apprentices, Canada, provinces and territories, 1995, 2000, 2005 and 2006 to 2009. (CANSIM Table 477-0055). Ottawa. Retrieved from www.statcan.gc.ca/pub/81-582-x/2011002/tbl/tbld1.1-eng.htm

Government of Canada/Statistics Canada. (2011, November 23). *Aboriginal people and the labour market. Estimates from the labour force survey.* (Cat. #71-588-x, no. 3). Retrieved from www5.statcan.gc.ca/bsolc/olc-cel/olc-cel?catno=71-588-XIE2011003&lang=eng#formatdisp

Government of Canada/Statistics Canada. (2011, December 14). *Number and percentage distribution of registered apprentices, by age group, Canada, 1995, 2000, 2005, 2006 to 2009*. (CANSIM Table 477-0053). Ottawa. Retrieved from www.statcan.gc.ca/pub/81-582-x/2011002/tbl/tbld1.3-eng.htm

Government of Canada/Statistics Canada. (2012). *Labour force historical review 2012, 367310*. Ottawa: Statistics Canada. Retrieved from http://publications.gc.ca/site/eng/367310/publication.html

Government of Canada/Statistics Canada. (2012, May 31). *Registered apprenticeship training, certificates, by age groups, sex, major trade groups and apprentice or trade qualifier indicator (Table 477-0051)*. Ottawa. Retrieved from www5.statcan.gc.ca/cansim/a26

Government of Canada/Statistics Canada. (2013, May 14). *Labour productivity and related variables by business sector industry, consistent with the North American Industry Classification System (NAICS) and the System of Nation Accounts (SNA), provinces and territories, annual 2007 to 2012* (Table 383-0029) and *Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and North American Industry Classification System (NAICS), annual, 2007 to 2012* (Table 383-0031). Ottawa: Statistics Canada. Retrieved from www5.statcan.gc.ca/cansim/a03?lang=eng&pattern=383-0029..383-0031&p2=31

Government of Ireland/Central Statistics. (2012, February 27). Back ground notes. *Quarterly national household survey, 30-34*. Retrieved from www.cso.ie/en/media/csoie/releasespublications/documents/labourmarket/2012/qnhs_q42012.pdf

Government of Western Australia, Department of Training and Workforce Development. (2012, May 9). Correspondence of Ruth Shean, Director General.

Government of Western Australia Department of Training and Workforce Development. (2010). *Skilling WA – a workforce development plan for Western Australia.* East Perth. Retrieved from www.dtwd.wa.gov.au/dtwd/detcms/apprenticeships-and-training/training-and-workforce-development/binary-files/skilling-wa/skilling-wa---a-workforce-development-plan-for-western-australia.en?oid=com.arsdigita.cms.contenttypes.FileStorageItem-id-11078286

Grady, Patrick. (2008). *Canadian Immigration: a labour market and productivity perspective, a presentation to the Fraser Institute Canadian Immigration Policy Conference June 4-5, 2008*. Retrieved from: http://global-economics.ca/fraser_immigration_policy_conference.ppt

Graham, I. (2010, January 10). *Working Paper 276 Working conditions of contract workers in the oil and gas industries*. Geneva: International Labour Organization. Retrieved from www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_161194.pdf

Grande Alberta Economic Region. (2006, June 21). Prepared by Bradley Wells Management Consulting. *Grande Alberta Economic Region: community response to the labour market challenge, final report. Retrieved from* www.grandealberta.com/_cabinet/1/labour-strategy-final-report.pdf

Grant, T. (2012, November 29). Why Canada's labour mismatch is getting worse. *The Globe and Mail*. Retrieved from www.theglobeandmail.com/

Grant, T. (2013, April 19). Foreign workers a boon for employers, for Canada not so much. *The Globe and Mail*. Retrieved from www.theglobeandmail.com/report-on-business/economy/jobs/foreign-workers-a-boon-for-employers-for-canada-not-so-much/article11433730/#dashboard/follows

Green, A.G. (2003). What is the role of immigration in Canada's future? In C.M. Beach, Green, A.G. & Reitz, J.G. (Eds). *Canadian Immigration Policy for the 21st Century.* Kingston: John Deutsch Institute for the Study of Economic Policy, Queen's University (pp.33-46).

