Fall 2012

Calgary and Region
Economic Outlook 2012-2017
with Long-Term Economic Trends 2018-2042

CALGARY ECONOMIC DEVELOPMENT

THE CITY OF CALGARY
CHIEF FINANCIAL OFFICER'S DEPARTMENT

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Part 2: Long-Term Economic Trends 2018-2042

Completed October 2012

Introduction

Introduction

Pre-amble

The City of Calgary monitors and forecasts the local economy throughout the year. The results from this process are published twice annually as the Economic Outlook: once in the spring and then again in the fall. The Economic Outlook presents forecasts for a selected number of economic variables.

This document provides an analysis of those factors that are considered most likely to have a significant effect on the local economy over the forecast period. The current document is divided into two parts: (a) short-term forecast and (b) long-term forecast. The first section provides an annual forecast for the period 2012-2017. The focus of the short –term forecast is to show where the economy would be at particular point in time as compared to the past. The short-term forecast is an attempt to chart the fluctuations in the local economy. The second section presents the long-term forecast: 2018-2042. The long-term forecast is focused on showing how the economy would grow on average over the next 30 years. The focus of the long-term is to identify and discuss trends that are likely to impact the local economy over the forecast period.

Purpose

1. This publication is created to serve as a reference document to support The City of Calgary in financial and physical planning of the city. It also provides a common basis from which decisions could be made. By monitoring and reporting on the economic region and its environment, decision makers are kept abreast of the opportunities and threats that the region faces.

2. The economy plays an important part in The City's financial well being. For example, population growth creates an increase in demand for municipal services and the municipality's assessment base is increased as more residential and non-residential space is built to serve a larger population. In turn, the municipality draws on its assessment base to finance the delivery of services.

3. This report fills an important information gap as no other publication currently provides a comprehensive analysis of the local economy. Several research institutions restrict their analyses to the Alberta economy and few analyses and forecasts are available for the urban areas within the province.

Economic Environment
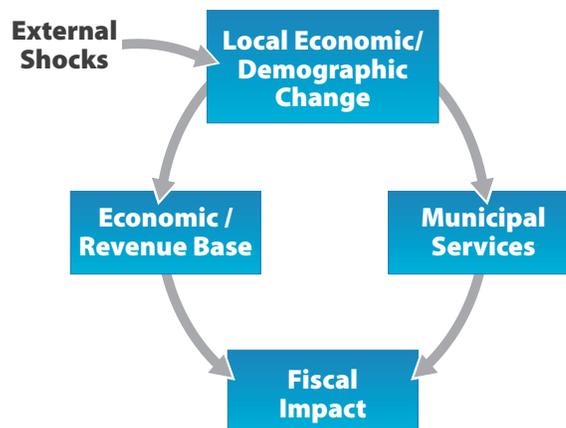
This report attempts to answer the following questions:

- What would be the overall rate of growth of the local economy?
- What would be the drivers of the local economy?
- How many jobs would be created?
- What would be the size of the city and region populations?
- What would be the inflation rate?
- What are the implications for municipal finance?

Assumptions

The study area for the economic forecast is the Calgary Economic Region (CER). The CER is a small open economy and is therefore affected by changes outside its borders. For example, political instability in the world's oil producing regions can produce a sharp increase in oil prices and in turn, this affects Alberta's energy industry's cash flow and investment in the local economy.

The economic forecast is therefore built on assumptions regarding changes in the world outside of the CER over the forecast period. The key assumptions underlying the forecast's basecase are as follows:

(a) The U.S. would avoid the fiscal cliff in January 2013 and

(b) the Eurozone would survive its fiscal problems.

If one or both of these assumptions are violated the level of economic activity that is charted in this report would not be realized. The world economy would grow at a sharply slower rate and local economic activity would follow suit. Unemployment rates would be higher and real estate vacancy rates would also be higher.

Calgary Economic Region Map

Legend

- Calgary Economic Region
- Census Metropolitan Area
- City of Calgary

Map labels: Sundre, Olds, Truchu, Three Hills, Didsbury, Carstairs, Crossfield, Irricana, Airdrie, Cochrane, Chestermere Lake, Strathmore, Tsuu T'ina Nation, Black Diamond, Okotoks, Turner Valley, High River, Vulcan, Nanton

Calgary and Region Economic Outlook 2012-2017 *with Long-Term Economic Trends 2018-2042* | Fall 2012

PART 1

Calgary and Region Economic Outlook

2012-2017

City of Calgary

- The 2012 civic census placed the city of Calgary's population at 1,120,200 persons, up from 1,090,900 in 2011, an increase of 29,289 persons. Natural increase was estimated at 9,631 persons and net migration at 19,658 persons.

- Total population in the city of Calgary is expected to reach 1,238,800 persons in 2017, up from 1,120,200 in 2012. Total population in Calgary is therefore expected to increase by 118,600 between 2012 and 2017, or by 2.0 per cent annually. In this period, the number of households should increase by roughly 50,600 units.
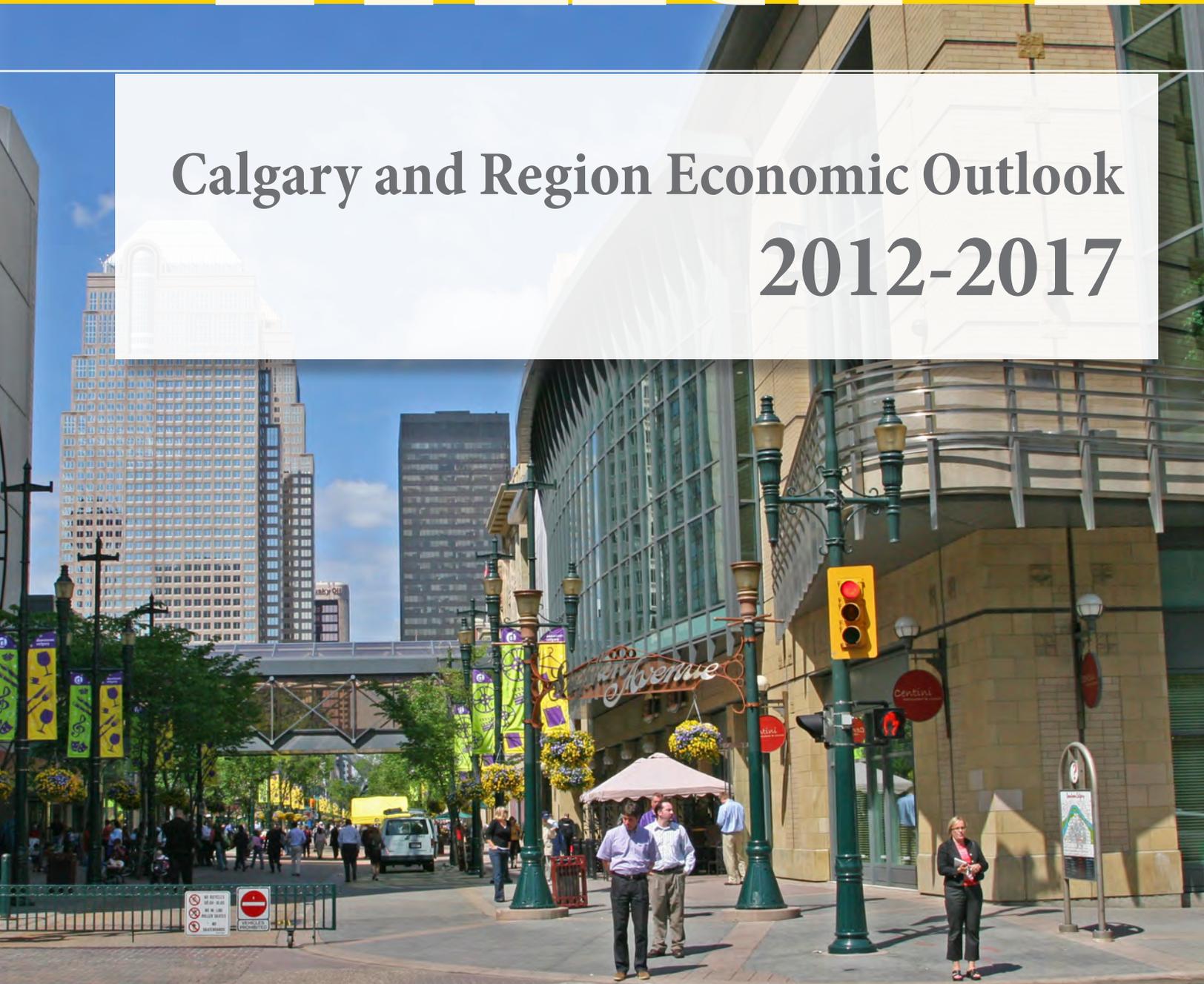
- A comparison of the population in the individual cohorts in 2012 against the same groups in 2017 shows significant growth occurring in the 60-64 (16,800 persons), 35-39 (14,600 persons) and 65-69 (13,300 persons) age groups (table 3). The 25-29 (-10,400 persons) and 20-24 (-1,700 persons) age groups should experience decline.

- Housing starts are expected to total 11,200 units in 2012 and 10,000 units in 2014. The Canada Mortgage and Housing Corporation's (CMHC) tighter credit restrictions should reduce the number of first time buyers and the number of housing starts below 2012 levels.

- The forecast anticipates the 2012 total building permit values to trend above the 2011 level as employment growth, increased labour incomes, positive net migration, low mortgage rates and low real estate vacancy rates combine to support the construction of new space. Building permit values are expected to range from $4.2 to $5.2 billion in 2012 and increase to $4.5 and $5.4 billion by 2017, as the economy produces space to support a larger population.

- Slower global economic growth should moderate commodity price increases over the next 10 years. Price increases are primarily the result of local labour shortages.

Calgary Economic Region

- The Calgary Economic Region's Gross Domestic Product is expected to expand by 3.5 per cent in 2012

and 3.7 per cent in 2015. Economic growth would decline to 3.6 per cent by 2017, as a relatively tight labour market restricts increased production and consumer spending.

- Total employment is also expected to increase by 98,000 jobs over the 2012-2017 period or by 2.5 per cent annually, up from 1.6 per cent for the 2006-2011 period.

- The unemployment rate for the 12 months ending August 2012 was estimated at 5.1 per cent and should average 4.9 per cent for 2012 and 4.5 per cent in 2014, as employment growth exceeds labour force growth. Over the forecast period, the aging population is expected to restrain the labour force growth rate and have a depressing effect on the unemployment rate over time.

- The inflation rate for 2012 should fall to 1.0 per cent from 2.2 in 2011. Economic growth in the world economy in 2013 and 2014 should result in higher demand for commodities and nudge consumer price inflation higher.

Alberta

- Alberta's GDP will continue to outperform most of the other provinces in Canada over the forecasting period. Business output continues to trend upwards, and ongoing strength in the labour market has pushed net interprovincial migration levels upwards in Alberta.

- Crude oil prices have been highly volatile in 2012. The production of both OPEC and non-OPEC countries remain at high levels, which should ease the fears of temporary supply disruptions from political instability. At the same time, with the global economic growth moderating, oil demand is expected to grow only slightly in 2012.

- Natural gas prices should continue their downward trend in the near term as a result of oversupply, ample storage and weak demand in the U.S. and Canada. Alberta's natural gas supply has to depend more on domestic consumers, as well as the potential market outside of North America for growth.

- Rising energy production volumes are exceeding pipeline capacity throughout North America. Pipelines

will become the arteries of the energy infrastructure connecting producing regions to refining centers and exporting places.

Canada

▶ Real GDP growth in Canada is expected to underperform that of the U.S. in the forecast period, due to domestic and external risks.

▶ External risks include: a further deterioration in Eurozone crisis, a potential U.S. recession in 2013, and a strong loonie due to increasing demand for commodities in the world market.

▶ Domestic risks include: moderate consumption growth due to weak job creation and high unemployment, reduced private investment due to consumer debt repayment, and reduced government spending due to deficit reductions.

United States

▶ The recent economic recession created a large gap between real and potential output levels in the U.S., and it is expected that the gap will close slowly over the next few years, which means moderate inflation pressures.

▶ A disorderly European debt default is the key external risk to the U.S. economy.

▶ Domestically, there is a concern that if the current law is not changed in time, a sharp fiscal tightening, namely the fiscal cliff, will lead to an economic recession in 2013 with a large amount of unused resources which would result in high unemployment and low inflation in the near-term. The forecast assumes that the U.S. Congress will put in place measures to blunt the effects of the impending tax increases and spending cuts.

World

▶ The global growth rate for 2012 is projected to decelerate from the 2011 rate given the deepening of the European Union (EU) financial crisis and the less than stellar performance from the U.S. economy and falling growth rate from the rest of the world's economies.

▶ Economic growth in the emerging world is also expected to dip in 2012 due to the global economic slowdown as no region is immune from the EU financial crisis, and sluggish U.S. economic recovery to mention a few.

▶ The ongoing EU financial sovereign debt crisis, resulting from the inability of EU countries, like Greece, Portugal and Ireland to pay their debt, has generated a very weak economic outcome for the region and the rest of the world as business and consumer confidences have plummeted.

Forecast Risks

Economic forecasts are always subject to upside and downside risks.

Upside Risk

A deepening of political unrest in the Middle East and North Africa, or a flare up of tensions surrounding Iran could result in further supply losses in the global oil market and hence higher oil prices. Alberta, as an energy producer, would benefit from higher energy prices. These prices are expected to increase the energy industry's cash flow and profitability and therefore induce further drilling activities. Increased investment spending should result in non-residential and residential construction growing above the baseline forecast as economic and demographic activity increases.

Downside Risk

External risks come from a worsening of the crisis in Europe, a sharp fiscal contraction in the U.S., stagnation in the U.S. economy and a larger-than-expected fall in oil prices. Failure to reach agreement over fiscal policy in the U.S. would result in a significant reduction in government spending and large tax increases. The U.S. Congressional Budget Office estimates that the combination of sharp tax increases and equally large reductions in government spending would have a depressing effect on the economy. Slower growth in the U.S. and the rest of the world would reduce the demand for Canadian exports and this would cause the Canadian and Alberta economies to grow below the baseline forecast.

Forecast Risks

Lifting Factors ⟵ ⟶ Dragging Factors

Consumer Sector

Lifting:
- Increasing employment

Dragging:
- Rising interest rates
- High consumer debt levels
- Negative net migration

+

Business Sector

Lifting:
- Rising oil prices
- Low interest rates

Dragging:
- Depressed natural gas prices
- Sagging consumer and business confidences
- Low housing starts
- Low non-residential construction
- Rising interest rates

+

Government Sector

Dragging:
- Budget deficit
- Reduction in government spending

+

World outside Alberta

Lifting:
- Strong growth in the emerging economies
- Confidence in the developed world prompting a stronger rebound in demand

Dragging:
- U.S. economy grows below its potential growth rate
- The BRIC economies experience weaker growth
- The developed economies experience significantly weaker growth
- Some EuroZone members default on their sovereign debt
- The global economy becomes significantly protectionist

Forecast Implications

Variable	Direction of Change	Implications for The City of Calgary
Canada		
Gross Domestic Product (%)	2013 increase over 2012. Canada's economic growth would be constrained below trend growth of the U.S. and world economies. This provides limited room for the growth in Canadian exports to the rest of the world.	The market for goods and services, in the rest of Canada, from the Calgary Economic Region would increase at a modest pace.
Prime Business Loan Rate (%)	2013 increase over 2012. The Bank of Canada has placed short term interest rates at extremely low levels in order to boost domestic demand.\n\nThese rates are expected to increase over the course of the forecast as the Bank of Canada attempts to unwind the monetary stimulus.	Higher interest service charges should not have a direct effect on The City. However, the impacts would be indirect as services providers pass on higher charges as increased fees to The City.
Government spending ($)	Federal expenditures are expected to decrease in the early stages of the forecast. Increased government spending was used to counter the recession's negative effects at both the provincial and national levels. Economic stability was therefore achieved by incurring deficits and increasing debt levels.	The federal government has publicly committed to balance its budget and therefore reduce the debt through expenditure restraint.\n\nConsequently, municipal governments should not expect significant increases in transfer payments. In fact, reductions in transfer payments may be a distinct possibility.
Alberta		
Crude Oil Price - WTI (US$/bbl)	Crude oil prices should fluctuate around US$94/bbl for the 2012-13 period as demand is restrained by relatively slower growth in the world economy. Prices would trend higher from 2014 to the end of the forecast period in response to faster growth in the world economy.	Producing economies such Alberta would benefit from higher prices and increased investment. Calgary would benefit from the economic spinoff. As prices begin to grow again, transit would improve its relative price competitiveness.\n\nPrices for petroleum based commodities such as diesel fuel and bitumen should increase.
Alberta Natural Gas Price - AECO/NIT (Can$/GJ)	Remains flat for the forecast period.\n\nNew technology has unlocked significant supplies of natural gas from shale formations across the United States, and therefore increasing domestic supplies and reserves. Soft U.S. demand and increased shale production have combined to reduce pipeline imports from Canada. This presents stiff competition for Canadian exports.	The net effect of $1.00/GJ price decrease for natural gas should decrease GDP by $1.8 billion. In addition, $1.00/GJ decrease in natural gas prices should cause provincial royalty revenues to decrease by roughly $1.0 billion. Also, this price decrease results in an decrease in corporate profits of roughly $250 million.\n\nA decrease in natural gas prices would cause The City's revenues to decrease assuming all things are equal.
Government spending ($)	Provincial expenditures are expected to decrease in the early stages of the forecast.\n\nIncreased government spending was used to counter the recession's negative effects at both the provincial and national levels. Economic stability was therefore achieved by incurring deficits and increasing debt levels.	The provincial government has publicly committed to balance its budget through expenditure restraint.\n\nConsequently, municipal governments should not expect significant increases in transfer payments. In fact, reductions in transfer payments may be a distinct possibility.
Calgary		
Gross Domestic Product (%)	The Calgary economy would grow over the forecast period as it benefits from the spin-off of investment in the non-conventional energy sector. Also, low vacancy rates in the various segments of the real estate market should boost construction activity in the local economy.	The City's revenue bases (tax and no-tax) would increase over this period as population and employment increase and the stock of building also increases.
Population Growth (persons)	• Continued growth\n• Population aging\n• Increase in number of retirees\n• Increase in youngest cohorts\n• Decrease in first time labour market entrants	Growth in demand for city services would be shaped by changing demographics.
Unemployment Rate (%)	The unemployment rate should trend downwards over the forecast period as employment growth exceeds labour force growth.	The statistics imply that employers would encounter greater difficulties in hiring younger workers.
Building Permits ($billion)	Building permit values to remain strong as low vacancy rates in the real estate sector leads to the construction of new space.	Pricing of goods and services may have implications for retired citizens.
Housing Starts ('000 Units)	Grow in line with population change.	Continued demand for serviced land for residential development. However, the demand for serviced land should grow at rates slower than in the past 10 years.
House Price ($)	House prices are expected to increase as Calgary benefits from positive net migration and low vacancy rates.	This would contribute to an increase in The City's assessment values.
Non-Residential Building Price Inflation (%)	Non-residential building costs should increase over the forecast period.	Lower unemployment rates would be reflected in increased labour costs and this would be passed on to buyers as higher prices. The City would face higher construction costs.

City of Calgary

Summary

▶ The 2012 civic census placed the city of Calgary's population at 1,120,200 persons, up from 1,090,900 in 2011, an increase of 29,289 persons. Natural increase was estimated at 9,631 persons and net migration at 19,658 persons.

▶ Total population in the city of Calgary is expected to reach 1,238,800 persons in 2017, up from 1,120,200 in 2012. Total population in Calgary is therefore expected to increase by 118,600 between 2012 and 2017, or by 2.0 per cent annually. In this period, the number of households should increase by roughly 50,600 units.

▶ A comparison of the population in the individual cohorts in 2012 against the same groups in 2017 shows significant growth occurring in the 60-64 (16,800 persons), 35-39 (14,600 persons) and 65-69 (13,300 persons) age groups (table 3). The 25-29 (-10,400 persons) and 20-24 (-1,700 persons) groups should experience decline.

▶ Construction of new office space is expected to rebound in the 2012-2017 period as vacancy rates trend lower. This should have a positive effect on building permit values in the office sector.

▶ Housing starts are expected to total 11,200 units in 2012 and 10,000 units in 2014. The CMHC's tighter credit restrictions should reduce the number of first time buyers and the number of housing starts below 2012 levels.

▶ The forecast expects the 2012 total building permitting values to trend above the 2011 level as employment growth, increased labour incomes, positive net migration, low mortgage rates and low real estate vacancy rates combine to support the construction of new space. Building permits values are expected to range from $4.2 to $5.2 billion in 2012 and increase to $4.5 and $5.4 billion by 2017 as the economy produces space to support a larger population.

▶ Slower global economy translates to moderate commodity price increases over next 10 years. Price increases mostly the result of local labour shortages.

Population

The 2012 Civic Census placed Calgary's population at 1,120,200, up from 1,090,900 in 2011, representing an increase of 29,289 persons. Net migration climbed to 19,658 in 2012, from 9,563 in 2011. The increase in net migration is partly explained by relatively faster job creation and a lower unemployment rate in Calgary compared to the rest of Canada. Natural increase, defined as births less deaths, was estimated at 9,900 in 2012, up from 9,600 in 2011.

The forecast anticipates total population to reach 1.239 million in 2017, up from 1.120 million in 2012. The city's population is projected to increase by 118,600 persons between 2012 and 2017, or by 2.0 per cent annually. The annual population growth rate over 2006-2011 period was estimated at 1.9 per cent. The number of households was estimated at 433,900 in 2012 and should increase to 484,500 by 2017, up by 50,600.
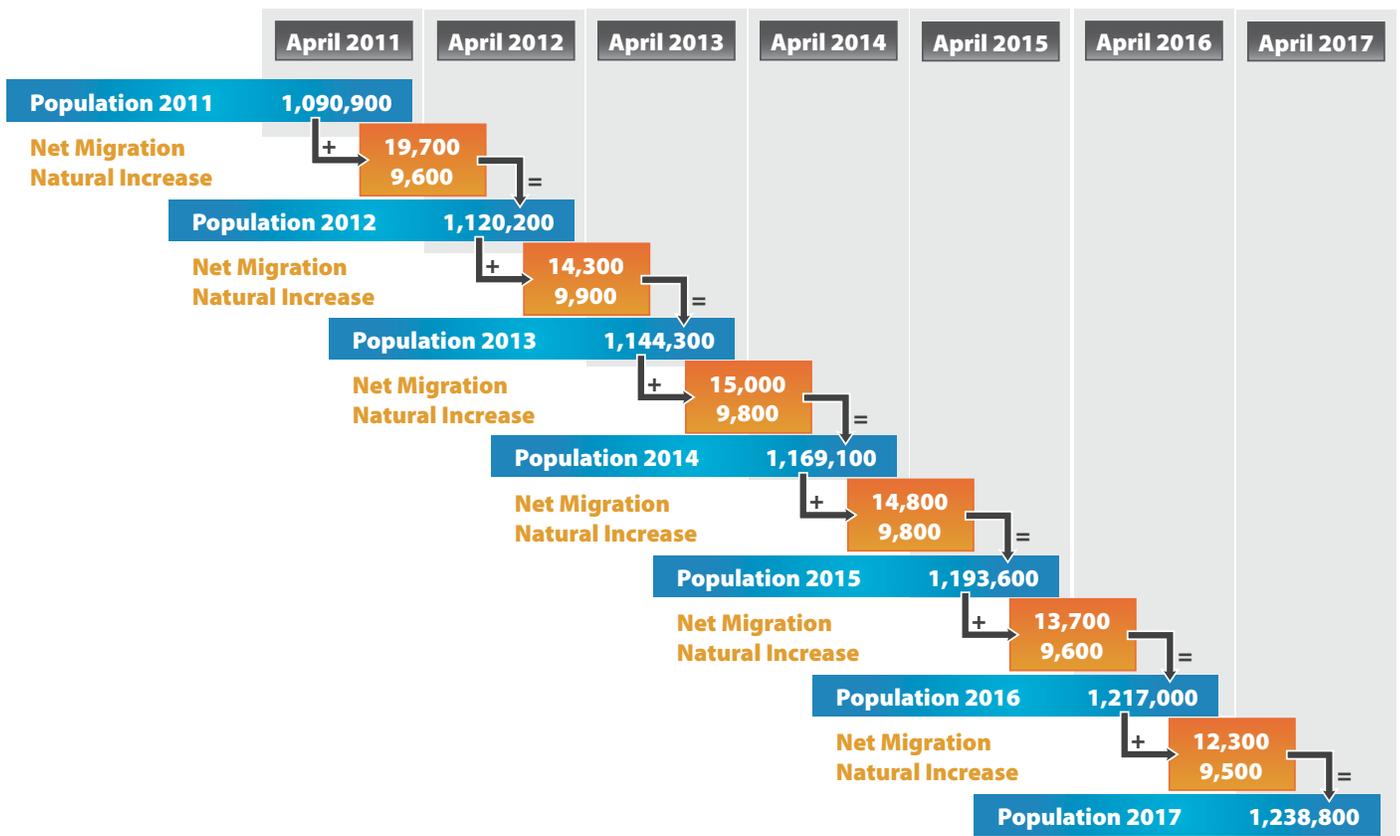
City of Calgary - Population 2012-2017

	2011	2012	2013	2014	2015	2016	2017
Total Population (as April)	1,090,900	1,120,200	1,144,300	1,169,100	1,193,600	1,217,000	1,238,800
Total Net Migration (April - March)	19,700	14,300	15,000	14,800	13,700	12,300	11,100
Total Births (April - March)	16,100	16,500	16,600	16,700	16,700	16,700	16,600
Total Deaths (April - March)	6,500	6,600	6,800	6,900	7,100	7,200	7,400
Total Natural Increase (April - March)	9,600	9,900	9,800	9,800	9,600	9,500	9,200
Total Population Growth Rate	1.81%	2.69%	2.15%	2.17%	2.10%	1.96%	1.79%
Total Households (as April)	422,300	433,900	444,200	454,700	465,100	475,000	484,500

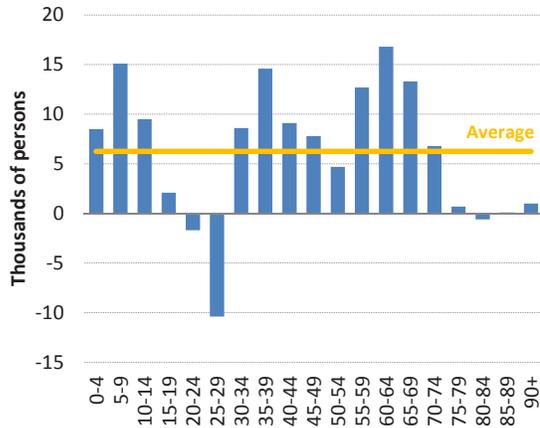Source: The City of Calgary, Corporate Economics, July 2012

Decomposition of Annual Population Growth (based on Civic Census)

Numbers may not add up due to rounding

City of Calgary: Population Shifts (2012-2017)

Source: Corporate Economics

The population age-distribution is projected to shift over the review period (2012-2017) in response to changes in net migration, natural increase and population aging. A comparison of the population in the individual cohorts in 2012 against the same groups in 2017 shows significant growth occurring in the 60-64 (16,800 persons), 35-39 (14,600 persons) and 65-69 (13,300 persons) age groups (table 3). The 25-29 (-10,400 persons) and 20-24 (-1,700 persons) groups should experience decline. Positive net migration has a corresponding effect on the numbers of births and numbers of children as, migrants tend to concentrate in the 20 to 35 age group which overlaps with the peak family formation years. The population 55 years and over is anticipated to increase by 50,800 and the population under 55 should increase by 67,900.