Greenwood, J.J. (1969). An analysis of the determinants of labor migration in the United States. The Review of Economics and Statistics, 51(2) 189-194.

Gross, D.M. & Schmitt, N. (2012, January). *Temporary foreign workers and regional labor market disparities in Canada*. Burnaby: Simon Fraser University.

Gross, D.M. (2011, December). Who feels economically threatened by temporary foreign workers? Evidence from the construction industry. *Economic Papers*. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1759-3441.2011.00140.x/pdf

Guillemette, Y. & Robson, W.B.P. (2006, September). *No elixir of youth: immigration cannot keep Canada young*. Toronto: C.D. Howe Institute.

Gunderson, M. & Krashinsky, H. (2012), *Returns to apprenticeship: analysis based on the 2006 census. Working paper no. 99*. University of British Columbia: Canadian Labour Market and Skills Researcher Network. Retrieved from www.clsrn.econ.ubc.ca/workingpapers.php

Guttormson, K. (2011, December 27). Alberta employers, schools try to stave off anticipated labour shortage. *Calgary Herald*. Retrieved from www.calgaryherald.com

Harris, M. (2012, March 19). Are employers ready for workers in their 80s? *Edmonton Journal*. Retrieved from www.edmontonjournal.com

Hart Energy. (2012, March 1). *The great crew change – fact or fiction?* Retrieved from www.epmag.com/item/The-Great-Crew-Change-Fact-Fiction_97959

Homeward Trust. (2012, January). *Edmonton area community plan on housing and supports: 2011-2015*. Retrieved from www.homewardtrust.ca

Institute for Research on Public Policy. (2012, April 2012). *Roundtable on temporary migration and the Canadian labour market*. Ottawa. Retrieved from www.irpp.org/show_study.php?id=400

Institute for Research on Public Policy. (2012, April). *Making it in Canada: immigration outcome and policies* Retrieved from www.irpp.org/pubs/IRPPstudy/IRPP_Study_no29.pdf

International Labour Office. (2012, May). *Short-term labour market outlook and key challenges in G20 countries*. Retrieved from www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_180912.pdf

International Labour Office. (2012, May, 16). *G20 still facing a 21 million jobs shortfall, say ILO and OECD*. Retrieved from www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_180901/lang--en/index.htm

Jackson, A. (2012, October 25). The upside of slow growth in the labour force. *The Globe and Mail*. Retrieved from www.theglobeandmail.com

Jergeas, G. (2009, May). *Improving construction productivity on Alberta oil and gas capital projects*. Government of Alberta: Finance and Enterprise.

Karabegovic, A., Nachum, G. & Velduis, N. (2011, September). *Measuring labour markets in Canada and the United States: 2011 edition*. Retrieved from Fraser Institute website www.fraserinstitute.org/uploadedFiles/fraser-ca/Content/research-news/research/publications/measuring-labour-markets-2011.pdf

Katz, L.F. & Murphy, K. M. (1992). "Changes in relative Rates, 1963-1987: supply and demand Factors." *Quarterly Journal of Economics, 107(1), 35-78.*

Kelly, L. (2012, January 7). Alberta rides strong job creation wave. *Edmonton Journal*. Retrieved from www.edmontonjournal.com

Kent, G. (2011, December 20). Ambrose gets earful about labour shortage. *Edmonton Journal*. Retrieved from www.edmontonjournal.com

Lampier, G. (2012, December 4). Seriously, there is a labour shortage. *Edmonton Journal*. Retrieved from www.edmontonjournal.com

Laporte, C. & Mueller, R.E. (2011, March). *The Completion behaviour of registered apprentices: who continues, who quits, and who completes programs?* Ottawa: Statistics Canada.

Lazear, E.P. & Spletzer, J.R. (2012). *The United States labor market: status quo or a new normal? NBER Working paper no. 18386*. Retrieved from www.nber.org/papers/w18386

Lefebvre, R., Simonova, E., & Wang, L. (2012, July). "Labour shortages in skilled trades – the best guestimate?" *Issue in Focus. Certified General Accountants.* Retrieved from www.cga-canada.org/_layouts/CGALinkTrack/CGALinkTrack.aspx?link=/en-ca/ResearchReports/ca_rep_2012-07_labour-shortage.pdf

List, J.A. & Rasul, I. (2010, June). *Field experiments in labour economics. NBER Working Paper No. 16062.* Retrieved from www.nber.org/papers/w16062.