The following cohorts are expected to grow above average (2.0 per cent):

Cohort	Growth Rate (%)
0-4	2.2
5-9	4.3
10-14	2.4
35-39	3.2
55-59	3.4
60-64	6.0
65-69	6.9
70-74	5.9
90+	5.0

The remaining cohorts are projected to grow below average (2.0 per cent). Specifically, the 15-19 (-0.2 per cent), the 20-24 (-1.0 per cent) and 25-29 (-2.7 per cent) cohorts are projected to be smaller in 2017 compared to what they were in 2012.

Population Distribution - City of Calgary

Age groups	2012	Dist %	2017	Dist %
Age 0 to 14	205,900	18.4	239,000	19.3
Age 15 to 24	138,300	12.3	138,700	11.2
Age 25 to 34	189,900	17.0	188,100	15.2
Age 35 to 44	180,300	16.1	204,000	16.5
Age 45 to 54	171,900	15.3	184,400	14.9
Age 55 to 64	124,100	11.1	153,600	12.4
Age 65+	109,800	9.8	131,100	10.6
Total Population	1,120,200	100.0	1,238,900	100.0

City of Calgary

| Dependency Ratio	2012	2017
0-14 to 15-64	25.6%	27.5%
65+ to 15-64	13.6%	15.1%
Total Dependency	39.2%	42.6%
Labour Replacement Ratio	1.114	0.903

The total dependency rate is estimated at 39.2 per cent in 2012 and should increase to 42.6 per cent by 2017. The youth dependency rate is estimated at 25.5 per cent in 2012 and should increase to 27.5 per cent by 2017. The 65 plus rate is calculated at 13.6 per cent in 2012 and should increase to 15.0 per cent by 2017. The number of individuals who are outside the working age population (0- 14 and 65+) is expected to grow at a faster rate than the rate of growth of in the 15-64 cohort[1]. Consequently, the tax burden on the 15-64 age group is expected to grow over time.

Historically, Calgary and Alberta have experienced relatively lower unemployment rates than the Canadian average. The forecast expects these relationships to hold over the 2012-2017 period. The current projection anticipates the unemployment rate will remain below 5 per cent between 2012 and 2017. Economic migration to Calgary should remain above trend from 2012-2017. Net migration is expected to be the major source of population growth during the forecast period. An active labour force with strong job creation and relatively low unemployment rates should continue to draw migrants to the Calgary Economic Region and the city. In this period, relatively higher unemployment rates in the rest of Canada should entice job seekers in those provinces to move to Calgary. The projected population migration assumptions are based on the hypothesis that net migration is sensitive to job availability.

Natural increase is expected to decrease over time as deaths grow at a faster rate than births. Natural increase is projected to decline over the forecast period, falling from 8.8 persons per 1,000 in 2012 to 7.4 persons per 1,000 in 2017. The number of births in this period should climb from 16,507 in 2012 to 16,626 in 2017. While, total deaths should grow from 6,630 to 7,383 over the same period. The number of deaths will grow over time as the population ages and moves into those cohorts with higher deaths rates. Above average net migration rates in the early stages of the forecast offer a temporary offset for the decline in birth rates. The majority of migrants to the region are assumed to be of child bearing age and therefore contribute to population growth over time through births.

Calgary: Net Migration and Unemployment (1976-2012)
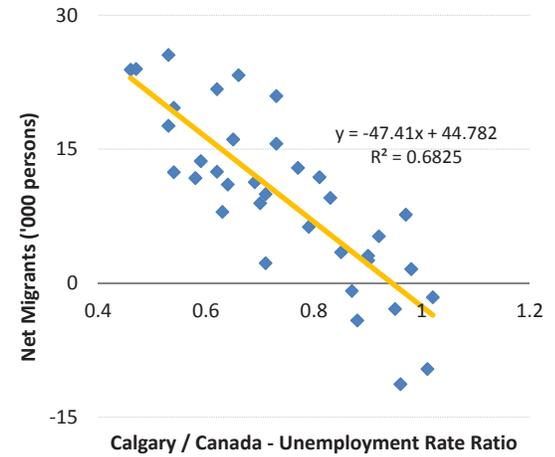
$y = -47.41x + 44.782$
$R^2 = 0.6825$

Source: Civic Census; Statistics Canada; Corporate Economics

City of Calgary: Births & Deaths per 1,000 persons (2011-2017)
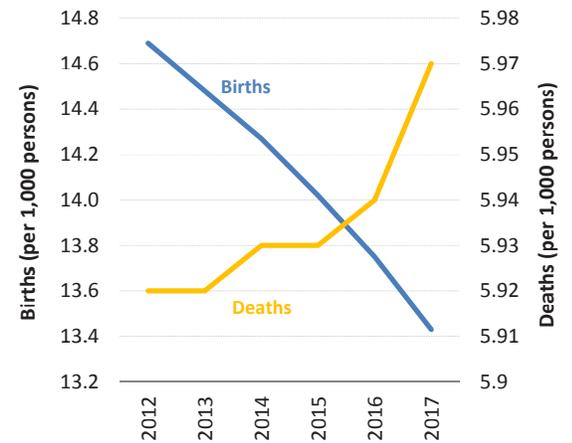

Source: Civic Census; Corporate Economics

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1   The individuals who are 15-64 are either employed or unemployed and could be regarded as the taxbase; while the 0-14 and 65+ are generally outside the labour force.

Box 1. Calgary's Aging Problem and Its Impact on Municipal Finance: 2012-2042

Calgary's aging population will put strong upward pressure on municipal expenditure in the areas of infrastructure requirements. These pressures will be compounded because the life expectancy of Calgarians is continually increasing. Population aging will also slow labour force growth, reduce GDP growth, and ultimately limit revenue growth to rates below those experienced historically.

This study simulates long-run municipal finance paths for The City of Calgary using a system dynamic model that captures the effects of population aging on economic growth and government revenues and expenditures. The model incorporates alternative assumptions about the annual growth rate of in-migration to Calgary every year, and simulates their impacts on key financial indicators for The City.
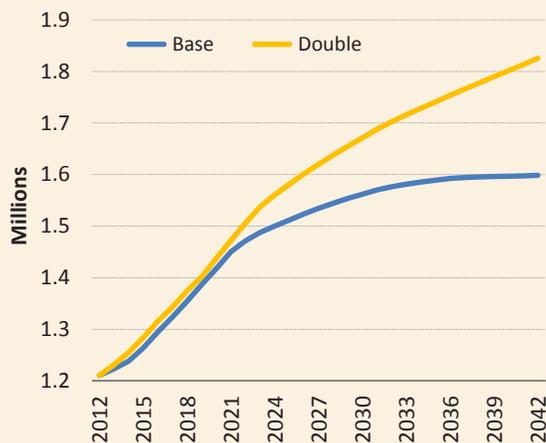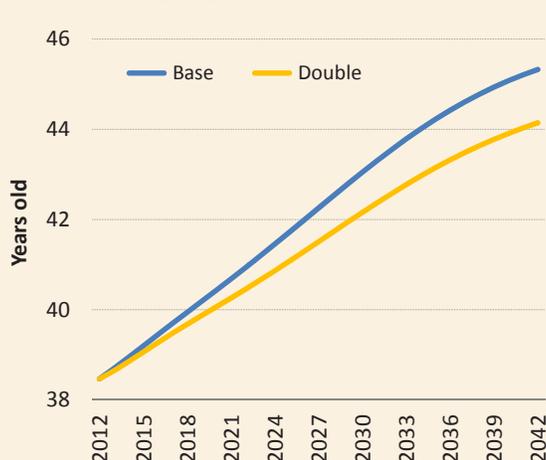
Figure 1. Total Population (2012 - 2042)

Simulation Assumptions

The analysis is conducted on a shock versus control basis, and hence two scenarios are established from 2012 to 2042. For the base scenario, net in-migration assumption is based on historical calibration. For the control scenario, we assume net in-migration to Calgary will be twice as much as the base case. Therefore we refer it as double scenario in the following analysis. In base scenario, total population in city of Calgary is expected to increase to close to 1.60 million in the next 30 years. While in double scenario, total population should expect higher growth and reach 1.83 million by 2042. However, in both scenarios, population growth rates are going to slow. Especially in the base scenario with fewer in-migration, population increase in Calgary after 2035 should be limited, though remaining positive. This is caused by the aging problem. Natural increase of population follows a downward trend. The aging society will have lower births and higher deaths.

The aging problem can be reflected more directly by showing the changes of average ages across time. As we can see from Figure 2, the average age in both scenarios will increase steadily to 2042. Calgary is getting older no matter how many in-migrations we get. In-migrants which are usually at younger ages could help to moderate the problem, but not enough to solve the aging caused by the great amount of baby boomers. In base scenario, the average age in Calgary will increase from 38.4 years old in 2012 to 45.3 years old in 2042. In double scenario, average age in 2042 is a bit lower, at 44.1 years old. This 1.2 years difference in average age reflects the improvement caused by higher in-migration.

Figure 2. Average Age (2012 - 2042)

Simulation results

The most obvious channel through which demographic pressures will affect future municipal finance is the expenditure channel. The consumption of public goods is not uniform across generations, with the heaviest consumption being the old. As can be seen from Figure 3, for both scenarios, municipal expenditures will grow at accelerating speeds. In the beginning period of forecasting, double scenario shows slightly higher expenditure. In the mid to long run, double scenario expects much higher municipal expenditure than base scenario as more population drives higher demand for public services.

Aging population will also affect the municipal budget balance via revenue yields. It will slow down the growth of labor forces with fewer younger people getting into the labour force source population and more retirement leaving the pool. Another mechanism by which demographic forces may influence government revenue yields comes through typical lifetime income and consumption patterns, and their implications given the predominance of the baby-boom generation. With fewer working age population, revenue sources will become more limited in the future for different levels of governments, including municipalities. Figure 4 shows the trajectories of non-tax revenues for the two scenarios, which are not monotonic for both cases. For base scenario, total non-tax revenues will drop after 2028 and slightly pick up after 2036. In double scenario with more in-migration, the drop of total non-tax revenue will be postponed for a few years, but still experience growth slowdown and a dent by 2039.

With the accelerating requirement of public services and decelerating revenue growth, higher tax burden becomes unavoidable as desired tax levy outgrows population in Calgary. Desired tax levy per capita is simulated for both scenarios as indexes with 2012 being the base year. As we can see from Figure 5, both indexes will increase across the forecast period. Base scenario will experience higher tax levy per capita than double scenario, with the latter being 27 per cent lower by 2042. The simulation results show that with more in-migration to Calgary in the future, more revenues will be created for the municipality which will exceed the corresponding expenditure growth. This will help to moderate the financial pressures caused by aging problem and improve the municipal financial budget for The City of Calgary.

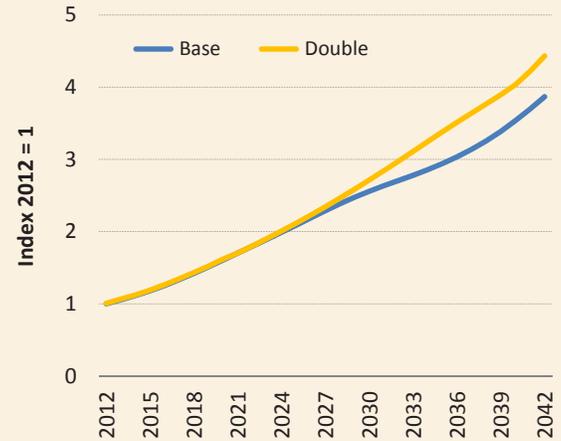**Figure 3. Indexes of Total Expenditures** (2012 - 2042)

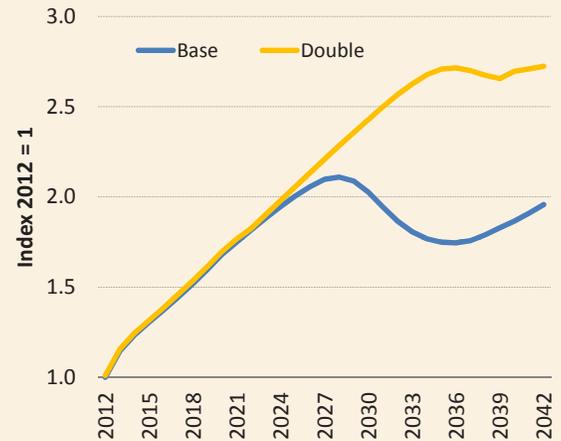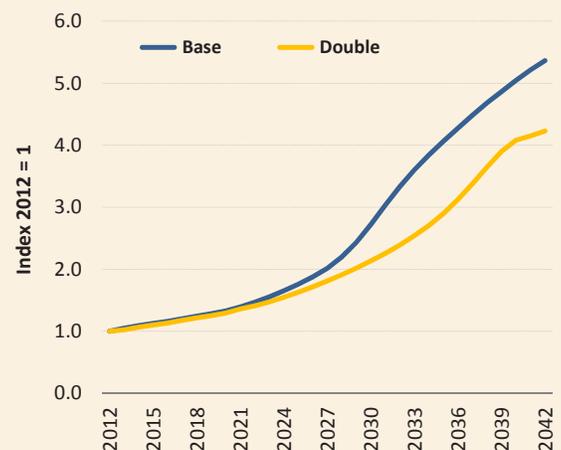**Figure 4. Indexes of Non-tax Revenues** (2012 - 2042)

Figure 5. Tax levy Per Capita Indexes (2012 - 2042)

Box 2. A Case of Fiscal Imbalance: the Calgary Experience

The first decade of the 21st century was one of increased prosperity for the Alberta economy in general and Calgary in particular. Before the boom ended in summer 2008, Calgary's economy reaped the benefits of strong demand for commodities from emerging world economies. To accommodate growth, The City of Calgary invested heavily in infrastructure to accommodate the increased demand for municipal services from a growing population. The City's increases in capital spending far exceeded its financial ability. As a result, the municipality of Calgary had to borrow from the market and its long-term debt increased substantially from $1.6 billion in 1988 to $3.6 billion in 2010. This is in sharp contrast to the situation at the federal or provincial government, wherein the federal government experienced declining debt balances since 1999, and the Government of Alberta paid off all sovereign debt in 2000 and managed to accumulate a surplus of $35 billion by the end of 2007[2] (see charts A-C).

Chart A. The City of Calgary total long-term debt
(1981 - 2010)
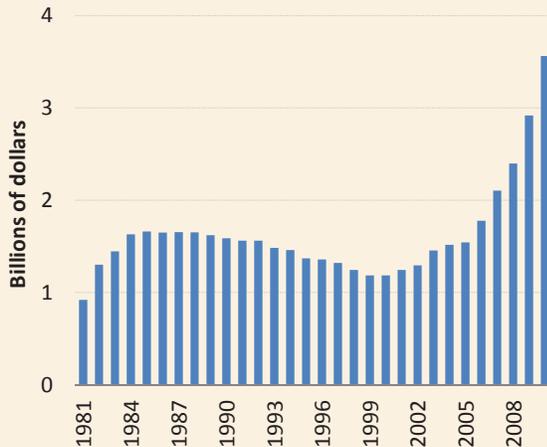
Chart B. Federal government net financial debt in Canada
(1981 - 2008)
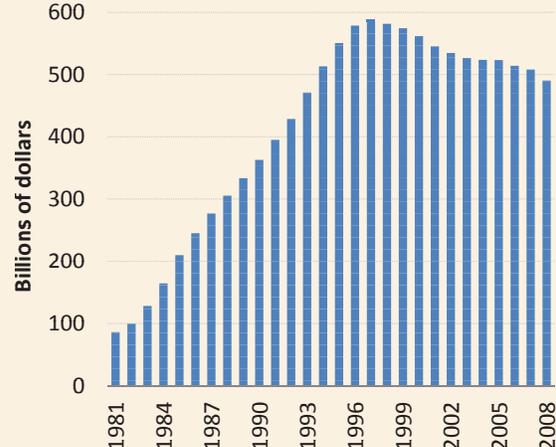
Chart C. Provincial government net financial debt in Alberta
(1981 - 2007)
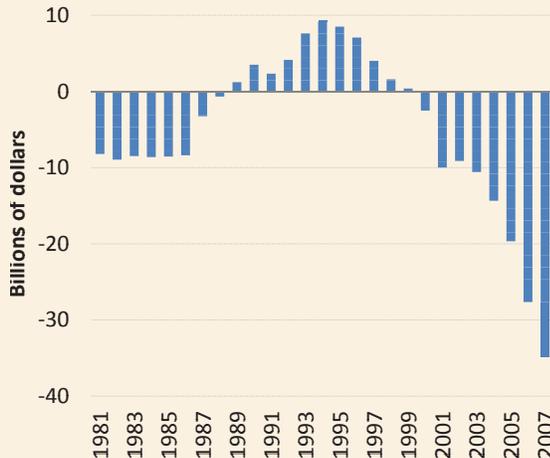
Chart D. Total revenues collected from Calgary excluding intergovernment transfers

Local 7% ($2 billions)

Provincial 42% ($11.6 billions)

Federal 51% ($14 billions)

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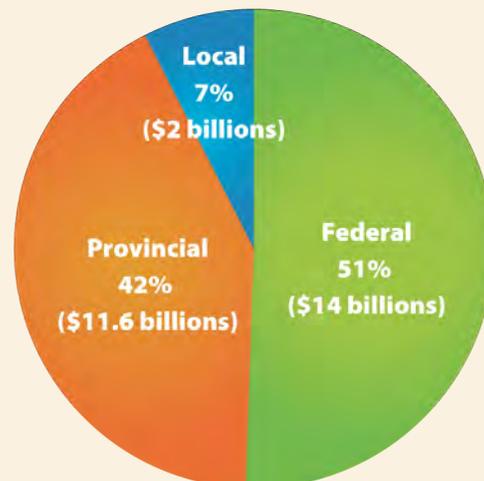
2   Note: 2007/2008 is the final reference year for which government financial statistical data was available on a Financial Management System basis. Statistics Canada will be adopting the International Monetary Fund accounting standard for government, called Government Finance Statistics, in 2014 starting with the reference year 2008/2009.

Naturally, a general question is asked: "Why does The City of Calgary experience financial stress in providing services to Calgarians, even in good economic times?" A short answer is that, Calgary's taxpayers over-contribute to the balance sheets of the federal and provincial governments, leaving the local government with less than adequate revenues to fund its spending responsibilities (see chart D).

The funding shortfalls are systemic for local governments in Canada, where a vertical fiscal imbalance[3] exists between the local governments and the federal or provincial governments. Specifically,

► The provincial and federal governments have revenue sources that are closely related to economic growth, such as income and sales taxes.

► The municipality does not have access to growth related taxes. The main source of tax revenue, the property tax is not growth sensitive which constrains the ability of the local government to raise revenues.

► There is a mismatch in revenue sources and the roles and responsibilities amongst the three orders of government in Canada.

The federal and provincial governments have recognized the fiscal imbalance problem and used intergovernmental transfers as a tool to address it. However, this arrangement is not stable as transfer payments can be changed at the discretion of the other orders of government. Local governments therefore face uncertainties in their financial planning due to potentially unexpected cuts caused by changes in the priorities of other orders of government.

Big cities like Calgary are not only the leaders of economic and employment growth in Canada, but also the places where knowledge economies exist and highly educated and skilled workers locate. Over-contribution caused by fiscal imbalance in Calgary is not sustainable in the long-run: it hurts not only the local economy, but also those of Alberta and Canada as a whole. As a result, the federal and provincial governments should grant local governments the access to alternative revenue sources other than municipal property tax.

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3   A vertical fiscal imbalance originally refers to a gap between revenue sources and spending responsibilities between orders of government, that is, between the federal and provincial governments. Here we refer to a funding gap between local and federal or provincial governments.

Real Estate Market

Vacancy rates are down

The apartment vacancy rate in the Calgary Census Metropolitan Area (CMA) in 2011 was estimated at 1.8 per cent, down from 3.4 per cent in 2010 and 5.4 per cent in 2009. Job losses and negative net migration during the economic downturn resulted in a reduced need for residential space and this drove the vacancy rate higher in 2009. With the economic recovery in 2011, job growth resulted in positive net migration to Calgary which created an increased demand for residential space and pushed the vacancy rate lower.

Calgary CMA: Apartment vacancy rate (2006 - 2011)
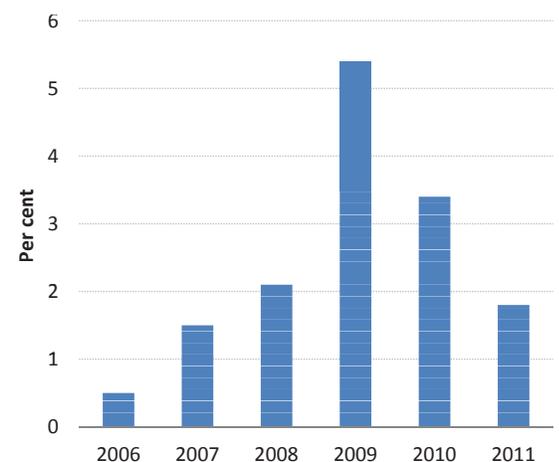
Source: Statistics Canada; Corporate Economics

Calgary: MLS average house price
(January 2002 - August 2012)
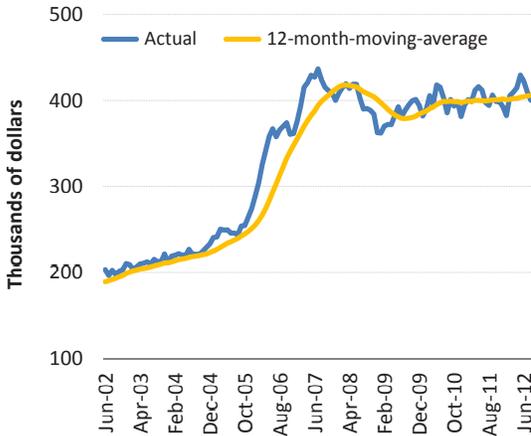
Source: CREB; Corporate Economics

Calgary vs. Vancouver: House price indices
(12-month-moving-average, January 2000 - August 2012)

Source: Teranet-National Bank House Price Index; Corporate Economics

Calgary: Wage income / MLS average house price
(January 2003 - August 2012)

Source: Statistics Canada; CREB; Corporate Economics

Re-sales housing prices, in Calgary, grew steadily from 2003 to 2007 and then declined from the 2007 to 2011 with some fluctuation. The shift in prices over time is largely explained by the changing demand / supply balance for housing. For example, the spike in house prices in 2006 and 2007 was accompan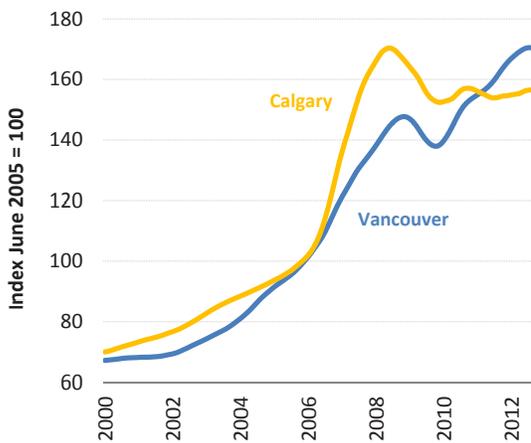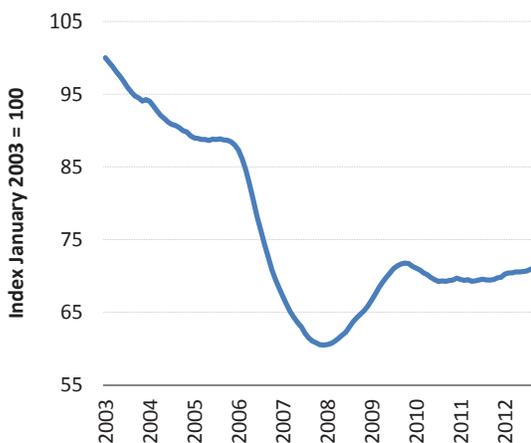ied by a sharp increase in employment growth in 2006 and 2007, which drove up housing demand. In this period, the inventory coverage (Inventory / Sales ratio) was below its long-term average, and similarly, the sales / listing ratio was above its long-term average. Both indicators signalled demand for housing was pressing against the available housing supply. The sharp increase in house prices produced a corresponding increase in house listings, with a time delay. The combination of a supply increase and weaker demand drove the short-term inventory / sales ratio above its long-term average and caused prices to fall or remain weak. The 2012 data on re-sale housing supply and demand in the local market indicates the market has moved to a more balanced situation. Consequently, higher prices can be expected over the forecast period as the economy experiences net migration and job growth.

The reduction in house prices in Calgary from 2007 to the present has contributed to making house prices in Calgary relatively more affordable compared to some metropolitan areas in Canada. Consequently, relatively affordable housing should prove attractive to would be migrants to the Calgary area.

Housing affordability is inversely related to the level of house prices: higher housing prices resulted in a relatively smaller number of buyers being able to qualify for mortgages and the reverse holds when prices are lower. The average house price in Calgary in 2011 was lower than in 2007. Consequently, the reduction in house prices in the 2007 to 2011 period is associated with an improvement in housing affordability. For example, the wage income to house price ratio declined steadily over the 2003 to 2007 period as house price growth outstripped wage rate growth. From 2007 to present the reverse occurred with some fluctuation.

2012 is expected to see a return to a banner year for housing starts as a number of conditions are currently in place to support the construction of new housing including low interest rates, increased employment levels, higher labour incomes, improved housing affordability and reduced MLS housing inventory. Low vacancy rates in the rental market are anticipated to result in some purpose built multi dwellings, the type of development the city hasn't seen in some time. Construction of these buildings may linger for a few years before these properties come on-line. Housing starts totalled 7,726 units in 2011, up from 7,295 units in 2010. Recent CMHC data shows 10,641 housing units were started in Calgary for the 12 month period ending August 2012, up from 6,489 for the same period in 2011. Housing starts are expected to total 11,200 units in 2012 and 10,000 units in 2014. The CMHC's tighter credit restrictions should dampen the

demand for residential space by reducing the number of first time buyers and cause the number of housing starts to fall below 2012 levels. Later in the forecast period, housing starts should grow in line with the rate of household formation. Slower population growth arising from an aging population should restrain the rate of household formation and reduce the demand for new residential space.

The vacancy rate in Calgary's office market fell to 6.6 per cent in Q2 2012, down from 8.7 per cent and 11.7 per cent for the same period in 2010 and 2011, respectively. The occupied space was estimated at 58.3 million square feet in Q2 2012, up from 51.6 million square feet in Q2 2010. The job recovery in 2010 / 2011 increased the demand for office space and pushed the vacancy rate lower. Employment growth over the forecast period should increase the demand for office space and lower the vacancy rate. Lower vacancy rates are expected to cause rental rates to increase and therefore improve conditions for the construction of new space.

For industrial space, the vacancy rate was 3.0 per cent in Q1 2012, down from 3.6 per cent and 5.1 per cent for the same period 2011 and 2010, respectively. As in the office sector, employment growth throughout the forecast period should improve conditions for the construction of new office space.

Total building permit values was estimated at $4.538 billion in 2011, up from $2.912 billion in 2010. The recovery in investment intentions was based in both the residential and non-residential sectors. The value of permits issued in the non-residential sector grew 86 per cent and the residential sector increased by 33 per cent. The available data shows that $4.8 billion of permits were authorised for the 12 months ending August 2012, up from $3.9 billion for the same period 2011.

The forecast anticipates 2012 total building permitting values to trend above the 2011 level as employment growth, increased labour incomes, positive net migration, low mortgage rates and low real estate vacancy rates combine to support the construction of new space. Building permits values are expected to range from $4.2 to $5.2 billion in 2012 and increase to $4.5 and $5.4 billion by 2017 as the economy produces space to support a larger population.

City of Calgary: Housing starts (2007 - 2017)
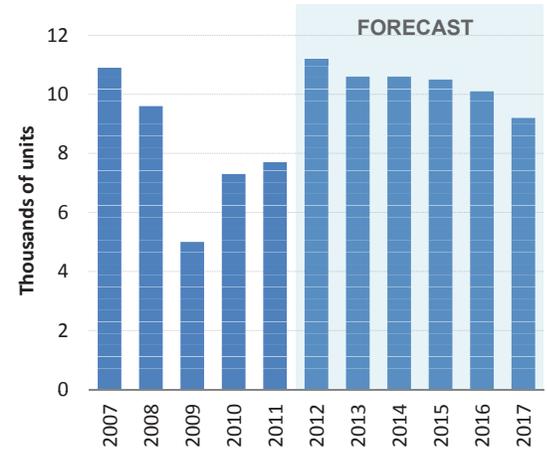
Source: CMHC; Corporate Economics

City of Calgary: Office market-rent inflation rate
(Q3 2003 - Q1 2012)

$$y = -0.0227x^2 - 1.2184x + 11.087$$
$$R^2 = 0.6021$$
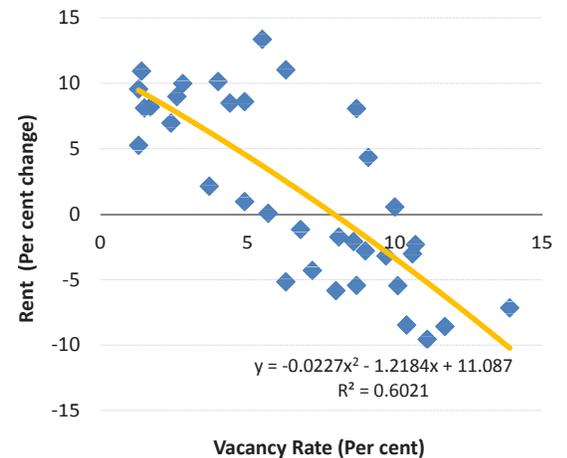
Source: Altus Insite; Corporate Economics

Calgary: Office space vacancy rate (Q1 2000 - Q2 2012)
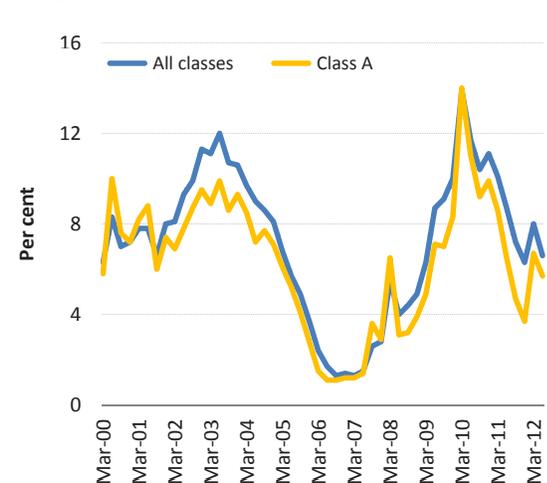
Source: Altus Insite; Corporate Economics

Box 3. Small Businesses: A key component of Calgary's Economy

Calgary small businesses account for nearly 95 per cent of all businesses-they are a driving force within the city's business community. Small business owners have the advantage over larger corporations in that their size gives them the flexibility to adapt quickly in terms of aligning resources. They are able to be innovative with products and implement processes and efficiencies. These advantages, married with their general passion for their business and ability to enjoy the advantage of customer focus sets them apart from larger corporations.

Business Establishments

Of Calgary's total business establishments (49,149) in 2011, small businesses (businesses with less than 50 employees) accounted for 94.9 per cent. Over the past decade, the number of small businesses has steadily increased, from 41,379 in 2002 to 46,652 in 2011, a growth of 12.7 per cent.

A breakdown of small businesses by employee size range demonstrates that the smallest segment (1-4 employees) is, in fact, the fastest growing at a rate of 23.3 per cent.

Employee Size Range	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	10-Year (2002-2011) Total Growth Rate
1-4 Employees	24,283	25,132	24,621	25,369	26,218	28,848	29,282	30,252	29,897	29,948	23.3%
5-9 Employees	7,442	7,544	7,703	7,770	7,936	8,167	8,105	8,083	7,943	7,919	6.4%
10-19 Employees	5,533	5,656	5,791	5,659	5,921	5,161	5,233	5,121	5,136	5,267	-4.8%
20-49 Employees	4,121	4,053	4,184	4,203	4,592	3,632	3,493	3,498	3,394	3,518	-14.6%
Total (<50 Employees)	41,379	42,385	42,299	43,001	44,667	45,808	46,113	46,954	46,370	46,652	12.7%

Source: Statistics Canada; Canadian Business Patterns, Calgary Economic Development

The dominant industries that made up Calgary's small business sector in 2011 were:

▶ Professional, Scientific, and Technical Services: 10,740 businesses (23.0 per cent of total share)
▶ Construction: 5,681 businesses (12.2 per cent of total share)
▶ Other Services (except Public Administration): 4,990 businesses (10.7 per cent of total share).

Among Canada's major Census Metropolitan Areas, Calgary ranked second for small business growth over the 2002 to 2011 period, at a rate of 18.8 per cent.

Relative to its population, Calgary had the highest number of small businesses per capita of the major cities in Canada in 2011 at a rate of 38.8 per 1,000 population.

Canadian CMAs: Small Businesses, 10 Year Total Growth (2002 - 2011)

Source: Statistics Canada; Canadian Business Patterns, Calgary Economic Development

Canadian CMAs: Small Businesses per 1,000 population (2011)
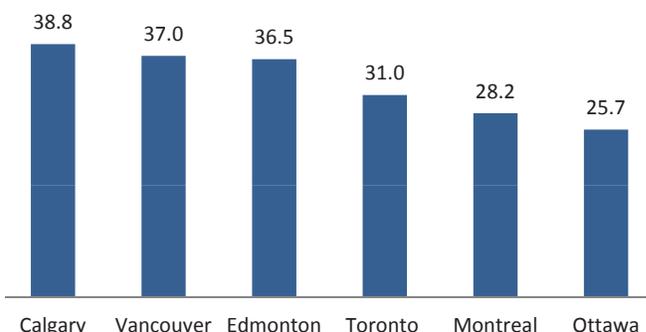
Source: Statistics Canada; Canadian Business Patterns, Calgary Economic Development

Self-Employment

In 2011, there were 112,300 self-employed Calgarians. On a per capita basis, Calgary had the highest number of self-employed people in Canada at 88.8 per 1,000 population.	During the past 10 years (2002-2011), Calgary experienced the second highest total growth in self-employment in Canada, at a rate of 30.9 per cent.

Canadian CMAs: Self-Employed per 1,000 population
(2011)
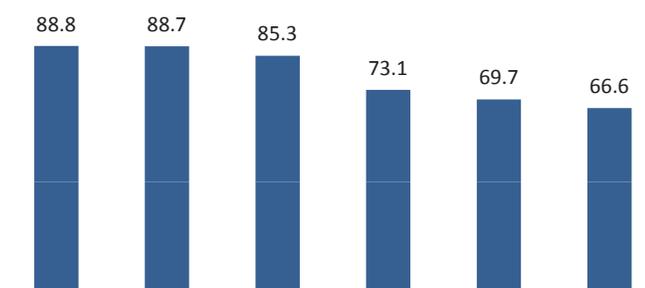
Calgary	Vancouver	Toronto	Edmonton	Montreal	Ottawa
88.8	88.7	85.3	73.1	69.7	66.6

Source: Statistics Canada; Canadian Business Patterns, Calgary Economic Development

Canadian CMAs: Self-Employment, 10 Year Total Growth
(2002 - 2011)

Edmonton	Calgary	Toronto	Montreal	Vancouver	Ottawa
34.3%	30.9%	30.2%	23.5%	16.4%	4.9%
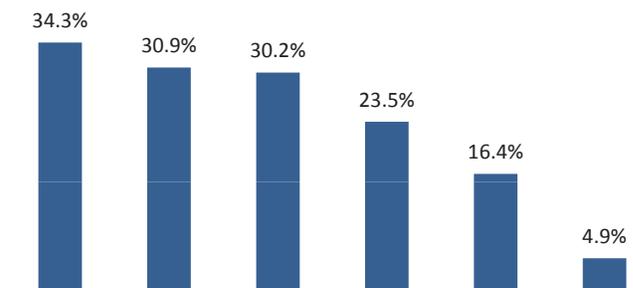
Source: Statistics Canada; Canadian Business Patterns, Calgary Economic Development

Calgarians are among the youngest entrepreneurs in Canada. Its 15-44 age cohort of self-employed was proportionately larger than all other major Canadian centres, a share of 43.5 per cent.

| Age Cohort	Montreal		Ottawa		Toronto		Calgary		Edmonton		Vancouver	
	Number	Share	Number	Share	Number	Share	Number	Share	Number	Share	Number	Share
Total	272,400	100.0%	83,800	100.0%	498,100	100.0%	112,300	100.0%	87,400	100.0%	214,600	100.0%
15-24	9,600	3.5%	2,900	3.5%	12,500	2.5%	4,100	3.7%	3,600	4.1%	6,000	2.8%
25-34	42,000	15.4%	11,500	13.7%	69,100	13.9%	16,500	14.7%	13,300	15.2%	30,100	14.0%
35-44	59,700	21.9%	21,600	25.8%	117,200	23.5%	28,300	25.2%	21,000	24.0%	48,200	22.5%
45-54	84,700	31.1%	24,100	28.8%	144,800	29.1%	34,900	31.1%	24,200	27.7%	68,100	31.7%
55-64	48,100	17.7%	17,000	20.3%	112,100	22.5%	21,200	18.9%	17,500	20.0%	44,300	20.6%
65+	28,300	10.4%	6,500	7.8%	42,500	8.5%	7,400	6.6%	7,700	8.8%	17,900	8.3%

Source: Statistics Canada; Canadian Business Patterns, Calgary Economic Development

Not only are small businesses integral to the health of the economy, but Calgary is a hot-bed for small business growth. With one of the youngest populations in Canada amongst major municipalities, Calgary is a great destination for young people to come and start a business.

Non-residential building price inflation
(2001 - 2021)

Source: Statistics Canada; Corporate Economics

Asphalt price inflation (2001 - 2021)

Source: Statistics Canada; Corporate Economics

Rubber price inflation (2001 - 2021)

Source: Statistics Canada; Corporate Economics

Commodities:

Non-residential Building Price Inflation
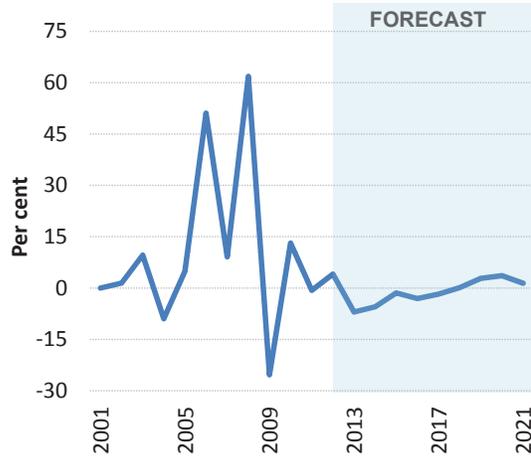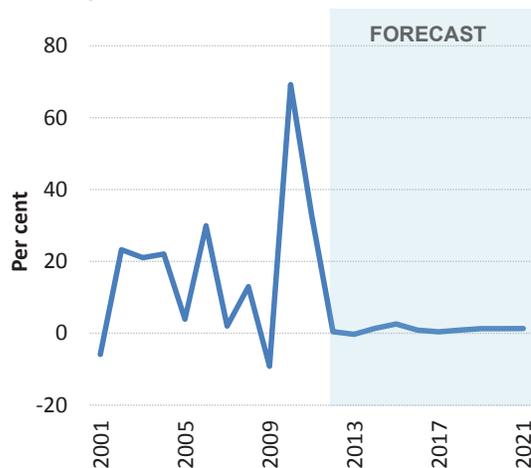
Non-residential building prices are expected to increase at more than double the pace of consumer inflation this year. General cost push inflation has been held at bay for three years now and suppliers are starting to feel some pressure with a banner year in building permits issued in 2012. Moderating oil prices are providing some welcome relief keeping building prices from rising much more this year. Rising interest rates and higher labour costs should combine to elevate construction costs towards the end of the forecast period.

Asphalt

Road asphalt: Skyrocketing oil prices in the first half of the year saw asphalt prices rise dramatically. Halfway through the year the tide turned with oil prices softening. Over the forecast horizon increased asphalt production from Ft. McMurray should stabilize asphalt prices.

The roofing material market is taking a slightly different tack over the next while in Calgary. About 15 years ago construction activity in Calgary jumped. Previously about 6,000 housing units per year were built but now, even with market fluctuations, construction is consistently over 10,000 units per year. Fifteen years are the average lifespan of asphalt shingles in Calgary before they start curling and need to be replaced and consequently the re-roofing market is seeing a dramatic jump in activity. However, we anticipate the market will adjust within two years and increased competition will start driving prices down.

Rubber

Rubber tree plantations in Malaysia have experienced bad weather since 2008 resulting in lower natural rubber production than normal. Meanwhile, other countries are ramping up production particularly; Thailand, Vietnam, China, Laos and Indonesia. Also synthetic production has increased and continues to be profitable even with high input prices so much so that 2011 saw the rubber market in a surplus position.

There is some increased demand for tires particularly in China and the eastern bloc countries while Thailand and Malaysia have been engaging in price support activity. However, demand for rubber is fickle as tire production depends mainly on demand for cars in Europe, which has remained in economic recession. As more players take a bigger slice of the market international competition is expected to have a dampening effect on future price increases and the forecast calls for only moderate annual price increases.

Diesel

Recent diesel price volatility has tracked recent crude oil volatility. We anticipate continued daily and weekly oil market volatility to continue to impact pump prices. Over the forecast period, movements in diesel prices should broadly track fluctuations in crude oil prices.

Vehicle Parts

Vehicle sales in Alberta slumped in 2009 but have shown fairly steady increases since. Used car sales have recently been brisk in other parts of the country, pushing up sales of parts and accessories to recent highs in Canada. We anticipate below inflationary price increases over the next couple years as most Canadians remain price conscious since the recession. However, in a few years cost inflation due to rising wages will result in some catch-up price increases. Beyond five years, the outlook anticipates price increases slightly higher than inflation as new vehicle designs require parts manufacturers to re-tool.

Wood

The Canadian softwood lumber market relies heavily upon its major customer, the U.S., where Canadian logs are used in residential housing construction. Construction in the U.S. housing market has stalled at the unusually low rate of 0.75 million housing units this year. Also, the Canadian government tightened rules on CMHC insured mortgages this year likely softening new home construction in Canada. Lumber prices are now stalled around $0.28/ board foot and given the outlook on the global economy and its implications for interest rates in Canada, we anticipate North American lumber prices will bottom out around $0.22 / ft about 2018. Thereafter we anticipate slow increases at slightly above the rate of inflation as the U.S. construction market activity climbs to about 1.4 million housing units per year before settling down to an average 1.2 million per year by about 2025.

Steel

Global demand for steel increased by about 5 per cent in 2011. Expectations are for growth to slow to 4 per cent in 2012 and 2013. This is due to overall economic conditions in Europe and the China's economic stabilization policies, which have reduced demand for steel below prior expectations. As a result, steel prices are expected to remain flat for the next two years. Beyond that we anticipate global demand for steel will be soft owing to reduced international trade in the coming era of quiet protectionism. All industrialized countries have committed to not undertake protectionist policies but stimulating local economies will incidentally reduce international trade. Indeed, prices for international shipping have been stuck at below pre-recession levels for the past year already.

Diesel oil price inflation (2001 - 2021)
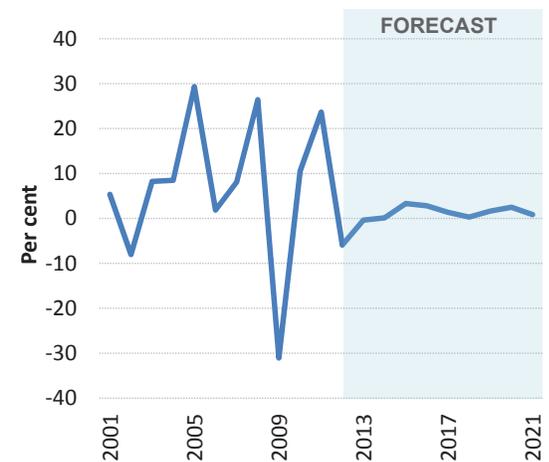
Source: Statistics Canada; Corporate Economics

Wood price inflation (2001 - 2021)
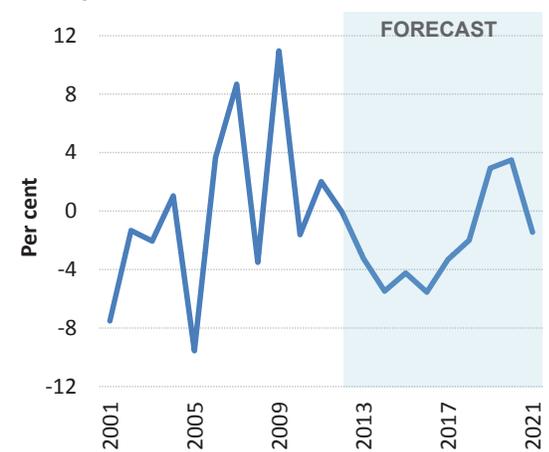
Source: Statistics Canada; Corporate Economics

Steel price inflation (2001 - 2021)
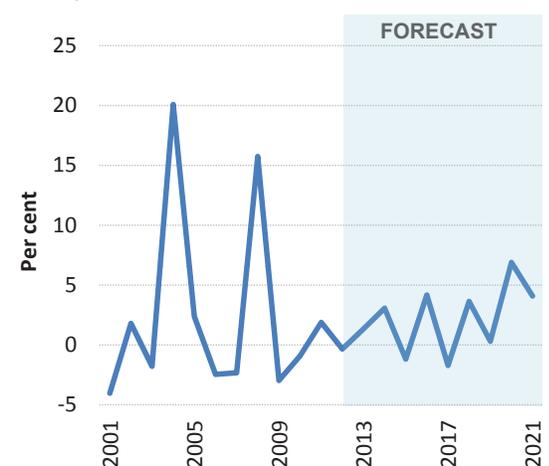
Source: Statistics Canada; Corporate Economics

Aluminum price inflation (2001 - 2021)
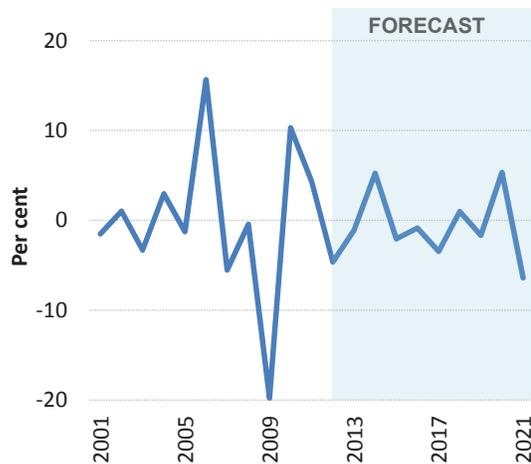
Source: Statistics Canada; Corporate Economics

Aluminum

Global aluminum prices dropped 18 per cent in the past 12 months, 11 per cent in the past 6 alone. Prices for ingots are now slightly less than the cost to produce them. Price declines have yet to hit the Canadian retail market and we anticipate a muted softening will filter to consumer products next year. Global supply capacity now exceeds global demand. Global demand would remain weak as world economic growth decelerates. As a result, we anticipate aluminum prices will be suppressed throughout the forecast, with occasional boosts as electricity price increases are passed on.