Literacy Alberta. (n.d.). *Extracting full value: essential skills for Canada's oil sands industry.* Calgary.

Makin, J.H. (2012, July). "Why so many financial crises?" *Economic Outlook.* Washington: American Enterprise Institute for Public Policy Research.

Mansell, R.L. & Percy, M.B. (1990). *Strength in adversity: a study of the Alberta economy.* Edmonton: Western Centre for Economic Research.

Marchand, J. (2012). Local labor market impacts of energy boom-bust-boom in western Canada. *Journal of Urban Economics, 71(1),* 165-174.

Margo, R.A. (1977). Wages in California during the gold rush. *NBER Historical Paper 101.*

McDonald, R. J. (2011, December 13.) *Final Report of the AFN Special Rapporteur on the National Panel Engagement Process. Assembly of First Nations.* Retrieved from www.afn.ca/uploads/files/education/np_sr_final_report_december_14,_2011.pdf

McQuillan, Kevin. (2013). All the workers we need: debunking Canada's labour-shortage fallacy. Calgary: School of Public Policy. Retrieved from: http://policyschool.ucalgary.ca/?q=content/all-workers-we-need-debunking-canadas-labour-shortage-fallacy

Menard, M., Chan, C.K.Y. & Walker, M. (2008). *National apprenticeship survey Canada overview report 2007, No 81-598-X-001.* Ottawa: Government of Canada / Statistics Canada. Retrieved from www.statcan.gc.ca/pub/81-598-x/81-598-x2008001-eng.pdf

Meredith, J. (2010, June). *Crucial contributors? Re-examining labour market impact and workplace-training intensity in Canadian trades apprenticeship. Working Paper no. 64.* University of British Columbia: Canadian Labour Market and Skills Researcher Network. Retrieved from www.clsrn.econ.ubc.ca/workingpapers.php

Michaels, G. (2010, March). The long term consequences of resource-based specialisation. *The Economic Journal, 121,* 31-57.

Mincer, J. (1978). Family migration decisions. *Journal of Political Economy*, 86(5), 749-773.

Miner, Rick. (2012) *Jobs of the future: options and opportunities*. www.minerandminer.ca/data/Jobs_of_the_Future_Final.pdf

Modestino, Alicia Sasser. (2010, November). *Mismatch in the labor market: Measuring the supply and demand for skilled labor in New England.* New England Public Policy Centre, Federal Reserve Bank of Boston.

Morett, C. (2012, October 31). A 20-year view of the labor force. *AGEnda Aging and Work Blog.* Retrieved from http://agingandwork.bc.edu

Morisette, R., Lu , Y. & Qiu, T. (2013, March). Worker reallocation in Canada. *Analytical Studies Branch Research Paper Series 11F0019M-No. 348.* Ottawa: Statistics Canada.

National Centre for Vocational Education Research. (2007). *Workforce planning for the resources and infrastructure industry.* Sydney.

National Panel on First National Elementary and Secondary Education. (2011, November 30.) *Alberta Summary.* Retrieved from http://firstnationeducation.ca/wp-content/uploads/2011/03/Alberta_e.pdf

National Seniors Council. (2011). *Report on the labour force participation of seniors and near seniors, and intergenerational relations.* Retrieved from www.seniorscouncil.gc.ca/eng/research_publications/labour_force/labour_force_participation.pdf

Nichols Applied Management. (2007, December). *Report on mobile workers in the Wood Buffalo Region of Alberta.* Retrieved from www.oilsandsdevelopers.ca/wp-content/uploads/2009/11/Final-Report-Mobile-Worker-Study.pdf

Oil & Gas Inquirer. (2011, September 26). *Out of the shadows.* Retrieved from www.oilandgasinquirer.com/article.asp?article=magazine%5C110926%5Cmag2011_sq0000.html