Box 4. Asset Management and Capital Infrastructure

Infrastructure gap breakout ($billion)

▶ Based on the most recent Infrastructure Status Report (ISR 2010) The City of Calgary will require an additional investment of $7.4 billion to fund infrastructure growth and maintenance over the next 10 years. The gap has dropped from the $10.4 billion reported in 2007. The breakout of the infrastructure gap is shown in the chart below.

▶ Some factors that may put upward pressure on the infrastructure gap are:

- **Population growth**. Calgary's population grew 10.9 per cent from 2006 to 2011. Higher services demand in conjunction with slower public infrastructure investment can compromise the Level of Service of institutional infrastructure.

- **Aging population**. As Calgary's population ages, a growing number of Calgarians are expected to require special services like affordable housing options, suitable transportation, as well as retrofitting accessibility of existing facilities.

- **Construction Escalation**. Awarded construction contracts by The City of Calgary have shown a steady increase in construction costs at a higher rate than the consumer price index (CPI) since 2009. The $7.4 billion infrastructure gap represents 2010 $'s and it is not adjusted for inflation.

- **Labor Market**. As a growing number of workers are expected to retire within the next 5 years, the need to attract qualified labor will put pressure on wage inflation. Furthermore, the oil and gas industry has forecasted an increase in infrastructure investment which traditionally translates into a tighter labor market.

- ▶ Some factors that may ease the pressure on the infrastructure gap:

  - ■ **Capital Budget adjustments**. The gap has dropped from the $10.4 billion reported in 2007. As capital budgets are approved year over year, The City continues to fund capital infrastructure needs as required and future capital budgets are expected to be adjusted accordingly.

  - ■ **Federal Government capital investment**. In Budget 2011 and Economic Action Plan 2012, the Government of Canada has committed to working with partners and stakeholders to develop a long-term plan for public infrastructure that extends beyond the expiry of the Building Canada plan in 2014. The Federal Government has also tabled legislation to make the $2 billion Gas Tax Fund permanent, to help municipalities support local infrastructure priorities.

Conclusion:

The City of Calgary is continually challenged to balance the capital investment required to support growth while funding maintenance and upgrade of infrastructure already in service. The City's asset inventory is increasing to support growth. Without a suitable allocation of spending on the operation and maintenance of the current asset portfolio, strain on service delivery can be expected.

Over the next 10 years, funding sources currently available will not support sustainable infrastructure capital maintenance programs based on medium-term projected needs. The additional investment required to fund infrastructure growth and maintenance is $7.4 billion.

The Infrastructure Status Report (ISR) 2010 illustrates that maintenance delay and deferral can contribute to future increased maintenance costs and advanced replacement (early retirement of assets) in the future.

Mitigation strategies outlined in the ISR 2010 include:

- ▶ Continuously improve the method of aligning service priorities with infrastructure decision-making

- ▶ Continuously improve the monitoring methods and reporting tools that support the performance of infrastructure to deliver services

Sources: The City of Calgary ISR 2010, Statistics Canada, Infrastructure Canada, The City of Calgary construction tenders analysis (Corporate Project Asset Management)

Calgary Economic Region (CER)

Summary

▶ The Calgary Economic Region's Gross Domestic Product is expected to expand by 3.5 per cent in 2012 and 3.7 per cent in 2015. Economic growth is expected to decline to 3.6 per cent by 2017, as a relatively tight labour market restricts increased production and consumer spending.

▶ Total employment is also expected to increase by 98,000 jobs over the 2012-2017 period or by 2.5 per cent annually, up from 1.6 per cent for the 2006-2011 period.

▶ The unemployment rate for the 12 months ending July 2012 was estimated at 5.3 per cent and should average to 4.9 per cent for 2012 and 4.5 per cent in 2014, as employment growth exceeds labour force growth. Over the forecast period, the aging of the population is expected to restraint the labour force growth rate and have a depressing effect on the unemployment rate over time.

▶ The inflation rate for 2012 should fall to 1.0 per cent from 2.2 in 2011. Faster growth in the world economy in 2013 and 2014 should result in higher demand for commodities and nudge the consumer price inflation higher.

Box 5. Calgary Economic Region - GDP

Regional Growth Dynamics
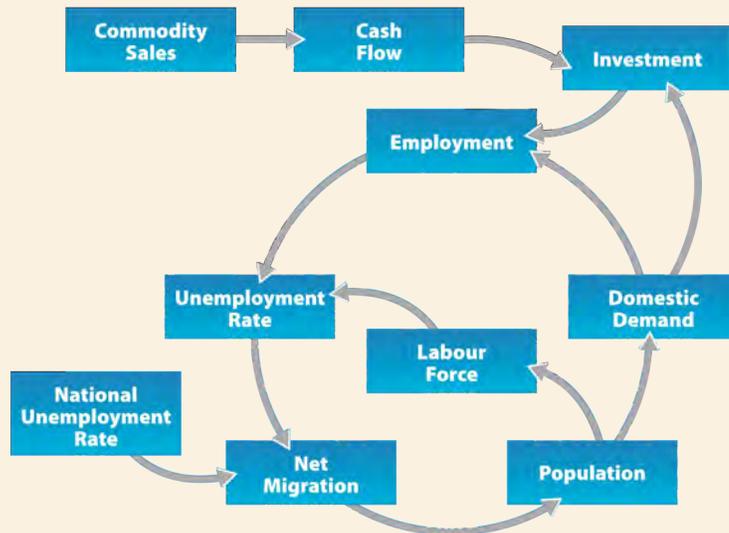
Economic growth in Calgary is influenced by factors outside of the local economy. Expansion in the provincial, national and world economies creates an increased demand for goods and services produced in Calgary and the inflow of funds from the sale of goods and services to businesses and organizations outside of Calgary result in a multiplier effect on the Calgary economy. Similarly, a reduction in exports to the world outside of Calgary produces the reverse effect.

These dynamics are sketched in the accompanying diagram. Increased commodity sales to a growing world economy should increase the cash flow to Calgary businesses and provide support for higher levels of investment. Higher investment levels should cause the local employment level to rise and push the unemployment rate lower, assuming all things are equal. A lower unemployment rate relative to the national rate should serve as an attraction for migrants from outside of the region. Increased net migration should push population levels higher and cause the demand for goods and services to increase. This increased demand for goods and services would lead to increased employment and also increased investment. Growth would lead to further growth.

Gross domestic product (GDP) is the broadest measure of economic activity. It represents the sum of all goods and services that are produced by an economy over a given time. The Canadian economy expanded by 22 per cent over the 2001 -2011 period. In this period, Alberta grew by 32 per cent and the Calgary Census Metropolitan Area (CMA) by 35 per cent. A growing world economy created and increasing demand for energy and this drove oil prices higher. Economic growth in Calgary was driven by strong investment and consumer spending which was supported by rising oil prices and relatively high disposable incomes.

The consumer sector is the largest sector in the Canadian economy representing roughly 60 per cent of GDP. Calgary's consumption/GDP ratio was similar to the national average. In this period retail sales, adjusted for inflation, grew by 24 per cent in Canada while Alberta and Calgary grew by 44 and 43 per cent respectively. Consumer spending was therefore a major contributor to Calgary's economic performance.

Calgary's real personal disposable income per capita was higher than Canada's. This is explained by the differences in the industry mix between Calgary and the rest of Canada. Calgary had a higher proportion of jobs in industries that enjoyed larger output/employee ratios than the rest of Canada. Other primary and utilities are examples of sectors that are concentrated in Calgary and have higher output/employment ratios.

Personal Distribution of Highest Level of Education Attainment for the population aged 25 to 64

Percentage Distribution of Highest Level of Education Attainment for the population aged 25 to 64

	Calgary	Edmonton	Alberta	Canada
University certificate, diploma or degree at bachelor's level or above	30.6%	22.9%	22.0%	22.9%
University certificate or diploma below the bachelor level	5.6%	4.8%	4.6%	5.0%
College, CEGEP or other non-university certificate or diploma	21.0%	22.1%	21.5%	20.3%
Apprenticeship or trades certificate or diploma	9.3%	12.6%	12.4%	12.4%
High school certificate or equivalent	22.3%	23.6%	24.1%	23.9%
No certificate, diploma or degree	11.2%	14.0%	15.4%	15.4%

Source: 2006 Federal Census

In addition, Calgary has the third largest concentration of head offices in Canada, behind Toronto and Montreal. The number of head offices and universities in Calgary have created a strong demand for skills that support head office and technical functions. Consequently, Calgary has a higher proportion of its population with some form of university training. This partly explains why Calgary has a higher level of level disposable income than Canada or Alberta.

Real gross domestic product (2001 - 2011)
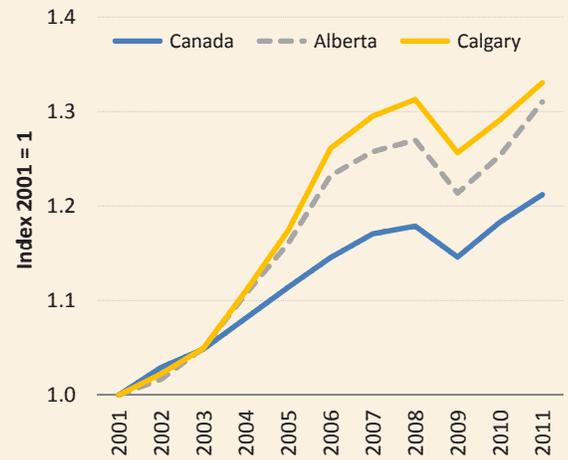
Source: Conference Board of Canada; Corporate Economics

Personal disposable income per capita (2001 - 2011)
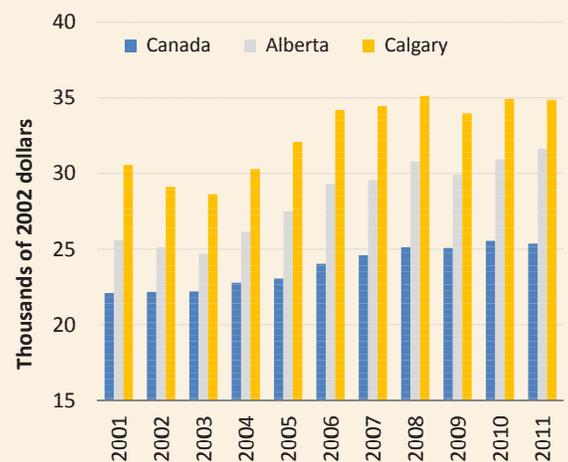
Source: Conference Board of Canada; Corporate Economics

CER: Economic growth (2007 - 2017)
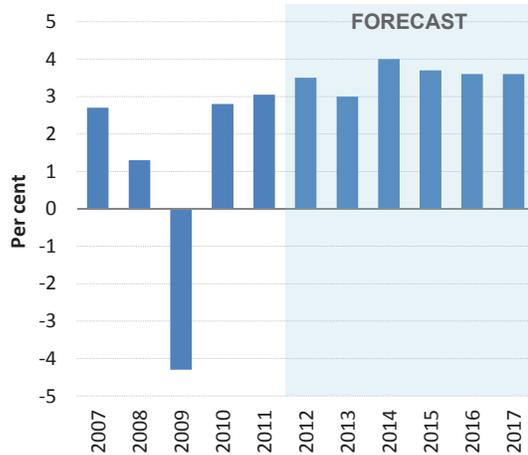
Source: Statistics Canada; Corporate Economics

CER: Total employment (2007 - 2017)
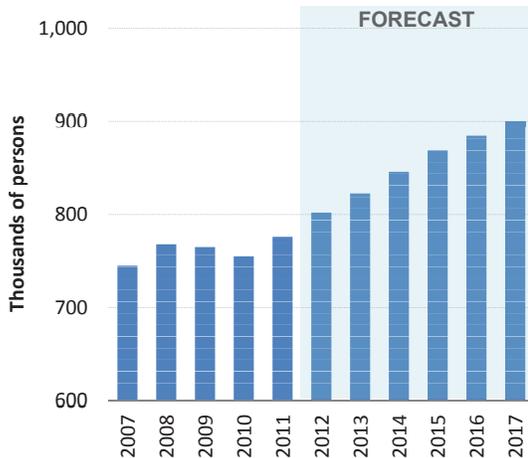
Source: Statistics Canada; Corporate Economics

CER: Unemployment rate (2007 - 2017)
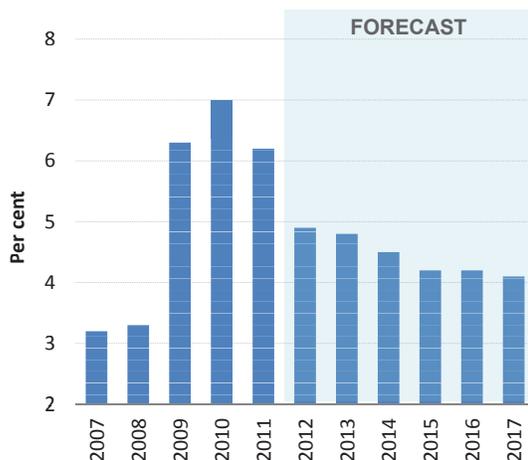
Source: Statistics Canada; Corporate Economics

Output

The regional economy expanded at an annual rate of 1.0 per cent from 2006 to 2011[4]. In this period, the economy experienced a recession where total output contracted between 2008 and 2009. The economy was caught in a downward spiral as slower growth resulted in slower growth. Specifically, weaker growth in the world economy led to a sharp reduction in demand for internationally traded commodities such as oil and caused a reduction in commodity sales and cash flow. Lower cash flow led to reduced investment spending in the energy sector. Also, energy dependent sectors such as professional, scientific and technical services and construction were adversely affected (see appendix). A shrinking labour market with relatively high unemployment rates and weak wage growth served as a deterrent for job seekers from outside the region and this lowered the level of net migration and the rate of population growth. In addition negative employment growth and meagre wage increases led to stagnation in labour incomes and this lowered the level of housing starts and also reduced consumer spending.

Looking ahead, The Calgary Economic Region's Gross Domestic Product is expected to expand by 3.5 per cent in 2012 and 3.7 per cent in 2015. The forecast assumes that elevated world oil prices would lead to higher levels of investment activity in the province's non-conventional oil sector over the forecast period. Calgary should therefore benefit from spinoff activity as it is home to a significant portion of businesses in the energy sector. Increased investment in the energy sector would result in higher output and employment levels. Higher employment would result in higher labour incomes and lay the foundation for increased consumer spending and boost economic growth. Economic growth is expected to decline to 3.6 per cent by 2017, as a relatively tight labour market restricts increased production and consumer spending.

Total employment in the Calgary Economic Region was estimated at 776,100 in 2011, up from 755,200 in 2010 and 765,000 in 2009. The monthly labour force survey data shows total employment in the CER peaked in April 2009 at 775,400 persons and then declined steadily to 755,000 persons by December 2010 before recovering to 776,000 by December 2011. The local economy therefore lost about 20,000 jobs from peak to trough. The analysis shows that the recession ended in late 2010 and the labour market recovery recovered all of the jobs lost during the recession.

The current year, 2012, is a year of expansion. Total employment for the 12 months ending August 2012 averaged 800,300, up from 765,100 in August 2011 and 776,000 in December 2011. Total employment is also expected

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4   Local economies rarely follow municipal boundaries and Calgary is no exception to this observation. The Calgary Economic Region is therefore used as a rough proxy for the Calgary economy. It represents the urban area (Calgary city) plus the surrounding areas. The main feature of this grouping is that it has a high degree of social and economic integration.

to increase by 98,000 jobs over the 2012-2017 period or by 2.5 per cent annually, up from 1.6 per cent for the 2006-2011 period.

The unemployment rate was estimated at 6.2 per cent in 2011, down from 7.0 per cent in 2010. As employment opportunities improve over the forecast period, discouraged workers should return to the labour force and keep the unemployment rate relatively high. The unemployment rate for the 12 months ending July 2012 was estimated at 5.2 per cent and should average to 4.9 per cent for 2012 and drop to 4.5 per cent in 2014 as employment growth exceeds labour force growth. Over the forecast period, the aging of the population is expected to restrain the labour force growth rate and help to keep the unemployment rate low over time.

Calgary's consumer inflation rate was estimated at 2.2 per cent in 2011, up from 0.8 per cent in 2010. The annual inflation rate as at July 2012 was estimated at 1.9 per cent, up from 1.2 for the same period 2011. The inflation rate in Calgary was driven by increase in water, fuel and electricity (9.1 per cent), gasoline (5.9 per cent), transportation (3.4 per cent) and health and personal care (3.3 per cent) prices. Lower prices for clothing and footwear (-1.2 per cent) and recreation, education and reading materials(-0.2 per cent) moderated the rate of price increase.

The inflation rate for 2012 should fall to 1.0 per cent from 2.2 in 2011. Economic uncertainty in the world outside Calgary has dampened consumer and business confidences and reduced the rate of growth of the world economy. The slower pace of economic activity has resulted in a reduction in the demand for commodities and dampened the rate of inflation for commodity prices. Moreover, the lower rate of commodity price inflation has fed through to consumer prices and caused the rate of inflation to moderate. Economic growth in the world economy in 2013 and 2014 should result in higher demand for commodities and nudge the consumer price inflation higher. In addition, population growth in the Calgary economy should increase the demand for residential space and cause the price of accommodation cost to increase and increase the overall consumer price inflation rate.

CER: Inflation rate (2007 - 2017)
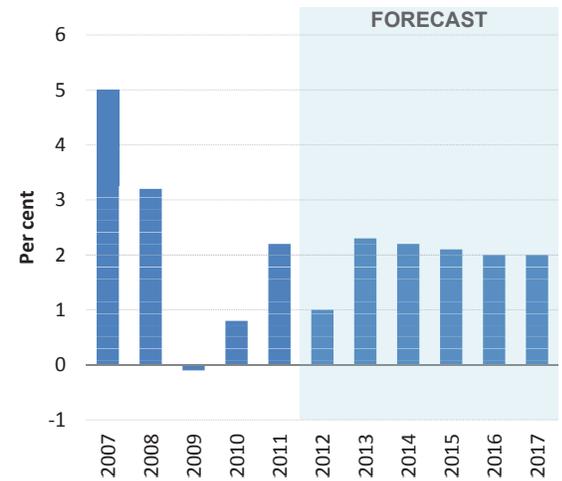
Source: Statistics Canada; Corporate Economics

Box 6. Calgary Economic Region Population 2011

CER: Population change (2006 - 2011)
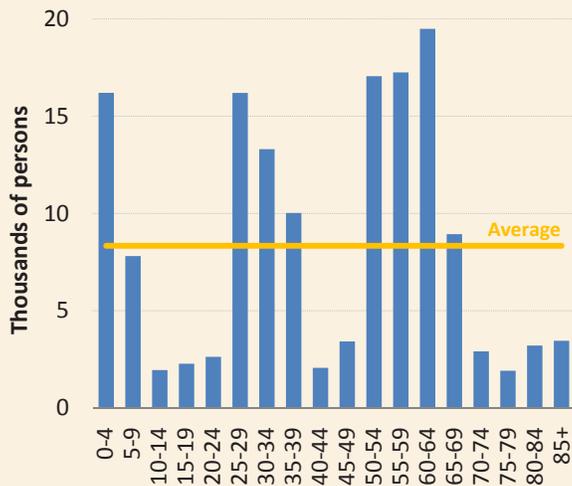
Source: Statistics Canada; Corporate Economics

The CER's population in 2011 is estimated at 1,362,020, up from 1,188,000 in 2006[5]. The CER's population grew by 174,000 over the 5 year period or by 34,800 annually.

Three groups-(50 to 64, 25 to 39 and 0 to 4)-experienced the largest population increases. The 50 to 64 group is made up primarily of baby boomers; i.e. those born in the 1946 to 1966 period. The impact on the region's population distribution is expected given its relative size in the overall population. The second group - (25 to 35)-approximates the age profile of the average migrant. During the 2006 to 2011 period, the CER experienced strong economic growth and migrants were drawn to the region because of available jobs. Net migration became a significant contributor to population growth. Strong growth in the 0 to 4 group is partly a reflection of the equally strong growth in the 25 to 35 group as the individuals 0-4 are children of the 25-35 group.

5   Statistics Canada. 2012. Division No. 6, Alberta (Code 4806) and Division No. 6, Alberta (Code 4806) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released May 29, 2012.

Box 7. Age Distribution: Calgary and the Rest of the CER

The population distributions in the city of Calgary and the rest of the CER differ in several ways.

Calgary and CER: Total population distribution (2011)
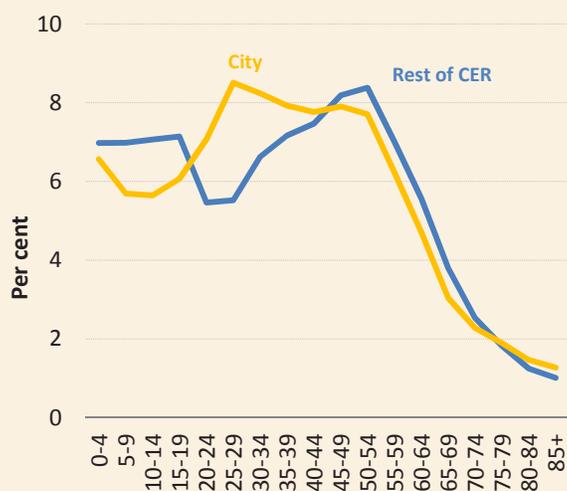
Source: Statistics Canada; Corporate Economics

▶ The region outside of Calgary has a higher proportion of individuals between the ages of 0-19 years than the city. The region also has a higher proportion of individuals between the ages of 40-74. It is reasonable to infer that these two groups are related; the older group being the parents and the younger group being the children. Individuals in the region appear to spend their youth outside of the city with their parents attending primary and secondary schools. The parents at an earlier point in their life-cycle lived in the city. Once enough savings were acquired, they purchased larger homes outside of the city.

▶ The city has a larger proportion of individuals who are in the 20-34 year age group. This group consists of post secondary students and first labour market entrants. Individuals come to the city to take advantage of the facilities for post secondary education. Once they have graduated, they remain in the city to seek employment. The city has a relatively larger pool of employers and therefore presents the job seeker with a better chance of finding employment compared to the rest of the CER.

▶ The data also shows the city tends to have a higher percentage of individuals in the 75-85 plus group. These individuals are retired and have a tendency to reside in the city to be close to family members and medical facilities.

Alberta Economy

Summary

▶ Alberta's GDP will continue to outperform most of the other Canadian provinces over the forecast period. Business output would trend upwards, and employment would grow at a faster rate than the labour force and this would attract migrants to Alberta.

▶ Crude oil prices have been highly volatile in 2012. The production of both OPEC and non-OPEC countries have remained at high levels, which should be able to ease the fears of temporary supply disruptions from political instability. At the same time, with the global economy moderating, oil demand is expected to grow only slightly in 2012.

▶ Natural gas prices should continue their downward trend in near term as a result of oversupply, ample storage and weak demand in the U.S. and Canada. Alberta's natural gas supply has to depend more on domestic consumers, as well as potential markets outside of North America.

GDP

Crude oil prices have remained sufficiently high despite short-term fluctuations and will improve cash flow and drive investment and business sector gains. This will lead to strong construction in Alberta, particularly in the energy sector where oil sands development is a driving force behind Alberta's growth. The most recent report of the inventory of major Alberta projects shows increased spending on oil sands projects[6]. Alberta's GDP will continue to outperform most of the other provinces in Canada over the forecast period.

Recent economic indicators signal a solid pace of expansion in Alberta. Business output continues to trend upwards, and ongoing strength in the labour market has attracted net interprovincial migrants to the province. In addition, the drop in the unemployment rate should tighten the provincial labour market and accelerate wage growth. Consequently, household incomes in Alberta should see a solid increase, resulting in growth in consumption and related sectors. Retail sales are expected to increase by 9.3 per cent in 2012, boosted by solid personal income growth in Alberta. Big ticket purchases, including spending at auto dealers and furniture stores, have helped drive retail sales so far in 2012. From 2013 to 2017, retail sales will continue to rise, but growth will moderate to around 4 per cent.

Alberta: GDP and Non-Residential Construction Investment (2002-2017)
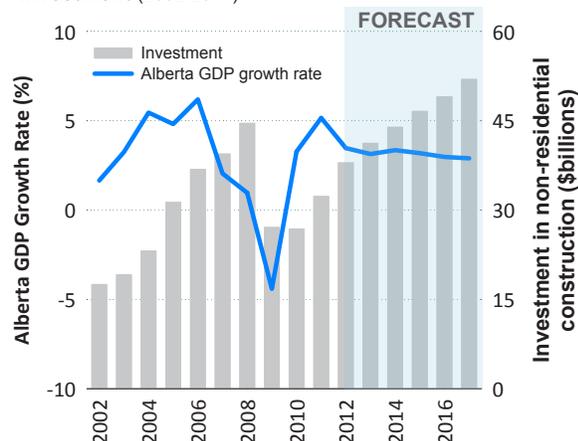
Source: IHS Global Insight; Conference Board of Canada; Corporate Economics

Alberta: Retail Sales and Personal Income Growth (2000 - 2017)
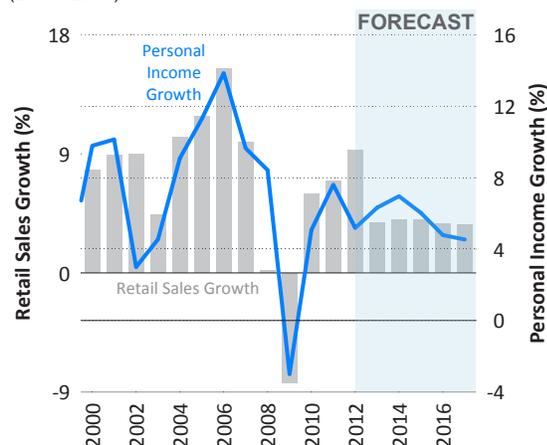
Source: IHS Global Insight; Statistics Canada; Corporate Economics

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6   Which are either under construction or scheduled to begin within the next two or three years.

Alberta unemployment rate and employment growth
(2000 - 2017)

Source: Statistics Canada; Conference Board of Canada;
Corporate Economics

Alberta: Housing Starts and Population Growth (2000-2017)

Source: CMHC; Conference Board of Canada; Corporate Economics

Alberta inflation and wage growth
(2000 - 2017)
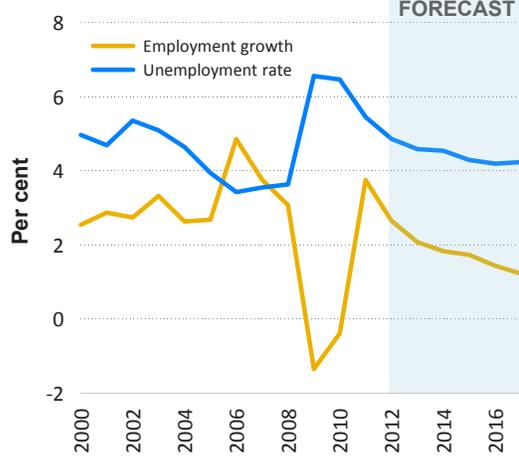
Source: Statistics Canada; Conference Board of Canada;
Corporate Economics

Labour Market

Rapid growth in business investment would increase the demand for labour in Alberta. The province should generate about 56,000 jobs in 2012, with the majority in full-time and self-employed positions. Consequently, total employment should average 2.16 million for 2012. Beyond that, the growth rate will decelerate slightly over the forecast period, but Alberta should still expect to see positive employment increase every year. Over the forecast period, Alberta should realise constant job gains in energy sector, which will have a spin-off effect in construction, commercial and business services, wholesale and retail trade, and other primary industries.

The unemployment rate should average 4.9 per cent in 2012 and decline steadily over time as employment growth exceeds labour force growth.

Housing Starts

Over the forecast period, economic and demographic growth will support demand for housing, while growth will be tempered by rising inventories and construction costs, as well as modestly higher mortgage rates and stricter mortgage policy rules. Improving economic and demographic conditions are now lifting housing demand and builders are responding by increasing supply. Housing prices in Alberta have moderated since the 2009 economic downturn, which also helped to improve the affordability of the households across the province.

Alberta housing starts are projected to rise by about 18 per cent to 31,700 units in 2012. In 2013, housing starts are expected to be similar to this year's production rate with 29,900 units.

Inflation

Alberta's consumer price inflation rate should average 1.3 per cent for 2012, down from 2.4 per cent in 2011. The lower inflation rate, in 2012,is a response to slower growth in both energy and food prices. Furthermore, weakening in the global market should contain the upward pressures in commodity prices. Inflation excluding volatile food and energy prices will drop to 1.5 per cent in 2012, indicating that core inflation pressures are well contained. However, price pressures will likely build in 2013 as economic activity picks up, and commodity prices start to rise again.

The average weekly wage rate in Alberta is expected to increase by 5.5 per cent in 2012. With average wage growth outpacing inflation this year, Albertans would continue to see gains in real wages.

Crude Oil

Crude oil prices are highly volatile in 2012. After rising in the first quarter, prices trended down for both the West Texas Intermediate (WTI) and Brent in the second quarter. Downward pressures resulted from increasing production and weakening demand. The production of both OPEC and non-OPEC countries remain at high levels, which has eased the fears of supply tightness from political instability in oil producing regions. OPEC has so far exceeded its self-imposed quota of 30 million barrels per day. Non-OPEC supply gains are mostly from North America, supported by non-conventional production in the U.S. and Canada. Demand for crude oil should be contained due to the slowing of the global market. Therefore, we expect WTI to average at US$94/bbl in 2012. The price is lower than last year, but still remains elevated enough to support business investment in Alberta.

Rising production volumes are exceeding pipeline capacity throughout the North American midcontinent. This is preventing the province from enjoying world prices for its oil production. At the moment, a significant price difference exists between prices for crude oil traded outside North America (Brent) and prices for North American traded oil (WTI). Extra pipeline capacity that takes Alberta's crude oil output to tidewater is the solution to this issue. However, it should be kept in mind that political obstacles could put uncertainties on pipeline and other infrastructure construction.

Demand for crude oil is closely correlated with economic growth. With the global growth rate decelerating, especially in the U.S. and China, oil demand is expected to grow only slightly at 0.8 per cent in 2012. In the U.S., the coming fiscal consolidation and deceleration in investment should depress the demand for oil. The slowing in Chinese economic growth should reduce China's demand for oil.

Natural Gas

Natural gas prices have continued their downward trend in the first half of 2012 as a result of over-supply, ample storage and weak demand. AECO spot prices reached $1.80/GJ in Q2 2012, the lowest level since 1998. We expect the average AECO price for 2012 to be $2.2/GJ, and pick up slowly after 2013.

Production of natural gas in North America has increased by over 20 per cent in the past 4 years due to shale gas extraction. Storage levels in the U.S. and Canada are reaching record highs. At the same time, demand in different segments of the market remain weak in response to slow economic growth.

West Texas Intermediate Crude Oil Price: Annual Average (2000 - 2017)
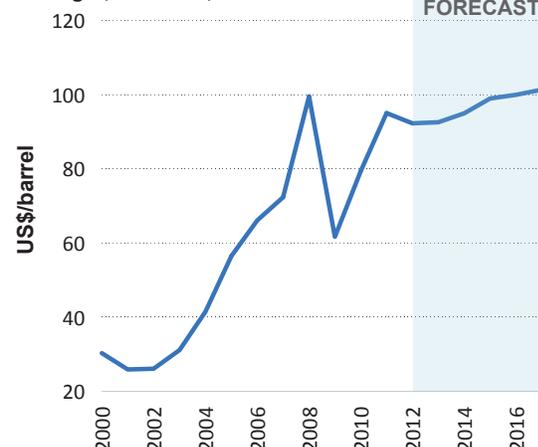
Source: U.S. Federal Bank Reserve of St. Louis; U.S. Energy Information Administration; Corporate Economics

World Oil Demand and Economic Growth (2000-2017)
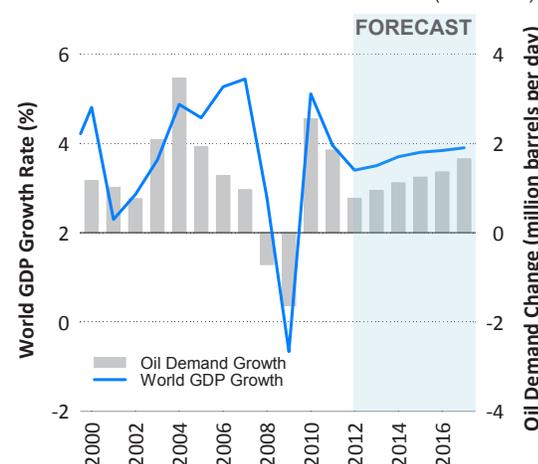
Source: IMF World Economic Outlook Database; U.S. Energy Information Administration; Corporate Economics

AECO Natural Gas Price: Annual Average (2000 - 2017)
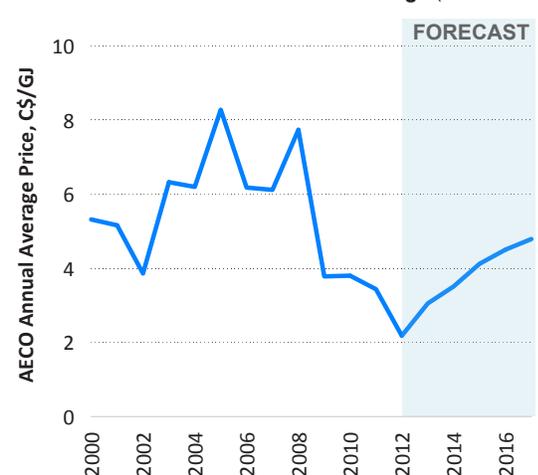
Source: GLJ Canadian Natural Gas Focus database; U.S. Energy Information Administration; Corporate Economics

Net Exports of Canadian Natural Gas to U.S.
(2007 - 2012)

Legend: Monthly Exports to U.S. — 12 Month Moving Average

Y-axis: Canadian Exports to U.S. (Bcf/month) — 200, 240, 280, 320, 360, 400
X-axis: 2007, 2008, 2009, 2010, 2011, 2012
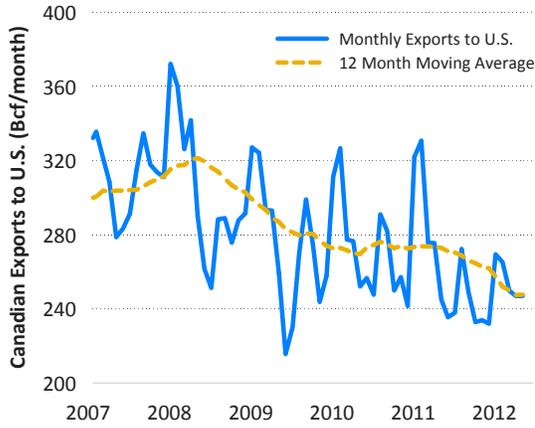
Source: U.S. EIA Office of Energy Statistics; Corporate Economics

Robust increases in U.S. natural gas production have led to decreased natural gas exports to the U.S. Imports from Canada in 2011 fell below the previous five year average, and have moved lower in 2012. Looking at the longer term trend, the 12-month-moving-average for exports to the U.S. is pointing downward. Alberta's natural gas supply has to depend more on domestic consumers, as well as the potential market outside of North America.

Box 8. Energy Text box

Chart 1 below shows crude oil consumption for the OECD[7] and the BRICS[8] by year (Million Barrels per Day). Total crude oil consumption of the BRICS increased at an accelerating rate for the past 20 years while the total crude oil consumption of the OECD show a modest increase, with some fluctuation. If these trend continue into the future, the BRICS countries would become a more important energy market.

Chart 2 shows the total crude oil consumption of China, United States and Canada by year (Million Barrels per Day). The total crude oil consumption of Canada remained relatively flat. Thus, we would expect the domestic market remains stable in the next 30 years. The crude oil consumption trend of United States is similar to that of OECD; showing relatively modest growth. China's crude oil consumption has increased at a rapid rate; outpacing both Canada and the U.S.

The increasing demand for energy product in the future would likely come from emerging countries, such as China. The Northern Gateway Pipelines project is therefore an important means for transporting energy products to Asian markets by oil tankers.

Chart 1. Crude Oil Consumption of OECD and BRICS
(1993-2010)

Y-axis: Million Barrels per Day — 0, 10, 20, 30, 40, 50, 60
Regions: OECD, BRICS
X-axis: 1993–2010
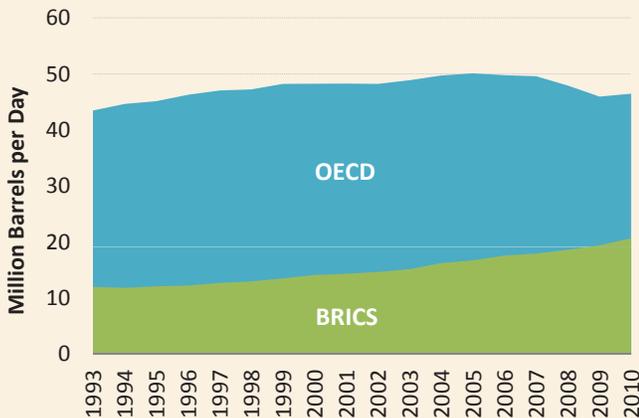
Chart 2. Crude Oil Consumption of China, United States and Canada
(1993-2010)

Y-axis: Million Barrels per Day — 0, 5, 10, 15, 20, 25
Lines: United States, China, Canada
X-axis: 1993–2010
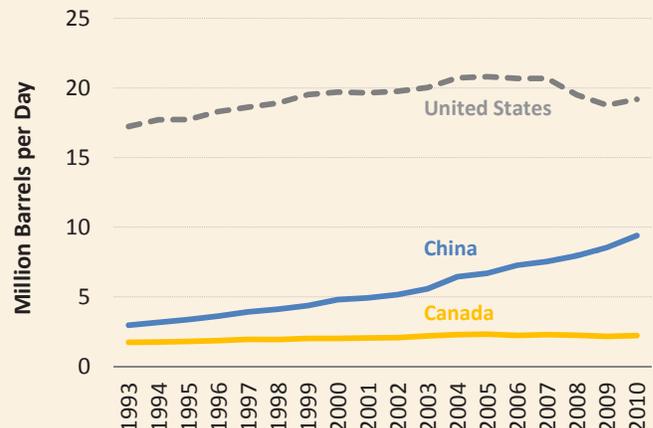
7   Organisation for Economic Co-operation and Development

8   BRICS is an association of leading emerging economies, including Brazil, Russia, India, China and South Africa.

Canadian Economy

Summary

▶ Real GDP growth in Canada is expected to underperform that of the U.S. in the forecast period, due to domestic and external risks.

▶ External risks are mainly weighed to the downside: a further deterioration in the Eurozone crisis, a potentially fiscal cliff triggered U.S. recession in 2013, and a strong loonie due to increasing demand for communities in the world market.

▶ Domestic risks are also mostly pointed to the downside: moderate consumption growth due to slow job creations and high unemployment, reduced private investment because of consumer de-leveraging, and a drag on growth from government spending due to deficit reductions.

GDP

The Canadian economy experienced a strong rebound from the recent global recession and outperformed the U.S. economy over the past three years. Economic growth has since decelerated in response to global economic uncertainty and weak domestic demand. Consequently, real GDP in Canada is expected to grow below that of the U.S. for the forecast period.

Canada's growth in the near term would be adversely affected by uncertainties in the global economy and a possible tightening of fiscal policy in the US[9]. A sharp reduction in government spending mixed with a significant increase in taxes would likely trigger a recession in the U.S. in 2013. This should have a large negative impact on the Canadian economy as 70 per cent or more of Canada's exports ($331 billion in 2011) go to the U.S. market.

The domestic economy would be pulled in different directions over the near term. Healthy corporate profits, firm commodity prices, low interest rates and a supportive tax structure should encourage business investment in the future and act as a partial offset to reduced exports to the US. However, high household debt-to-income ratio is already at a record level of 151 per cent and this implies modest consumption growth over the medium to long-term. In addition, changes to the mortgage rules should cool the housing market and reduce the growth of residential investment. Finally, government spending should be a drag on GDP growth for the next two years, as the Canadian Government attempts to balance its budget through reduced spending.

Canada vs. U.S. real GDP growth (2002 - 2017)
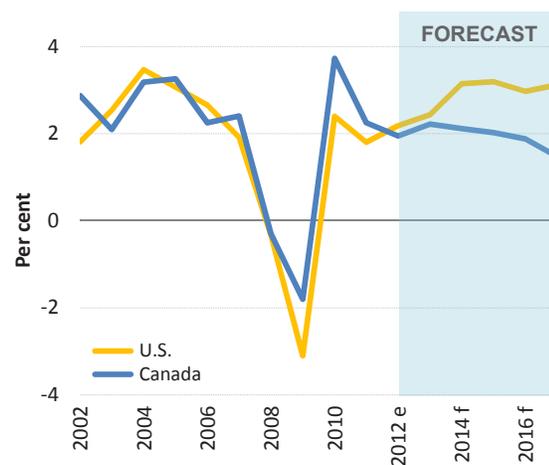
Source: Statistics Canada; Corporate Economics

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9   This shock to the economy is being referred to as a fiscal cliff in the popular media.

Box 9. Canada Growth Drivers

Canada growth driver: productivity vs labour input
(2002 - 2011)
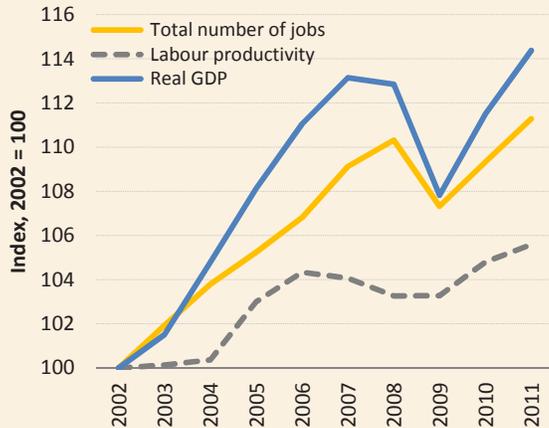
Source: Statistics Canada; Corporate Economics

Canadian real GDP growth in the past decade was mainly driven by the employment growth (total number of jobs or total hours worked) than by the growth in labour productivity. The increase in labour utilization (hours worked) benefited employees. However, the slow growth in productivity meant moderate growth in real labour income.

▶ Over the 2002-2011 period, average annual real GDP growth was 1.7 per cent, while annual average labour productivity growth was 0.7 per cent and annual average hours worked growth was 0.9 per cent.

▶ Labour productivity growth slowed in 2003-2004, declined in 2007-2008 and stalled in 2009, but accelerated in 2005-2006 and 2010-1011.

▶ A slow growth in labour productivity indicates either slow growth in capital intensity, or small increase in the composition (quality) of the workforce, or sluggish development in technology, innovation, firm organization, and scale and capacity utilization.

Canada inflation vs. interest rate (12-month-moving-average, January 2002 - June 2012)
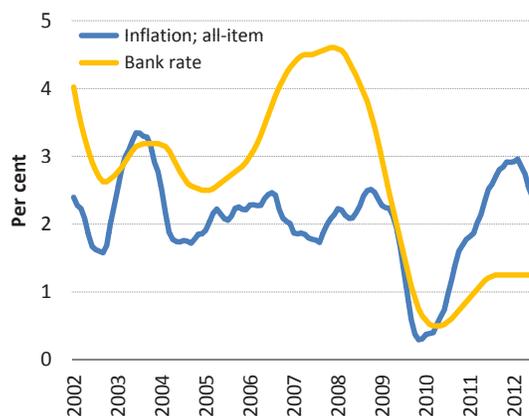
Source: Statistics Canada; Corporate Economics

Canadian monetary policy, with low interest rates, is currently supportive of economic growth. It is expected that the Bank of Canada will raise the overnight interest rate earlier than the U.S. Fed, given that the output gap is closing sooner in Canada. However, the drag from planned cuts in government spending may delay the closing of the output gap and cause the Bank of Canada to delay interest rate hikes at least until late 2013, when solid improvements in the domestic and external economies are in sight. Currently, the Canada/U.S. interest rate differential is contributing to a strong dollar that has negative impacts on exchange rate sensitive industries such as energy, manufacturing and tourism. If the Bank of Canada raises interest rates too soon and too high, the Canada/U.S. exchange rate will be pushed higher.

Box 10. Prime Rates in Canada and U.S.

Interest rate is the price for borrowing money. A reduction in interest rate usually causes consumers and businesses to increase their spending by taking on more credit. When interest rates increase, both individuals and firms will hold off on making big ticket purchases as the cost is high. The Bank of Canada (BoC), the central bank for Canada, controls the interest rate to have an effect on the economy. During times of economic downturn, the BoC will lower rates to encourage spending. The opposite action will be taken during rapid economic growth.

Graph here displays the prime interest rate in Canada and U.S. by year from 1991 to 2011. It can be seen that the prime rates in Canada and U.S. are highly correlated as Canada's economy is easily affected by the U.S. In the near term, we do not expect to see a dramatic increase in interest rates in Canada until late 2013 as the recovery of the economy of the U.S. is slow. Also, due to uncertainty and weakness in Europe, any growth in Canada will be moderate.

Prime Rates in Canada and U.S. (1981-2011)
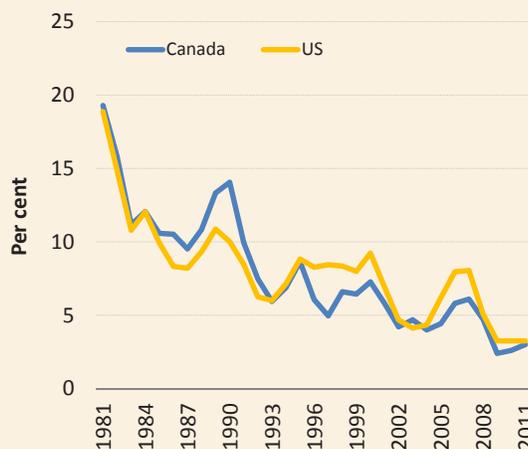
Source: Statistics Canada; Federal Reserve Bank of St. Louis; Corporate Economics

Over the past decade, the Canadian economy has benefited largely from strong global demand for commodities, especially increasing demand for crude oil from emerging markets. As Canada became increasingly important as an oil supplier to the U.S. market, the Canadian dollar appreciated against the U.S. currency. Consequently, there is a strong correlation between the WTI prices and Canadian/U.S. exchange rates.

▶ Between January 2002 and June 2012, oil price (WTI) increased by 279 per cent. In that period, the Canadian dollar appreciated against the U.S. dollar by 55 per cent.

▶ The strong dollar helped to lessen the impact of imported inflation. But, it also had a negative effect on the competitiveness of Canadian manufacturing industries in foreign markets. The Organization for Economic Co-operation and Development (OECD) warned that the Canadian economy is showing symptoms of Dutch Disease[10].