Park, J. (2011). Retirement, health, and employment among those 55 plus. *Perspectives on Labour and Income.* Ottawa: Statistics Canada 75-001-X, 5-13. Retrieved from www.statcan.gc.ca/pub/75-001-x/2011001/pdf/11402-eng.pdf

Patrickson, M. & Ranzijin, R. (2005). Workforce aging: the challenges for 21st century management. *International Journal of Organisational Behaviour* 10(4), 729-739. Retrieved from www.usq.edu.au/extrafiles/business/journals/HRMJournal/InternationalArticles/Volume10Ageing/PatricksonRanzijnVol10-4.pdf

Petroleum Human Resources Council of Canada. (2010a, December). A look at the current state of the Canadian upstream petroleum industry including key trends and their impact on the workforce. *Situational analysis and Q3/Q4 2010 short term hr trends report.* Retrieved from www.petrohrsc.ca/labour-market-information/short-term-hr-trends.aspx

Petroleum Human Resources Council of Canada. (2012). *The decade ahead: oil sands labour market outlook to 2021.* Retrieved from www.petrohrsc.ca

Petroleum Human Resources Council of Canada. (2012, March 30). *Oil sands labour market outlook press release.* Retrieved from www.petrohrsc.ca/news-events/media-releases/2012/march-30,-2012-oil-sands-labour-market-outlook-press-release.aspx

Petroleum Human Resources Council of Canada. (2011, March). *The decade ahead: labour market projections & analysis for Canada's oil and gas industry to 2020.* Calgary.

Petroleum Human Resources Council of Canada. (2011, May). *The decade ahead: labour market projections and analysis for Saskatchewan's oil and gas industry.* Retrieved from www.aeei.gov.sk.ca/labour-market-projections-analysis-sk-oil-gas-industry-2020

Petroleum Human Resources Council of Canada. (2011b, December). *HR trends and insights: a look at current and short-term Workforce trends within Canada's oil and gas industry Q3/Q4 2011 Report.* Retrieved from www.petrohrsc.ca/media/19533/q3-q4_2011_petroleum_hr_trends_and_insights_report_final_december_2011.pdf

Petroleum Human Resources Council of Canada. (2012, May 23). *Canada's oil & gas labour market outlook to 2015.* CAPP Oil & Gas Workforce Strategy Session.

Petroleum Human Resources Council of Canada. (2012, May 29). *Canada's oil and gas industry will need to fill at least 9,500 jobs by 2015.* Retrieved from www.petrohrsc.ca/news-events/media-releases/2012/may-29,-2012-canada%E2%80%99s-oil-and-gas-industry-will-need-to-fill-at-least-9,500-jobs-by-2015.aspx

Petroleum Human Resources Council of Canada. (2012a, May). *Alberta's oil and gas labour market outlook to 2015.*

Petroleum Human Resources Council of Canada. (2012a, July). *HR trends and insights: a look at current and short-term workforce trends within Canada's oil and gas Industry Q1/Q2 2012 Report.* Retrieved from www.petrohrsc.ca/labour-market-information/short-term-hr-trends.aspx

Petroleum Human Resources Council of Canada. (2012b, July 5). *Oil and gas labour challenges call for innovative hr strategies.* Retrieved from www.petrohrsc.ca/news-events/media-releases/2012/july-5,-2012-oil-and-gas-labour-challenges-call-for-innovative-hr-strategies.aspx

Petroleum Human Resources Council of Canada. (2013, May). The Decade Ahead: Labour Market Outlook to 2022 for Canada's Oil and Gas Industry. Retrieved from www.petrohrsc.ca/document-list.aspx

Petroleum Services Association of Canada. (2012, May 23). *Immigration and temporary foreign workers.* CAPP Oil & Gas Workforce Strategy Session.