▶ It is expected that Canada's relatively strong fiscal position and widening interest rate differentials, as well as firm commodity prices should support a Canadian dollar at parity with the U.S. over the medium term.

WTI price and Canadian/U.S. dollar exchange rate (12 month-moving-average, January 2002 - June 2012)
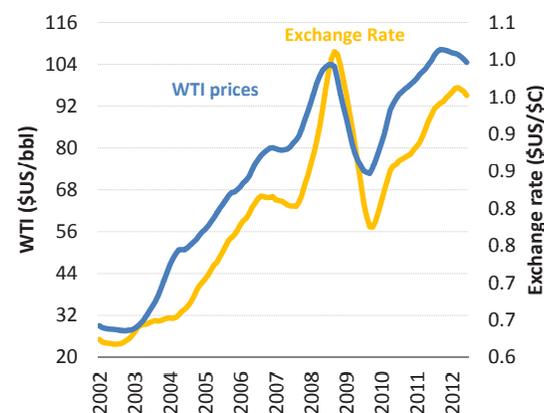
Source: Statistics Canada; Corporate Economics

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10 Dutch Disease — a phrase that refers to the decline in the manufacturing sector in the Netherlands after the development of its oil resources in the 1970s.

Box 11. Exchange Rates

Trade weighted U.S. dollar exchange rate index, *Broad based* (January 1973 - June 2012)
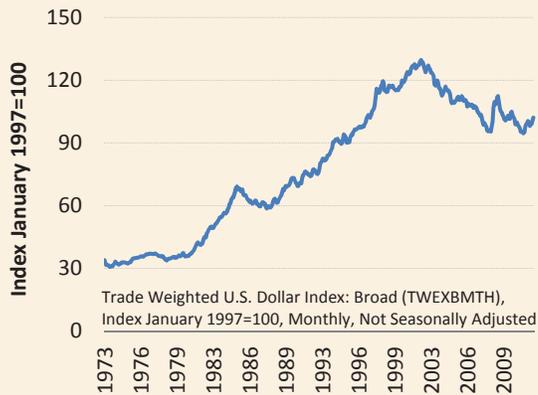
Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S./Euro foreign exchange rate
(January 1999 - June 2012)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

Canadian dollar effective exchange rate index
(May 1981 - June 2012)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

The exchange rate is the rate at which one currency is exchanged for another, or the price of one currency in terms of another. It is determined by the interaction of market participants (commercial banks, corporations, institutions, and government central banks) from both supply and demand sides of the foreign exchange market. Changes in the exchange rate affect the relative prices of domestic and foreign goods, and thus the demand for exports and imports. For example, an appreciation of a currency makes it harder for domestic manufacturers to sell their goods in foreign markets. However, it makes easier for foreign producers to compete in the domestic market with cheaper foreign products. As a result, changes in the exchange rate can indicate changes in competitiveness in the world market.

1. Changing competitiveness in the world market

Over the past decade, exchange rates between world major currencies fluctuated frequently and all other major currencies appreciated against the U.S. dollar. The long-term trend of weakening in the U.S. dollar reflected new developments in the global trade market since the Eurozone introduced a single currency among member countries in January 1999 and China became a member of the World Trade Organization (WTO) in December 2011. Reduced trade barriers such as tariffs and quotas, increased competition among foreign producers, and increased productivities in producing countries all contributed to the increasing demand for foreign goods in the world's largest market, the U.S.

Against this long-term trend, there were short periods when the U.S. dollar appreciated against other major currencies, especially during economic and financial market turmoil. For example, the recent Eurozone debt crisis triggered by Greece, Portugal, Ireland and Spain severally damaged the market's confidence in the Euro. The fear of a possible financial collapse and breakdown of the Eurozone sent Central Banks, institutions and investors fleeing to the safety of the U.S. dollar. Although its dominant position is currently challenged by countries concerned about its stability in the long-run, the U.S. dollar is the single most important reserve currency[11] in the world given the scale and liquidity of Fed reserve funds.

2. Foreign exchange rate policies

Countries manage their currency values through different exchange rate

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11   A reserve currency, or anchor currency, is a currency that is held in significant quantities by many governments and institutions as part of their foreign exchange reserves. It also tends to be the international pricing currency for products traded on a global market, and commodities such as oil, gold, etc.

policies, including free-floating, pegged or fixed[12], or a hybrid. Canada, like most developed economies, is in a free-floating exchange rate regime where the value of Canadian dollar is allowed to fluctuate according to the foreign exchange market. The Canadian-dollar effective exchange rate index[13] (CERI) shows that the dollar appreciated against the currencies of Canada's six major trading partners (the U.S. dollar, the European Union euro, the Japanese yen, the U.K. pound, the Chinese yuan, and the Mexican peso) in recent years. The appreciation of Canadian dollar indicates the sound domestic economy and the world's stable demand for commodities that Canada produces and exports.

Some central banks intervene in the foreign exchange market under extreme circumstances. A recent example[14] was the G-7 joint intervention in Japanese Yen on March 18, 2011, after a 9.0-magnitude earthquake rocked Japan and caused a tsunami that killed more than 15,000 people and damaged properties worth more than hundreds of billions of dollars.

Other countries such as China have fixed exchange rate regime. In China's case, the yuan is pegged against the U.S. dollar, which helped Chinese exporters in their largest foreign market, the U.S. market. However, this policy cost China the freedom of using monetary policy.

3. Canadian vs. U.S. dollar

The U.S. is Canada's biggest trade partner. The Canada/U.S. Exchange rate is critical to the trade balances between the two countries. Over the past decade the Canadian dollar appreciated steadily against U.S. dollar, driven by: higher interest rates, better economic recovery and stronger job market in Canada, and strong demand and high prices for commodities. A strong Canadian dollar benefited consumers with cheaper imported goods and services, however it negatively impacted the competitiveness of the country's exchange sensitive sectors such as manufacturing and tourism industries.

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12 A fixed exchange rate, sometimes called a pegged exchange rate, is a type of exchange rate regime wherein a currency's value is matched to the value of another single currency or to a basket of other currencies, or to another measure of value, such as gold.

13 The Canadian-dollar effective exchange rate index (CERI) is a weighted average of bilateral exchange rates for the Canadian dollar against the currencies of Canada's major trading partners. The six foreign currencies in the CERI are the U.S. dollar, the European Union euro, the Japanese yen, the U.K. pound, the Chinese yuan, and the Mexican peso.

14 The Japanese yen (JPY) appreciated rapidly following the earthquake on March 10, by 5 percent against the U.S. dollar (USD) in a week. In addition, foreign currency markets became extremely volatile. In response to these market conditions, the G-7 financial authorities announced late on Thursday, March 17, that they would jointly intervene the next day to reduce the value of the yen. On March 18, Japanese Bank alone purchased 692.5 billion yen worth of the U.S. dollar. After the G-7 intervention, the yen immediately depreciated by about 3 percent and was much less volatile in the subsequent week.

Japanese Intervention: Japanese Bank purchases of USD against JPY (April 1991 - June 2012)
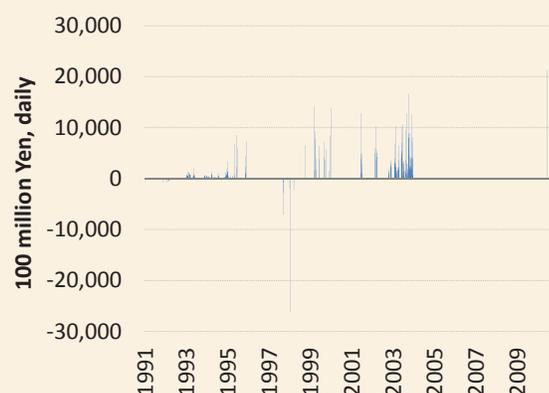
Source: Federal Reserve Bank of St. Louis; Corporate Economics

China/US Foreign Exchange Rate (January 1981 - June 2012)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

Canada/US Foreign Exchange Rate (January 1971 - June 2012)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

Canada total employment change by industry
(12-month-moving-average, January 2002 - June 2012)

Source: Statistics Canada; Corporate Economics

Canadian housing market (2002 - 2011)

Chart 6. Canadian Housing market
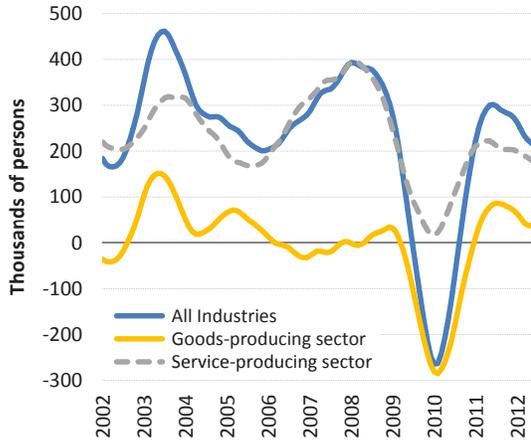
Source: Statistics Canada; Corporate Economics

Canada's total employment was 17. 7 million in July 2012, up from July 2008 pre-recession peak by 373,000. Labour markets across Canada are expected to face problems of weak job creation and high unemployment rates in the short-term, as the economy adjusts to external uncertainty and weak domestic demand. In the long-run, growth in labour force should be constrained by Canada's aging population, which could result in labour shortages and high wage inflation.
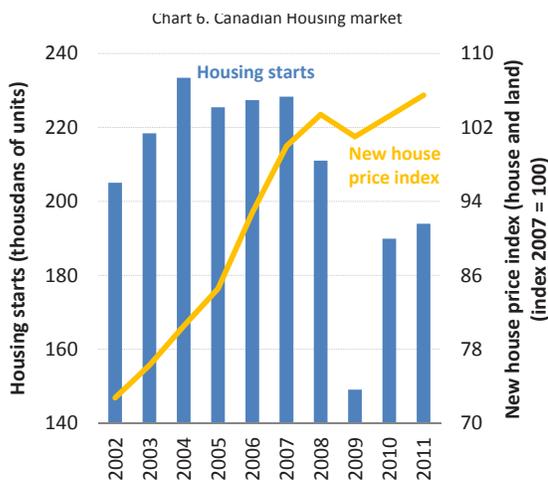
The Canadian housing market staged a strong rebound from the 2008-2009 recession. Housing starts and house prices are now higher than pre-recession peaks. The Bank of Canada became concerned that the housing recovery was not sustainable as it was partly driven by rising household debt. In 2011, the ratio of household debt to personal disposable income in Canada increased to 151 per cent, compared to 66 per cent in 1966. The high debt-to-income ratio placed mortgage holders at increased risk of mortgage default should interest rates return back to normal. To cool the housing market, the Canadian Government announced changes to mortgage rules: from July 2012, lenders can only issue home equity loans up to a maximum of 80 per cent of a property's value-down from 85 per cent; the maximum amortization period drops to 25 years from 30 years. As a result, it is expected that housing market activities in Canada should decelerate and housing starts should be lower than the levels seen in the past few years.

U.S. Economy

Summary:

▶ The recent economic recession created a large gap between the real and potential output levels in the U.S., and it is expected that the gap will close slowly in the next few years. The output gap is reducing inflationary pressures in the U.S. economy.

▶ A disorderly European debt default is the key external risk to U.S. economy.

▶ In the U.S., there is a concern that if the current law is not changed in time, sharp fiscal tightening will lead to an economic recession in 2013 with a large amount of unused resources which would result in high unemployment and low inflation in the near-term. The forecast is on the assumption that the U.S. Congress will put in place measures to blunt the effects of the impending tax increases and spending cuts.

The recent economic recession in the U.S. created a large gap between the real and potential output levels; a gap that reached 4 per cent of total real GDP in 2011. Real GDP in the U.S. grew 1.5 per cent in the second quarter of 2012, after a 2 per cent growth in the first quarter. This year's growth was driven by personal consumption and private domestic investment, but dragged by government spending. It is expected that the gap will close slowly in the next few years, given a slow recovery and moderate growth in the U.S. economy. A slow recovery and moderate growth should gradually improve production capacity utilization, which means moderate inflation pressures in the next few years.

Consumer spending in the U.S., accounting for 70 per cent of the country's total GDP, continued to recover from the recent recession. Retail and food services sales (adjusted for inflation) recovered from $158 billion in 2009 to $175 billion this year. Light weight vehicle sales, including autos and light trucks, have partly bounced back from the recent low of 10 million units to 14 million units. A weak labour market and high household debt continues to restrain growth in consumer spending.

Monetary policy in the U.S. has been favourable to borrowers for four years, as the Fed kept interest rate at historic lows. The Fed has recently announced to keep interest rate at current levels until mid-2015, given that inflation should be under control. Low inflation is expected because of the excess production capacities in the current U.S. economy.

U.S. potential vs. actual real GDP (2001 - 2011)
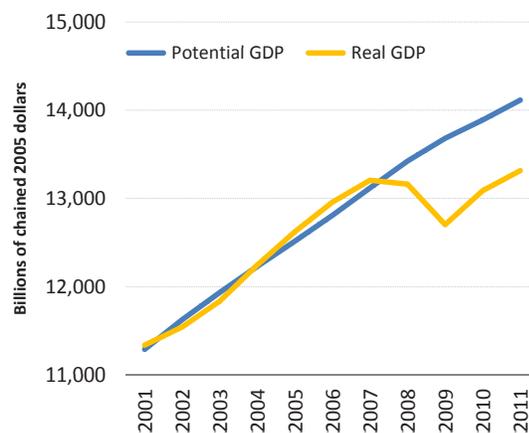
Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S. consumer spending
(12 month-moving-average, January 2005 - June 2012)
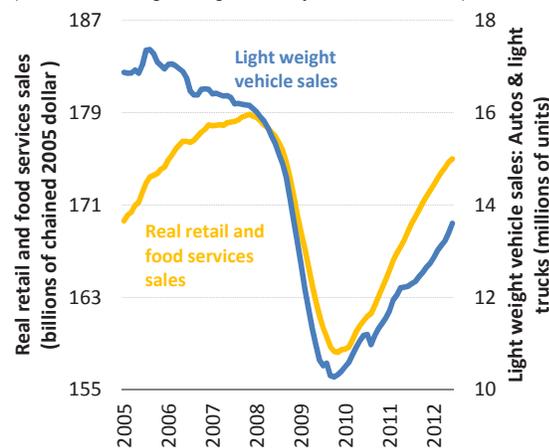
Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S. inflation vs. interest rate (January 1982 - June 2012)
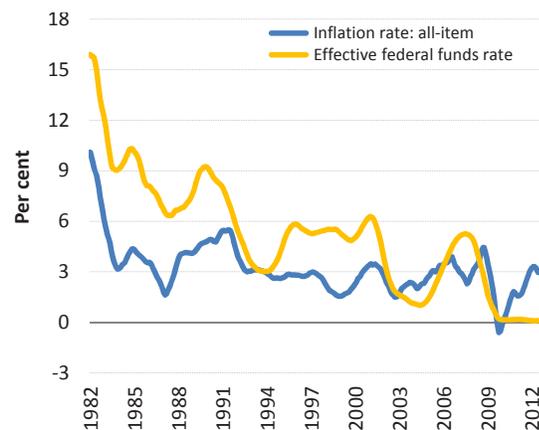
Source: Federal Reserve Bank of St. Louis; Corporate Economics

Box 12. U.S. Federal Government Total Public Debt to GDP Ratio

U.S. total public held federal debt to GDP ratio
(1966 - 2011)
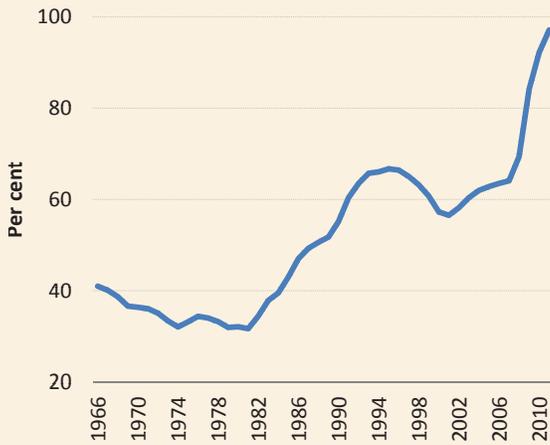
Source: Federal Reserve Bank of St. Louis; Corporate Economics

In 2011, total federal government held public debt[15] in the U.S. reached 97 percent of GDP—the highest level since 1950 and about 1.5 times the 2007 level, before the financial crisis and recent recession. By the end of fiscal year 2012, the U.S. federal deficit is estimated[16] to total $1.1 trillion, marking the fourth year in a row with a deficit of more than $1 trillion.

Under current law, policy changes are scheduled to take effect in January 2013 to cut deficits and reduce the federal debt. The Changes include: 1) a host of significant provisions of the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 are set to expire, including provisions that extended reductions in tax rates and expansions of tax credits and deductions originally enacted in 2001, 2003, or 2009. 2) Sharp reductions in Medicare's payment rates for physicians' services are scheduled to take effect. 3) Automatic enforcement procedures established by the Budget Control Act of 2011 to restrain discretionary and mandatory spending are set to go into effect. 4) Extensions of emergency unemployment benefits and a reduction of 2 percentage points in the payroll tax for Social Security are scheduled to expire. These policy changes should reduce the federal deficit to $641 billion in 2013, almost $500 billion less than that in 2012. This sharp fiscal tightening, namely fiscal cliff, is expected to lead to an economic recession in 2013 and produce a large amount of excess capacity measured by high unemployment and real estate vacancy rates. In that environment of large spare capacity, low inflation would prevail in the near-term.

To avoid this fiscal cliff and recession (base) scenario, changes have to be made to the current law. An alternative fiscal scenario proposed by the Congressional Budget Office (CBO) assumes that no fiscal cliff occurs in 2013. Under this scenario, real GDP growth should be higher and unemployment rate should be lower in the first few years of the projection. However, the economy should grow slower and interest rates should be higher in the later part of the projection period, as persistent large budget deficits and escalating federal debt are not sustainable in the long-run.

15 Federal government total public debt includes debt held by the public and debt held by agencies & trusts.

16 Congressional Budget Office (CBO) August 2012 updates.

The U.S. Job market in 2012 entered the second year of recovery, creating 3.5 million jobs between July 2010 and July 2012. Compared to previous recoveries, this recovery is weaker as the economy is faced with a number of structural problems.

▶ The July 2012 unemployment rate was 8.3 per cent, down from 9.1 per cent a year ago. However, the current unemployment rate is substantially higher than the natural rate of unemployment by both short-term and long-term standards. The persistently high unemployment rate above 8 per cent has lasted for four years, which has caused serious social and economic problems in the U.S.

▶ By July 2012, there were 12.8 million unemployed persons in the U.S. Among them, 5.2 million were long-term unemployed (those jobless for 27 weeks and over). About 0.8 million of the long-term unemployed became discouraged workers because they believed no jobs were available to them.

▶ On the other hand, unemployment rates were lower in certain industries such as manufacturing (6.9 per cent in July 2012), which indicates a structural problem in the U.S. job market-namely, a mismatch between demand for and supply of labour skills.

U.S. unemployment rates (2002 - 2011)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

Five years after the housing market bubble burst in 2007, house prices in the U.S. are back to what they were ten years ago and the total number of housing starts has been reduced to extremely low levels. Current statistics show signs that the market has finally turned the corner. If the recent trend continues, a housing recovery should contribute to the growth over the next few years.

▶ Building permits hit a multi-year high in the first half of this year.

▶ The national composite home price index shows the sharpest increase since 2006.

▶ Builder confidence in August was at its highest since February 2007.

U.S. housing market (2002 - 2011)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

World Economy

Summary:

▶ The global growth rate for 2012 is projected to decelerate from the 2011 rate given the deepening of the EU financial crisis, the less than stellar performance from the U.S. economy and falling growth rate from the rest of the world's economies.

▶ Economic growth in the emerging world is also expected to dip in 2012 due to the global economic slowdown, as no region is immune to the EU financial crisis, and sluggish U.S. economic recovery to mention a few.

▶ The ongoing European Union (EU) financial sovereign debt crisis, resulting from the inability of EU countries, like Greece, Portugal and Ireland to pay their debt, has generated a very weak economic outcome for the region and the rest of the world as business and consumer confidences have plummeted.

World Economic Assumptions:

The global growth rate for 2012 is projected to decelerate from the 2011 rate given the deepening of the EU financial crisis, the less than stellar performance from the U.S. economy and falling growth rate from the rest of the world's economies. The sluggish recovery in the U.S., the persistence of EU financial crisis and lower than expected growth numbers in China and lower projected growth numbers for most other countries has depressed world economic growth. The forecast is for 3.53 per cent growth in 2012 and will then increase each year to settle at 4.6 per cent by 2017.

Economic growth in the emerging world is also expected to dip in 2012 due to the global economic slowdown as no region is immune from the EU financial crisis, and sluggish U.S. economic recovery to mention a few. However, it is the emerging and developing regions that have driven world economic activity. Weak export numbers and insufficient domestic demand stemming from global uncertainties and government debt reduction policies in the advanced economies have created some cooling for the emerging and developing economies.

The ongoing European Union (EU) financial sovereign debt crisis, resulting from the inability of EU countries like Greece, Portugal and Ireland to pay their debt, has generated a very weak economic outcome for the region and the rest of the world as business and consumer confidence has plummeted. This lack of confidence has translated into higher bond yields for struggling EU countries like Greece, Portugal, Ireland and Spain, and has further exacerbated the ability of these countries to repay their debt obligations. To contain the contagion, Germany, the European Central Bank (ECB) and the International Monetary Fund (IMF) have made further encouraging commitments to restore confidence in the region by (a) increasing the bailout funds, (b) the ECB's purchasing of long term maturity bonds to subdue the high yields, (c) imposing necessary austerity measures and monitoring, and (d) proposing measures to harmonize fiscal unity across the member states. Though, better late than never, the prescription currently would have had the EU on stronger and faster path to recovery if subscribed to during the initial financial crisis in Greece. The ECB's signal to also purchase short term (2 and 3 year maturity) bonds has added further confidence to the financial market. However, the effect of downgrading the EU to a negative rating by Moody's reflects the financial weakness in the EU markets but, should not mitigate the forward momentum of financial confidence gained in the market .

The world inflation rate is expected to fall in 2012, in line with slower growth in aggregate demand. Reduced growth would result in a corresponding reduction in the growth in demand for commodities. This would relieve price pressures in commodity markets. World inflation should decline from 4.84 per cent in 2011 to 4.04 per cent in 2012 with future downward pressure still mounting in our short term forecast horizon, and inflation at 3.32 per cent by 2017.

Debt Spiral
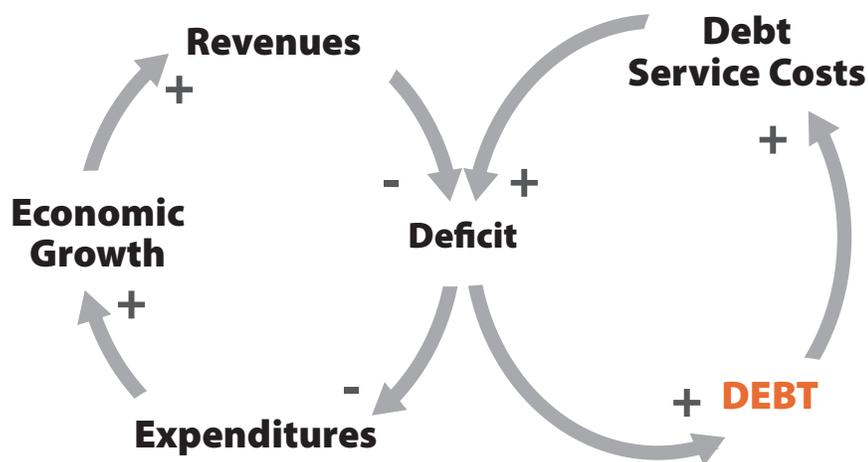
Downside Risks:

Increased uncertainty in the EU;

▶ Will Greece, if given the two year grace period for first repayment of debt, be capable of repayment?

▶ Will Germany decide that it is better off to separate from the EU?

▶ Will Italy be able to improve its austerity measures given that it poses the greatest challenge?

▶ Will Greece decide to exit the EU due to the inability to adjust to the stiff austerity measures necessary?

Increased government and consumer deleveraging in North America, though necessary, would essentially pose a short term risk to an already dragging economy. The management of degree of rate deleveraging (reducing debt level) is needed to keep the economy from stalling and reducing the potential for a significant drop in domestic aggregate demand.

World GDP Growth Rates (1981 - 2017)
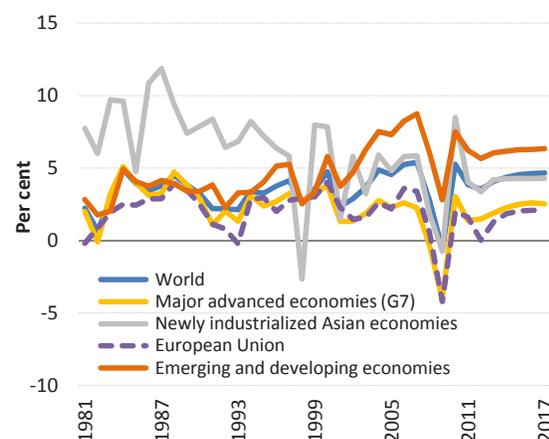
Source: International Monetary Fund, World Economic Outlook Database; Corporate Economics

World Inflation Rates (1981 - 2017)
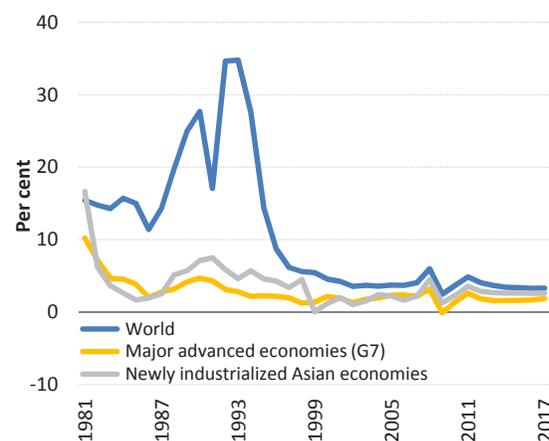
Source: International Monetary Fund, World Economic Outlook Database; Corporate Economics

World Inflation Rates (1981 - 2017)
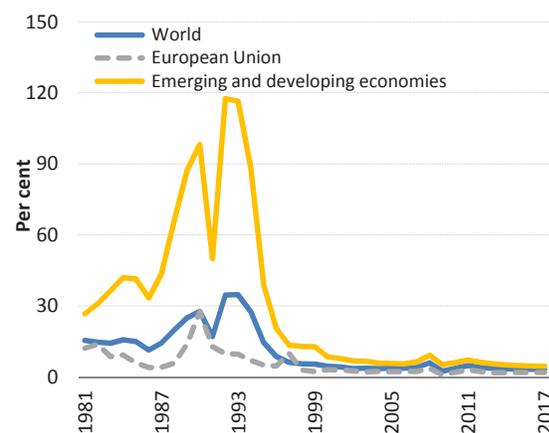
Source: International Monetary Fund, World Economic Outlook Database; Corporate Economics

PART 2

Calgary and Region Economic Outlook
Long-Term Economic Trends 2018-2042

Calgary and Calgary Economic Region (CER)

▶ Economic growth should trend downwards over time in response to slower population growth as this affects the potential rate of consumer markets and the labour force. The population projection shows that the working age population is expected to grow at a relatively slower pace compared to the total population and this should further constrain the rate of growth in consumer spending.

▶ Slower labour force growth acts as a constraint on economic growth. The fastest growing industries over the next 30 years are expected to be wholesale trade (5.0 per cent) and manufacturing (3.8 per cent).

▶ Calgary's population is expected to total 1.626 million in 2042, up from 1.488 million in 2032 and 1.332 million in 2022. The city's population is projected to increase by 505,700 between 2012 and 2042. In the 2012-2042 timeframe, the number of households in Calgary should increase by 227,600.

▶ The long-range projection is based on the assumption that net migration will converge to its long-term average (1976-2012) of 10,000 towards the end of the projection period, after some deviation in the short to medium term.

▶ Household formation is projected to fall continuously over the 2012-2042 period as the population ages. Declining natural increase is expected to constrain the rate of household formation over the period.

▶ The projection shows that Calgary's population would age over time as the baby-boom generation shifts into the older age cohorts and the average age of the population rises. The number of potential retirees (65 plus) outnumbers the number of children (0-14) from 2032 onwards. Consequently, the base case projection shows the overall labour force participation rate trending downwards over time.

Alberta

▶ Like the rest of Canada, Alberta's population is aging. In 2012, there are about 429,000 persons in the 65 and over cohort, accounting for 11 per cent of the total population and by 2042 this cohort will reach 1.14 million in Alberta, representing 21 per cent of the overall population.

▶ Alberta's population growth is expected to decline gradually over time. It is projected that annual population growth should increase to about 65,000 in the medium term, and decelerate to 55,000 by the end of the forecast period. Future population growth would mainly be driven by net migration.

▶ Dependency ratio in Alberta should increase significantly from 42 per cent in 2012 to 66 per cent in 2050.

▶ From now to 2042, most of the growth in conventional oil output is expected to come from OPEC countries, while un-conventional growth will mainly come from non-OPEC countries.

▶ Demand growth for oil will be driven by non-OECD countries. Strong economic growth will drive emerging economies especially Asia to become bigger energy consumers.

▶ Supported by rising world oil prices and increasing demand from developing markets, Alberta oil production should continue to grow from now to 2042 from oil sands, tight oil and natural gas liquids.

▶ With abundant supply weighing on the market, natural gas price may actually stagnate in the near term before picking up in the middle and long run.

▶ Rising production volumes are exceeding pipeline capacity throughout the North American midcontinent. Crude oil pipelines will become the arteries of the energy infrastructure connecting producing regions to refining centers and exporting places.

Canada

▶ The source of Canada's population growth shifted from natural increases to international migration in the 1990s.

▶ Asian countries have replaced Europe and the U.S. to become the main-source regions of international immigrants to Canada since the 1980s.

▶ Total population in Canada should grow at a slower

pace over the next five decades. Total population in Canada is projected to reach 42 million by 2031 and 53 million by 2061[1].

▶ The growth rates of youth (age 0-14) and the working age population (age 15-64) are expected to be much slower than that of older population (age 65+).

▶ Over the next twenty years, the acceleration of baby boomer retirements should sharply increase the old-age dependency ratio (or retiree/worker ratio) in Canada, from 21 per cent in 2011 to 37 per cent in 2031.

U.S.

▶ Total population in the U.S. is projected to grow at a slower pace over the next four decades[2]. Total population in the U.S. should increase to 399 million persons by 2050, a 29 per cent increase from 309 million in 2010.

▶ Over the next four decades, the main source of population growth in the U.S. would shift from natural increase to net international migration.

▶ Population aging in the U.S. is expected to accelerate over the next twenty-five years, as baby boomer attain retirement age.

▶ The slower growth of the working age population relative to the total population implies an increased tax burden on the working age population.

World

▶ The demographic shift in population age distribution across the globe brought about by falling fertility rates and increased longevity poses a significant challenge to policy makers.

▶ As the world becomes older, that is, as the proportion of age-over-64 increases significantly faster than the under 15 age cohort, thus hindering the tax base necessary for the revenue generating scheme which is essential in providing goods and services to the citizens, the strategy of policy makers to manage this phenomena needs to be holistic and thus self-sustaining.

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1   Assuming a total fertility rate of 1.7 births per woman, life expectancies at birth reaching age 84 for male and age 88 for female, and immigration rate at 7.5 per thousand persons.

2   This is based on the U.S. Census Bureau 2009 population projection, constant international migration scenario.

Introduction

Ideally a discussion on the long term economic growth forecast for Calgary should involve a description of how the local economy would grow on average over a specified period of time. This growth rate would represent the maximum production given the technology, human capital, physical capital, and resources that the region is capable of producing without generating inflationary pressures. The forecast would therefore be influenced by the growth rate of the region's factors of production. The lack of adequate information on future investment intentions for physical and human capital and technological change prevents such a discussion. The prime focus of the discussion would therefore centre on demographic change in the city and region.

In a regional economy, population size is positively correlated with the size of the economy: population grows as the economy grows and shrinks as the economy shrinks. A strong local economy creates an equally robust demand for employees and this pushes the local unemployment rate down relative to the national rate. Consequently, a relatively lower unemployment rate makes the city an attractive destination for would be job seekers from outside the region. Positive migration therefore adds to population growth. Population is both the source of consumer demand as well as the source from which the labour force is drawn. Population is therefore a major driver of the supply side of the economy as labour is a key input into the production process. Given the aging of the population and the retirement of the baby boomers from the workforce, it becomes necessary to understand the influence of the baby boom cohort on the future growth rate of the labour force.

The focus of this section of the report would be on the long-term or average growth instead of the short-term[3].

Short- and Long-term Forecast

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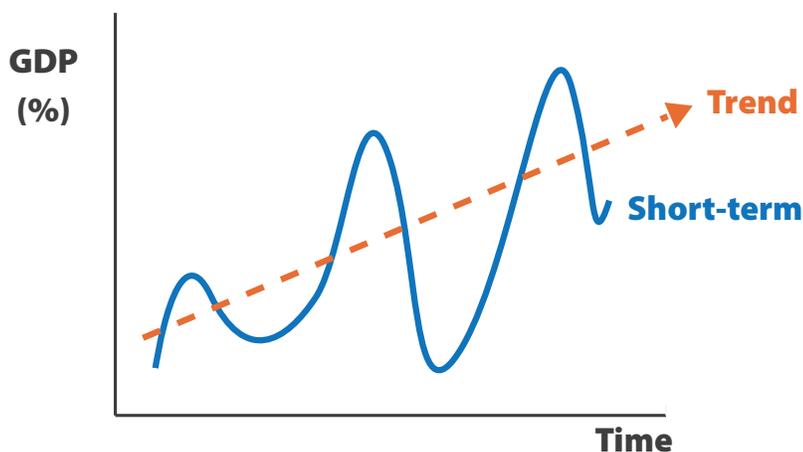
3   At a given time, the actual growth may deviate from the long-term growth rate. The actual growth rate cycles around the long term trend. The difference between the actual growth rate and the long-term rate is referred to as the output gap. In the event of a positive gap, the economy is growing above its potential (much faster than the trend): inflationary pressures build. Inputs costs such as wages and rents are rising and businesses are able to pass on these costs to consumers as higher prices. This is referred to as demand-pull and cost-push inflation. When the economy is operating below its long term path, such as in the recent 2008 / 2009 recession, a negative output gap develops. Growth is below the trend rate. The result is rising unemployment because of a lack of aggregate demand and downward pressure on prices.

Box 1. Drivers Behind Long-term Economic Growth

The total economic activities over a period of time in a country (or region) can be measured by the aggregate output or gross domestic product (GDP) in a national account system. Economic growth is then represented by the growth rate of GDP, which can be decomposed either by income (wages, profits, etc.) or by expenditure (consumption, investment, etc.).

In the long-run, an economy's growth potential will ultimately be determined by factors on the supply side: a country or region's technological growth and improvement in productivity, the growth rates of capital accumulation, and the growth rate of labour inputs. The relationship between the total output and factor inputs can be shown as follows in an aggregate production function, where total output (Y) at some particular point is a function of the economy's stock of capital (K), labour force (L), and total factor productivity (TFP) (A).

$$Y = F(A, K, L)$$

Under the assumptions of constant returns of scale in the production function (which means that if you double both K and L you get double the output) and perfect competition, the growth of output can be decomposed into three parts:

$$g_Y = \beta^* g_A + \alpha^* g_K + (1-\alpha)^* g_L$$

where g_Y, g_K, g_L are the growth rates of output, capital stock and labour inputs, α is the capital's share of total income, and $1-\alpha$ is the labour's share of income. $\beta^* g_A$ captures technological growth and improvement in productivity that are unrelated to changes in factor inputs. In principle, α, g_K, g_L are all observable and can be measured using standard national accounting systems. The term $\beta^* g_A$ however is not directly observable.

Most empirical works show that the labour's share of income accounts for about two thirds of the total income and the capital's share accounts for the remaining one third. As such, growth of labour input is one of the most important drivers behind long-term economic growth. If growth in labour is lower than the desired level, the growth potential in an economy will be constrained. As a result, in the long-term outlook our discussion is focused on demographic changes, which sheds light on the growth of a region's working age population/ labour force and the impact on its long-term economic growth potential.

Calgary and CER

Summary:

▶ Economic growth should trend downwards over time in response to slower population growth as this affects the potential rate of consumer markets and the labour force. The population projection shows that the working age population is expected to grow at a relatively slower pace compared to the total population and this should further constrain the rate of growth in consumer spending.

▶ Slower Labour force growth acts as a constraint on economic growth. The fastest growing industries over the next 30 years are expected to be wholesale trade (5.0 per cent) and manufacturing (3.8 per cent).

▶ Calgary's population is expected to total 1.626 million in 2042, up from 1.488 million in 2032 and 1.332 million in 2022. The city's population is projected to increase by 505,700 between 2012 and 2042. In the 2012-2042 timeframe, the number of households in Calgary should increase by 227,600.

▶ The long-range projection is based on the assumption that net migration will converge to its long-term average (1976-2012) of 10,000 towards the end of the projection period, after some deviation in the short to medium term.

▶ Household formation is projected to fall continuously over the 2012-2042 period as the population ages. Declining natural increase is expected to constrain the rate of household formation over the period.

▶ The projection shows that Calgary's population would age over time as the baby-boom generation shifts into the older age cohorts and the average age of the population rises. The number of potential retirees (65 plus) outnumbers the number of children (0-14) from 2032 onwards. Consequently, the base case projection shows the overall labour force participation rate trending downwards over time.

Population

Calgary's population is expected to total 1.625 million in 2042, up from 1.467 million in 2032 and 1.292 million in 2022. The city's population is projected to increase by 505,700 between 2012 and 2042. In the 2012-2042 timeframe, the number of households in Calgary should increase by 227,600. The average household size is expected to trend downwards over time falling from 2.6 persons in 2012 to 2.4 persons by 2042.

Population Distribution - City of Calgary

Age groups	2012	Dist %	2022	Dist %	2032	Dist %	2042	Dist %
Age 0 to 14	205,900	18.4	257,300	19.3	252,800	17.0	269,200	16.6
Age 15 to 24	138,300	12.3	146,900	11.0	188,700	12.7	187,800	11.6
Age 25 to 34	189,900	17.0	169,700	12.7	173,100	11.6	215,500	13.3
Age 35 to 44	180,300	16.1	222,200	16.7	194,900	13.1	199,700	12.3
Age 45 to 54	171,900	15.3	198,100	14.9	234,600	15.8	208,600	12.8
Age 55 to 64	124,100	11.1	170,100	12.8	193,700	13.0	228,900	14.1
Age 65+	109,800	9.8	167,300	12.6	250,000	16.8	316,200	19.4
Total Population	1,120,200	100.0	1,331,600	100.0	1,487,800	100.0	1,625,900	100.0

Calgary and CER

Dependency Ratio	2012	2022	2032	2042
0-14 to 15-64	25.6%	28.4%	25.7%	25.9%
65+ to 15-64	13.6%	18.4%	25.4%	30.4%
Total Dependency	39.2%	46.8%	51.0%	56.3%
Labour Replacement Ratio	1.114	0.864	0.974	0.820

A comparison of the population in the individual cohorts in 2012 against the same groups in 2042 shows that significant growth should occur in the 55-64 (104,800 persons), and the 65 and over (206,400 persons) age groups. For example, the 65 and over population should grow from 109,800 in 2012 to 316,200 by 2042. The population 65 and over (316,200) would exceed the population 0-14 (269,200) by 2042. In other words, the number of potential retirees (65+) outnumbers the number of children (0-14) by 2042. The 65 and over dependency rate is projected to grow from 13.6 per cent in 2012 to 30.4 per cent by 2042. This implies that the population 65 and over is growing at a relatively faster rate than the population between 15-64.

Calgary population change (2012-2042)
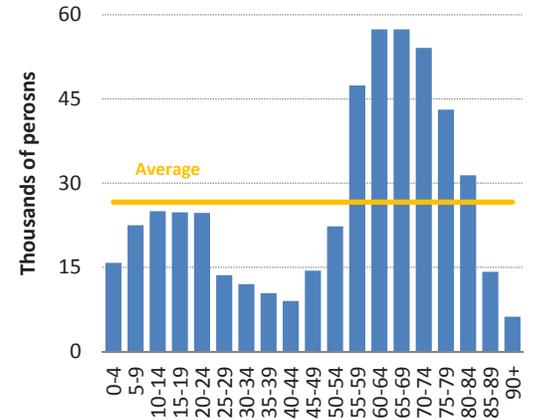
Source: Civic Census; Corporate Economics

City of Calgary: 65+ dependency ratio (2012-2042)
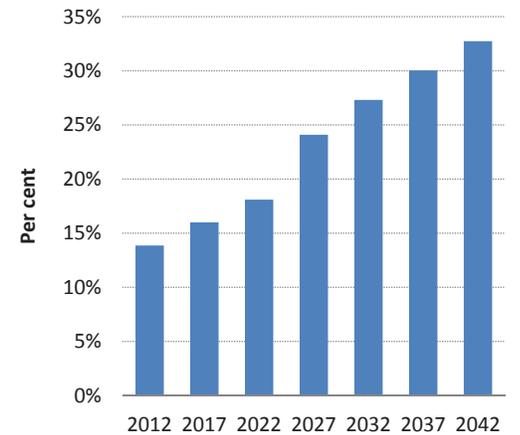
Source: Civic Census; Corporate Economics

City of Calgary: Population distribution (2042)
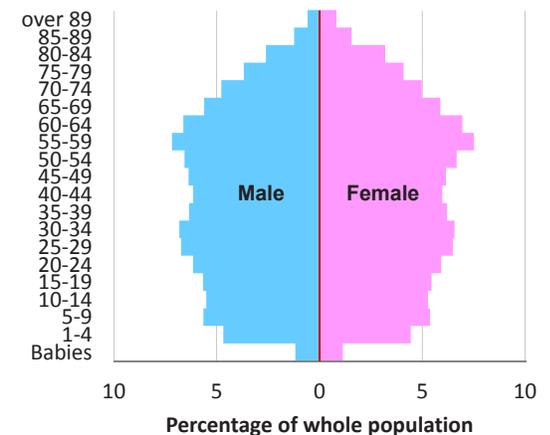
Source: Civic Census; Corporate Economics

City of Calgary: Population source of growth
(1976-2012)

Source: Civic Census; Corporate Economics

City of Calgary: Sources of population growth
(2012-2042)

Source: Statistics Canada; Corporate Economics

City of Calgary: Births, deaths and natural increase
(2012-2042)

Source: Statistics Canada; Corporate Economics

The sources of population growth are net migration and natural increase. Net migration is defined as the difference between in and out migration and natural increase is the difference between births and deaths. Historic data on population growth for Calgary shows that net migration is relatively unstable over time when compared to natural increase.

Net migration fluctuated between a high of 25,557 and a low of -11,295 over the 1976 to 2012 period. The mean for net migration for the 1976 to 2012 period was estimated at 9,861. Natural increase, on the other hand, fluctuated between 5,171 and 10,552 during this period and had a mean of 8,143. The volatility in net migration is explained by economic and employment changes. Natural increase is relatively stable because it is influenced by the size and age distribution of the population.

The long-range projection is based on the assumption that net migration would converge to its long-term average (1976-2012) of 10,000 towards the end of the projection period after some deviation in the short to medium term. Natural increase is calculated by assuming that the birth and death rates remain constant at their 2012 values. The projection results show that natural increase would trend downwards over time as deaths grow at a faster rate than births. The number of births per 1,000 persons is expected to decline steadily over the next fifteen year before reversing direction. The reversal comes as the local community benefits from net migration. Migrants tend to be young and are in the family formation years. Net migration grows in importance as a source of population growth over time.
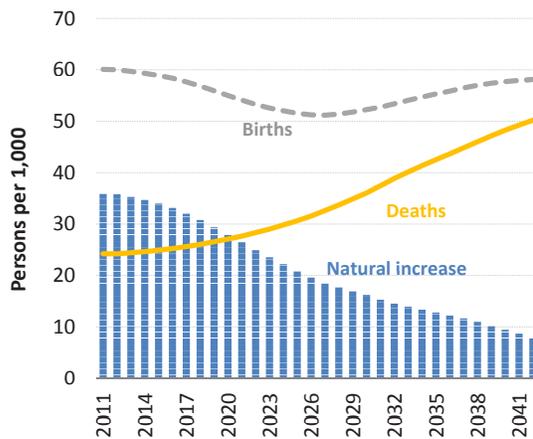
Household formation is projected to fall continuously over the 2012-2042 period as the population ages. Declining natural increase is expected to constrain the rate of household formation in this period. A declining rate of household formation should therefore reduce the need for net new residential space over time and depress the number of housing starts that are required to satisfy population growth.

The projection shows the overall labour force participation rate would trend downwards over time[4]. The projection is based on the assumption that the participation rate for a given age group would remain constant throughout the forecast period. The change in the aggregate participation rate is explained by the shifts in the population's age distribution. The population projections show that Calgary's population is aging and consequently, lower labour force participation can be expected, assuming that past behaviour holds. This method for computing the labour force participation rate tends to exaggerate the effects of aging on the labour force. Individuals participate in the labour force for a number of reasons besides age. Public policy and labour market changes may mitigate the trend towards declining labour force participation rates. For example, the Canadian Government has enacted rules to increase the contribution age for the Canadian Pension Plan from 65 to 70. In addition, lower unemployment rates would lead to higher wage inflation rates and this would increase older workers attachment to the labour force.

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4   The labour force refers to the civilian non-institutional population 15 years of age and older who are employed or unemployed. The labour force participation rate is defined as the labour force divided by the population that is fifteen years and older. The aggregate labour force participation rate for Calgary is computed as a weighted average for the population the population that is 15 year and over.

City of Calgary: Household formation (2012-2042)
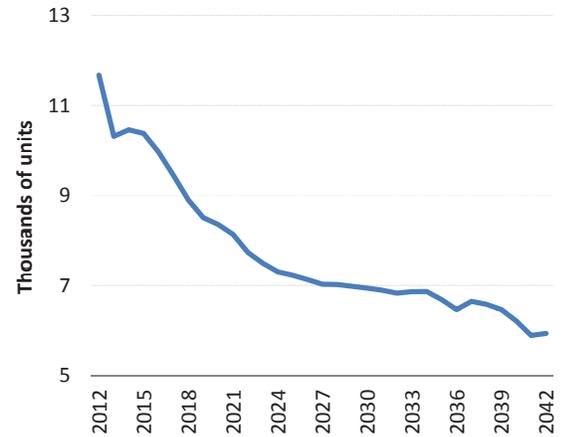
Source: Civic Census; Corporate Economics

City of Calgary: Labour force participation rate (2012-2042)
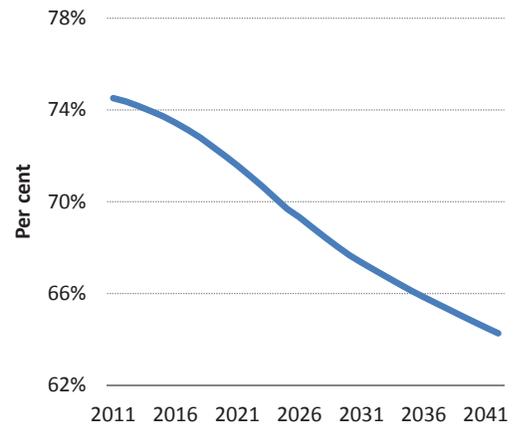
Source: Statistics Canada; Corporate Economics

Calgary: Labour force participation rate by age (2012)
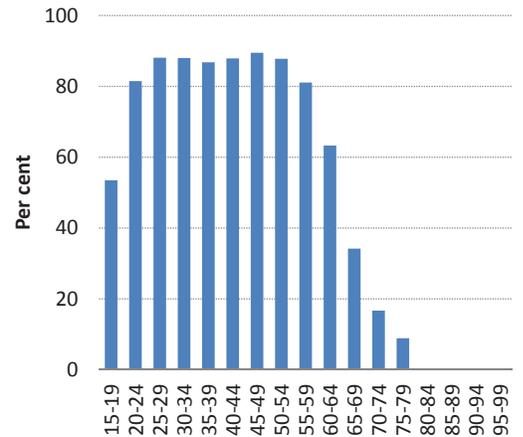
Source: Civic Census; Statistics Canada; Corporate Economics

City of Calgary: Labour force replacement ratio age 15-24 / age 55-64 (2012-2042)
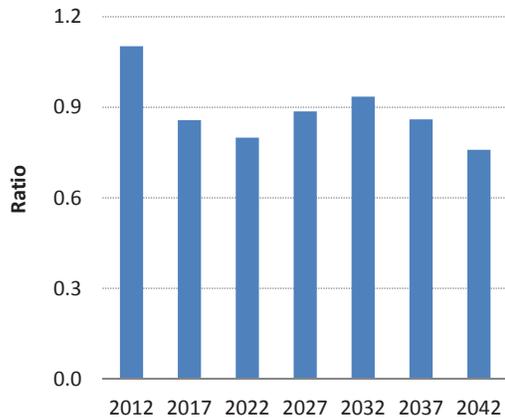
Source: Statistics Canada; Corporate Economics

The labour force replacement ratio is the ratio of individuals in the 15 to 24 cohort relative to individuals in the 55 to 64 group. The 15 to 24 cohort approximates individuals who are likely to enter the labour market for the first time and the 55 to 64 cohort represents individuals who are likely to depart from the workforce. The ratio shows how many entry level workers are available to replace a potential retiree. The projections show the replacement ratio should trend downwards over time. This indicates that it is likely become harder to recruit young workers to replace the potential retirees.