Picot, G. & Sweetman, A. (2012). Making it in Canada. *IRRP Study, (29)*. Retrieved from Institute of Research on Public Policy website. www.irpp.org/pubs/IRPPstudy/IRPP_Study_no29.pdf

Plante, J. (2011, September 29). *Integration of internationally-education immigrants into the Canadian labour market: determinants of success.* Statistics Canada 81-595-MIE. Retrieved from www.statcan.gc.ca/pub/81-595-m/81-595-m2011094-eng.htm

Prism Economics and Analysis. (2010, September 1). *Engineering labour market conditions 2009 – 2018*. Retrieved from Engineers Canada website. www.engineerscanada.ca/files/engineering_labour_market_conditions_report_2010.pdf

Ramjohn, J. (2011, July 11). *Resource based communities & hyper-growth planning to plan: the Regional Municipality of Wood Buffalo experience.* Presentation to the Canadian Institute of Planners 2011 Conference. Retrieved from http://cip2011.cip-icu.ca/english/pdfs/MCS20%20-%20RESOURCE%20BASED%20COMMUNITIES%20&%20HYPER-GROWTH%20-%20Planning%20to%20Plan%20The%20Regional%20Municipality%20of%20Wood%20Buffalo%20-Experience.pdf

RDA Global Inc. (2012, February). S*ummary report: labour supply in Canada, the US, the UK, and Ireland.* Retrieved from the Calgary Economic Development website www.calgaryeconomicdevelopment.com/sites/default/files/pdf/research/reports/whats_new/global_demand_canada_us_uk/2012_Labour_Supply_Executive_Summary_Report.pdf

Regional Municipality of Wood Buffalo. (2010, November 5). *Municipal Census 2010.* Retrieved from www.woodbuffalo.ab.ca/Assets/Corporate/Census+Reports/2010+Municipal+Census.pdf

Regional Municipality of Wood Buffalo. (2012, October). *Census 2012 count yourself in.* Retrieved from www.woodbuffalo.ab.ca/

Resources Industry Training Council. (2010, November). *Western Australian gas and oil industry: workforce development plan*. Retrieved from http://ritcwa.com.au/LinkClick.aspx?fileticket=oH5bC1PV7aA%3D&tabid=133

Richards, J. (2009, October). *Dropouts: The Achilles' heel of Canada's high-school system*. Toronto: C.D. Howe Institute. Retrieved from www.cdhowe.org/pdf/commentary_298.pdf

Richards, J. (2011, January 6). *School Dropouts: Who Are They and What Can Be Done?* Toronto: C.D. Howe Institute.

Richardson, S. & Tan, Y. (2007). Forecasting future demands: what we can and cannot know. Australia.

Roback, J. (1982). Wages, rents and the quality of life. In *Journal of Political Economy, 90(6)*, 1257-1278.

Robertson, M. & Roy, A.S. (1982). Labour shortages and immigration policy: reply. In *Canada Public Policy (Summer)*. Retrieved from www.jstor.org/stable/pdfplus/3549418.pdf?acceptTC=true

Robson, W.B.P. (2001, October). *Aging populations and the workforce challenges for employers.* Winnipeg: British-North American Committee. Retrieved from www.cdhowe.org/pdf/bnac_aging_populations.pdf

Ruddy, A., D'Autremont, M., Carmichael, J. & Truscott, R. (2013, April). *Looking for hire ground: the small business perspective on labour shortages in western Canada.* Canadian Federation of Independent Business. Retrieved from www.cfib-fcei.ca/english/article/5107-looking-for-hire-ground.html

Sankey, D. (2012, January 7). Recruiters brace for 'war for talent'. *Calgary Herald*. Retrieved from www.calgaryherald.com

Schellenberg, G., Turcotte, M. & Ram, B. (2005). Post-retirement employment. *Perspectives on Labour and Income, 6(9)*. Ottawa: Statistics Canada. Retrieved from www.statcan.gc.ca/pub/75-001-x/10905/8622-eng.pdf

Schellenberg, G. & Ostrovsky, U. (2008, September). The retirement plans and expectations of older workers. *2007 General Social Survey Report*. Ottawa: Statistics Canada 11-008-X. Retrieved from www.statcan.gc.ca/pub/11-008-x/2008002/article/10666-eng.pdf

Seidle, F.L. (2012, June 5). Immigration and temporary migration to Alberta: trends and emerging Issues. Working Lunch for Institute for Research on Public Policy.

Sharpe, A. & Gibson, J. (2005, September). *The apprenticeship system in Canada: trends and issues.* Ottawa: Centre for the Study of Living Standards.

Sharpe, A. & Qiao, S. (2006, December). *The role of labour market information for adjustments: international comparisons.* Research Report 2006-03. Ottawa: Centre for Study of Living Standards. www.csls.ca/reports/csls2006-03.pdf

Sharpe, A. (2008, September). Three policies to increase productivity growth in Canada. *Canadian Priorities Agenda Brief No. 8*. Institute for Research on Public Policy. Retrieved from www.irpp.org/cpa

Shaw, C., Cooney, R., Long, M. & Burke, G. (2005). *Availability of skilled labour in selected occupations in Western Australia.* Melbourne: Monash University. Retrieved from www.education.monash.edu.au/centres/ceet/docs/cciwa-skills-in-resources-sector-dec2005-shah.pdf

Someshwar, R. & Kapsalis, C. (1982). Labour shortages and immigration policy. *Canadian Public Policy, 8(3)*, 379-383.

Stoller, J. (2013, April 18). Where Canada stands in the global race for talent. *The Globe and Mail.* Retrieved from: www.theglobeandmail.com/report-on-business/economy/canada-competes/where-canada-stands-in-the-global-race-for-talent/article11369770

Storey, K. (2010). Fly-in/Fly-out: Implications for community sustainability. *Sustainability 2(5)*, 1161-1181. Retrieved from www.mdpi.com/2071-1050/2/5/1161

Sweetman, A. & Warman, C. (2012, January 15). The structure of Canada's immigration system and Canadian labour market outcomes. *Queen's Economics Department Working Paper No. 1292*. Kingston. Retrieved from http://qed.econ.queensu.ca/working_papers/papers/qed_wp_1292.pdf

Tal, B. (2012, November 29). *Assessing labour market mismatch.* CIBC. Retrieved from http://research.cibcwm.com

Taylor, A., Foster, J. & Cambre, C. (September 2012). *Temporary foreign workers in trades in Alberta.* Work and Learning Network for Research and Policy. Retrieved from www.wln.ualberta.ca/~/media/wln/Documents/TFW/TFW_Report__trades_final.pdf

Thorp, K. (2009). *Harnessing the power: recruiting, engaging, and retaining mature workers*. Ottawa: Conference Board of Canada

Thorp, S., Hulley, H., McKibbin, R. & Pedersen, A. (2009). *Means-tested income support, portfolio choice and decumulation in retirement*. Sydney: University of Technology Quantitative Finance Research Centre Research Paper Series 248. Retrieved from www.business.uts.edu.au/qfrc/research/research_papers/rp248.pdf

Timilsina, R.R., LeBlanc, N. & Walden, T. (2005, October). *Economic impact of Alberta oil sands.* Canadian Energy Research Institute. Retrieved from www.ceri.ca/docs/OilSandsReport-Final.PD

Toneguzzi, M. (2012, July 19). Alberta has top job vacancy rate in Canada. *Edmonton Journal,* p.C3.

Trendle, B. (1999, September). *Industrial diversification and regional employment stability – a Framework for analysis.* Paper presented 1999 ANZRSAI Annual Conference, Newcastle, NSW, Australia. Retrieved from http://catedradiversificacion.unizar.es/contenidos/publicaciones/IndustrialDiversification.pdf

Turcotte, M. & Schellenberg, G. (2007). *A portrait of seniors in Canada 2006.* Ottawa: Statistics Canada 89-519-XIE. Retrieved from www.statcan.gc.ca/pub/89-519-x/89-519-x2006001-eng.pdf

Weber, J.G. (2012). The effects of a natural gas boom on employment and income in Colorado. Texas and Wyoming Energy Economics 34(5), 1580-1588.

Western Australia Technology and Industry Advisory Council. (2009). *Managing Western Australia's expansion. The need for people and skills.* Perth.

UNIVERSITY OF ALBERTA
DEPARTMENT OF ECONOMICS
Institute for Public Economics

RELEVANT · INFORMED · DEBATE

Institute for Public Economics

Department of Economics

8-14 H.M. Tory Building

University of Alberta

Edmonton, Alberta

T5G 2H4

www.ipe.ualberta.ca