City of Calgary: Population growth (2012-2042)
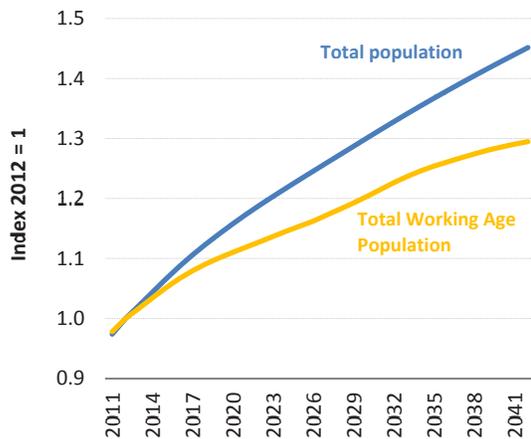
Source: Statistics Canada; Corporate Economics

City of Calgary: Growth of working age population (2012-2042)
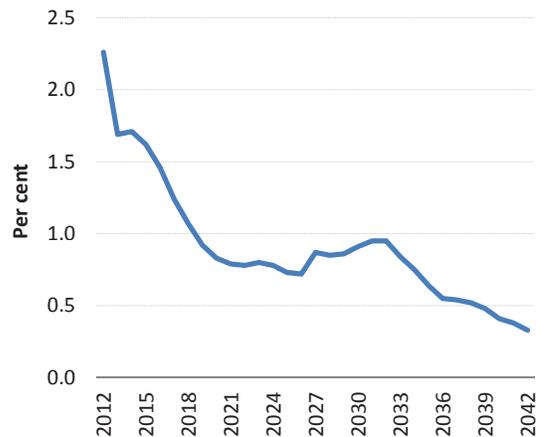
Source: Statistics Canada; Corporate Economics

Box 2. The Calgary Employee Gap

It's too late to increase the labour force with natural growth and, given Calgary's young population and the fact that everywhere else will experience tightening labour markets over the forecast horizon, it is unrealistic to expect net migration to Calgary to be big enough to solve this problem. Other authors, like David Foot, author of Boom Bust and Echo, have addressed this problem by saying we will get the migrants because we need them. We are not convinced. For other reasons it appears that some nations are starting to delay the age that retirement is allowed. Computer simulations were run to estimate the likely outcome on the Calgary economy of extending the retirement age to increase the labour force and compare it to the outlook should the retirement age remain at the current 65 years old.

In the base case scenario, we assume the retirement age remains at the current 65. In this scenario our model indicates looming labour shortages affecting some industries first. By the end of the forecast the entire Calgary economy is plagued by labour shortages with employers seeking to find staff for 145,000 new positions. Some of those would be filled by commuters from surrounding towns; even so, this scenario includes reduced output and large wage increases which, in turn, drive up the overall price level in Calgary. For example, Calgary house prices would rise significantly. These results are expected. The labour shortage would be resolved by employers and employees bidding up wages. These higher wages would translate into higher prices for goods and services as labour is key input in the production process. Also on the demand side, higher wages would drive competition for limited supplies of goods and services and cause prices to increase.

In our alternative scenario the retirement age is increased every time the unemployment rate drops below 4 per cent in Calgary. The labour force within Calgary is thus increased by extending the working life of existing Calgarians. Successive retirement age increases would be required to maintain the unemployment rate but in 2039 the model indicates the retirement age would stabilize somewhat higher than where it is currently. Over the course of the forecast the model indicates annual inflation in Calgary would not rises above 2 per cent and neither would wages. House prices would be expected to remain at their inflation adjusted current levels across the region and young families would be able to make a good home both within Calgary and nearby.

The conditions that are simulated in the base case for Calgary are representative for all communities across Canada and the developed industrial world. The continued retirement of the baby boomers from the work force will significantly constrain the growth of the labour force and keep the unemployment rate at low levels. A possible alternative would be to relax the mandatory retirement age to increase the labour supply.

Calgary Alternate Work Force Scenarios (2000-2045)
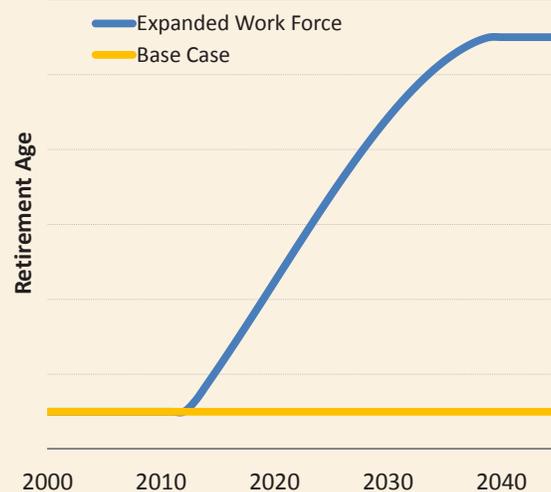
Source: Corporate Economics

CER: Economic growth rate (2012-2042)
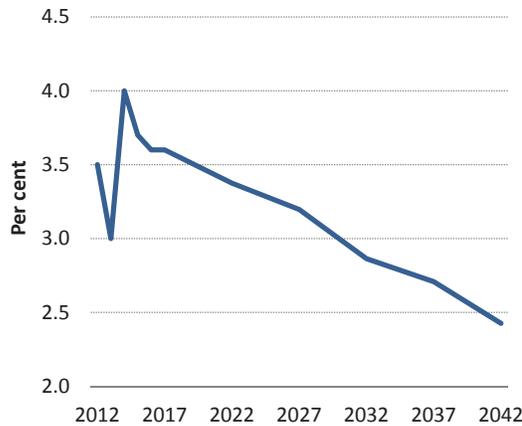
Source: Statistics Canada; Corporate Economics

Output

Economic growth should trend downwards over time in response to slower population growth as this affects the potential growth rate of consumer markets and the labour force. The population projection shows that the working age population is expected to grow at a relatively slower pace compared to the total population, which should further constrain the rate of growth in consumer spending. Also, growth in the working age population has a direct effect on the growth rate of the labour force and therefore acts as a constraint on the rate of job creation. Businesses ability to invest and hire is limited by the availability of labour. Investment in labour saving technologies may act as an offset to slower population growth.

Box 3. The Calgary Economic Region (CER) Model: A Synthesis

Output
Share of output across industries

Aggregate Expenditure:
Private Household Consumption, Gross Private Ivestment, Government Spending, Net Exports

Employment
Capital and Labour
Wages, Interest Rates, Profits, Rents
Income

Labour
Labour Force, Participation Rate, Unemployment

Housing
Housing Starts, Housing Stock, House Prices

Population
Net Migration, Births and Deaths

A summarized schematic economic flow of regional activities.

An econometric model was used to guide parts of the discussion on the Calgary economy. This model provides information on employment across 17 industries unemployment rate, participation rate, consumer price index, gross domestic product across 17 industries, retail sales, new housing prices, average house prices, housing starts (single and multiple), wages across industries, new house price index, non-residential construction price index, residential and non-residential assessments, building permit values for residential and non-residential, net migration, births, deaths and population. The model allows us to perform 'what if' scenario's and generate forecasts for the economic and demographic indicators above.

Alberta being one of a number of places in the world endowed with natural resources like: bitumen, natural gas and crude oil. These commodities are essential in any production process. Prices for these commodities are established by world markets and are therefore very sensitive to consumption and supply shifts across the globe.

The CER model is designed to capture the impact of changes in investment, oil prices, or gas prices and other external variables on the Calgary Economic Region (CER). The investment component is a function of an industry profit gap proxy (using the difference between lagged capital labour ratio and its long run potential), and changes in natural gas

and oil prices. The main driver of employment by industry is the investment by industry. The labour force is estimated as a function of net migration and relative unemployment rate and the past labour force. The housing block estimates have as a key ingredient the labour force variable; a proxy for capturing the population impact. The figure on the right is an attempt to highlight or convey the embedded nature of a regional economy as a major building block, like a nucleus or nuclei for any national economy.
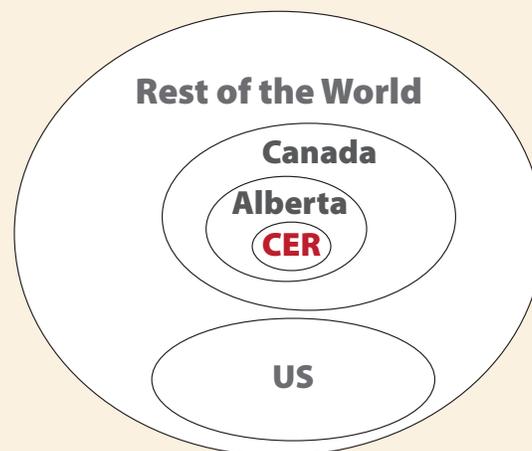
Output by Industry

Total output is expected to grow at an average annual rate of 3.1 per cent over the 2012-2042 period. Economic growth is forecasted to trend downwards over time and slower labour force growth acts as a limit on economic growth. The fastest growing industries over the next 30 years are expected to be wholesale trade (5.0 per cent) and manufacturing (3.8 per cent). Manufacturing is linked to other industries and an increase in manufacturing activity would create a greater need for warehousing and transportation services. Manufactured goods need to be moved to the consumer or warehoused and this creates a need for transportation and warehouse facilities and personnel. The GDP growth in manufacturing is also captured by strong growth in the construction industry, which is an off shoot of capacity enhancement and increased employment in the manufacturing sector. Increased construction activity also generates the need for increased services in the finance, insurance and real estate services industry which has shown an average GDP growth of 3.1 per cent annually.

Employment by Industry

Total employment is expected to grow by 1.3 per cent annually over the 2012-2042 period. Employment growth rate is expected to decelerate over time in response to relatively slow labour force growth[5].

Given that Alberta is an energy exporting province and most offices for the energy sector are headquartered in Calgary, it is appropriate to discuss the mining, oil and gas (MOG) industry. The majority of the investment in Alberta is attributed to the MOG industry, and though real GDP growth rate remains above 2 per cent per year on average for the forecast period (2012-2042), the forecast shows a decline in the employment numbers going forward. The fall of employment in this industry is also reflected in a decline in the professional, scientific and technical services (PSTS) industries, which provides essential services as a significant supporting cast to the MOG industry, both in the short time and long term horizon. The average GDP growth rate for PSTS over the long term forecast is about 2 per cent per year.

Fishing, Forestry, Hunting and Agriculture (FFHA) industry is forecasted to grow at 1.2 per cent annually over the 2012-2042 period. Though, we observe slowing growth in employment in this sector, output per worker is forecasted to improve over the forecast horizon. In previous years, the competition for workers between the FFHA and other industries resulted in continuous migration of workers from farms to more urbanized areas, and this created the need for improved productivity in agriculture[6].

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5   To prevent the employment growth rate from peaking or losing momentum, improvement in participation rates is one essential way to forestall the inevitable. This may come from a combination of public policy and labour market adjustments. Higher wages may entice workers to remain or re-enter the work force and thus increase the supply of labour above the baseline.

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6   This has clearly been answered via genetically modified crops and several other means.

Alberta Economy

Summary:

▶ Like the rest of Canada, Alberta's population is aging. In 2012, there are about 429,000 persons in the 65 and over cohort, accounting for 11 per cent of the total population and by 2042 this cohort will reach 1.14 million in Alberta, representing 21 per cent of the overall population.

▶ Alberta's population growth is expected to decline gradually over time. It is projected that annual population growth should increase to about 65,000 in the medium term, and decelerate to 55,000 by the end of the forecast period. Future population growth would mainly be driven by net migration.

▶ Dependency ratio in Alberta should increase significantly from 42 per cent in 2012 to 66 per cent in 2050.

▶ From now to 2042, most of the growth in conventional oil output is expected to come from OPEC countries, while un-conventional growth will mainly come from non-OPEC countries.

▶ Demand growth for oil will be driven by non-OECD countries. Strong economic growth will drive emerging economies especially Asia to become bigger energy consumers.

▶ Supported by rising world oil prices and increasing demand from developing markets, Alberta oil production should continue to grow from now to 2042 from oil sands, tight oil and natural gas liquids.

▶ With abundant supply weighing on the market, natural gas price may actually stagnate in the near term before picking up in the middle and long run.

▶ Rising production volumes are exceeding pipeline capacity throughout the North American midcontinent. Crude oil pipelines will become the arteries of the energy infrastructure connecting producing regions to refining centers and exporting places.

Aging Population

Like the rest of Canada, Alberta's population is aging. In 2012, there are about 429,000 persons in the 65 and over cohort, accounting for 11 per cent of the total population; and by 2042 this cohort will reach 1.14 million, representing 21 per cent of the population. The 65 and above cohort will more than double its size over the next thirty years- about one in five Albertans will be over 65 years. By 2042, retirees will outnumber children as the 65 and older cohort will outnumber the 0 to 14 cohort. In the mean time, the share of youth aged 15 to 34 would shrink significantly, from

close to 30 per cent of the total population in 2012 to less than 24 per cent in 2042. The changes in the age distribution would fundamentally shift the shape of Alberta's population pyramid.

The aging population will have profound and lasting economic and social implications for Alberta. The government will face challenges from the changing demand for housing, health care, transportation and infrastructure services. In addition, slower population and labour force growth will reduce the province's potential growth over time. An aging population will also affect the way goods and services are produced and consumed in the private sector.

Alberta Population Growth

Alberta's population growth is expected to decline gradually over time. It is projected that the annual population growth should increase to about 65,000 in the medium term and decelerate to 55,000 by the end of the forecast period. Future population growth is anticipated to be mainly driven by net migration. Investment in the energy sector in Alberta would continue to create jobs and attract people from other provinces and countries. Natural increase will decelerate due to lower fertility rates, but it will stay positive over the forecast period. However, net migration levels will not be high enough to reverse the trend of slower population growth.

Working Age Population

The working age population in Alberta will grow at a relatively slower rate than total population over time. In 2012, the percentage of working age population is estimated to be above 70 per cent of the total population. With the aging problem, decreasing fertility rate, and moderate in-migration, this ratio should continue on the downward trend, reaching slightly higher than 60 per cent by the end of the forecast period. The direct impact will be a labour shortage in the province. With fewer working age individuals in the labour market, employers will have to pay higher wages to attract labour. This will result in higher production costs across the province. As a result, businesses would have to invest more heavily in technology to improve overall productivity. At the same time, the increase in the total dependency rate implies a faster growth in expenditures relative to revenues. With increasing demand for services, the government is going to face serious fiscal challenges keeping the taxation burden low on the working age population.

Alberta Dependency Ratios

The dependency rate is defined as the sum of children (0-14) and the elderly (65+) relative to the working age population (15-65). This ratio in Alberta should increase significantly from 42 per cent in 2012 to 66 per cent in 2050,mainly due to the increasing number of retirees. The

Alberta Population Pyramid: 2012
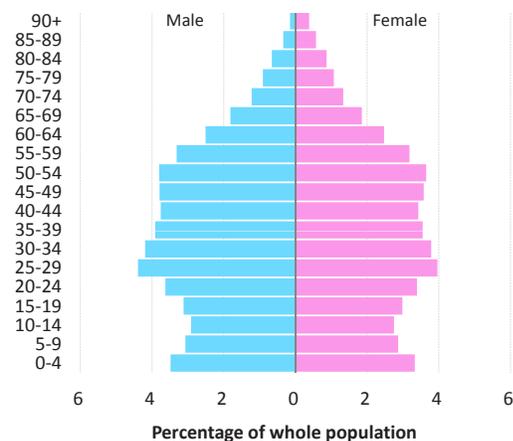
Source: Government of Alberta; Corporate Economics

Alberta Population Pyramid: 2042
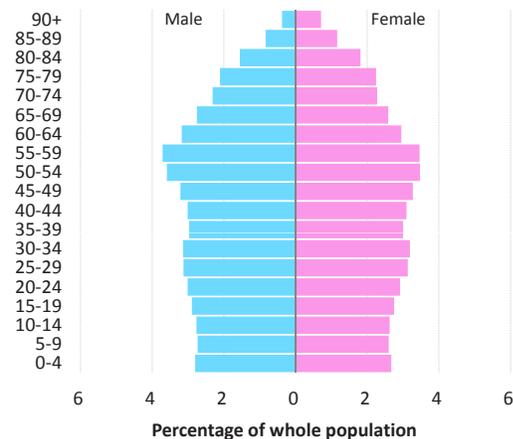
Source: Government of Alberta; Corporate Economics

Alberta Population Growth (2011 - 2042)
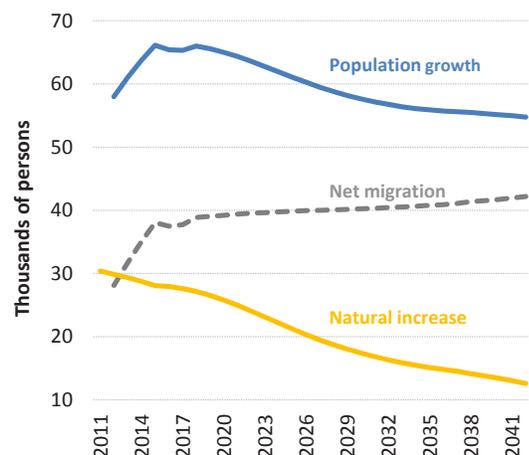
Source: Government of Alberta; Corporate Economics

Alberta Working Age Population (2012-2050)
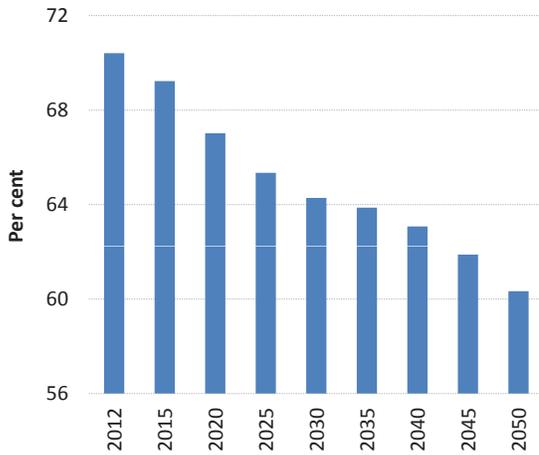
Source: Government of Alberta; Corporate Economics

Alberta Dependency Ratios (2012-2050)
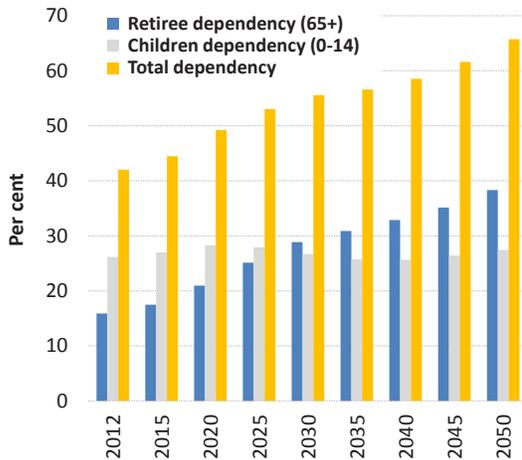
Source: Government of Alberta; Corporate Economics

World Crude Oil Supply (1990-2042)
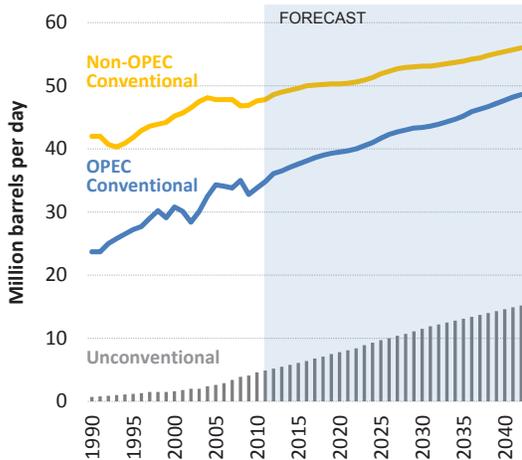
Source: U.S. Energy Information Administration

retiree dependency (ratio of elderly aged 65 and above to the working age population) is 16 per cent in 2012. It will be more than double by the end of forecast period, reaching 35 per cent in 2042. Child dependency (the ratio of children aged 0-14 to the working age population) will not change much. It will remain around 26 per cent for the forecast period.

The major challenge from an aging population is the potential impact on demand for health care and other services provided by the government. With a lower share of working people to support more retirees, the government may need to rely less on personal income taxes and more on other source revenues.

Crude Oil

Global Supply Trend:

World oil production is expected to continue increasing to meet the growth in consumption, though the sources of growth will change. Conventional oil production should still account for most of the global supply, while unconventional production will grow at a much faster pace over the forecast period. From now to 2042, most of the growth in conventional oil output would be from OPEC countries, which control the majority of the world's remaining recoverable resources.

Non-OPEC conventional supply will continue to rise, albeit modestly. Unconventional supplies will come from oil sands, biofuels, extra-heavy oil, coal-to-liquids, gas-to-liquids, deep-water extraction, and shale oil. World production of unconventional liquids in 2011 totalled 4.9 million barrels per day or about 5.6 per cent of total world liquids production. By 2042 this should increase to 15.2 million barrels per day and account for 12.7 per cent of total world liquids production. Oil sands in Alberta should continue to be an important source of world oil supply.

Global Demand Trend:

Growth in demand for oil will be driven by non-OECD countries. Strong economic growth will drive emerging economies, especially Asia, to become bigger energy consumers. Demand in the Middle East will also increase due to access to ample and relatively inexpensive domestic resources.

Oil demand in OECD regions generally grows more slowly over the next 30 years, reflecting marginally growing or declining populations and relatively low economic growth as compared with non-OECD nations. In addition, higher fuel efficiency and new transportation technologies will also slow growth of oil consumption. China will remain a key component of oil demand growth, but it is also likely to slow. Growth in China is expected to remain concentrated in the industrial and transportation sectors through 2020. Industrial growth slows post-2020 as industrial expansion becomes

less energy-intensive and population growth slows. Transportation will then be the dominant growth driver.

Impact on Alberta Market

U.S. crude oil production has increased over the past few years, reversing a declining trend that began in 1986. Over the next 10 years, continued development of tight oil in combination with the ongoing development of offshore resources, would push U.S. crude oil production from 5.1 million barrels per day in 2007 to 6.7 million barrels per day in 2020. After that, U.S. crude oil production is projected to decline slightly due to a slowdown in enhanced oil recovery production and remain above 6.1 million barrels per day through 2042. With modest economic and population growth, increased efficiency, growing domestic production, and continued adoption of nonpetroleum liquids, the import demand for Canadian crude oil from the U.S. will slow over the forecast period. Supported by rising world oil prices and increasing demand from developing markets, Alberta oil production should continue to grow from now to 2042, from oil sands, tight oil and natural gas liquids.

Rising production volumes are exceeding pipeline capacity throughout the North American midcontinent. Crude oil pipelines will become the arteries of the energy infrastructure connecting producing regions to refining centers and exporting places. In the future, the construction of several key pipelines should impact energy output in Alberta, including the Keystone XL Pipeline (Alberta to Cushing), and the Trans Mountain Pipeline and the Northern Gateway Pipelines (Alberta to B.C.). However, it should be kept in mind that political obstacles could put uncertainties on pipeline and other infrastructure construction.

Natural Gas

Long-term Demand

With abundant supply weighing on the market, natural gas price may actually stagnate for a while in the near term, before picking up in the middle and long run. Use of natural gas for electric power generation should rise significantly over the long-term. New environmental rules and regulations should accelerate coal plant retirements in favour of natural gas-fired power generation. With natural gas prices staying competitive, residential and commercial demand for natural gas should also increase due to fuel switching from heating oil to gas.

Over the long run, energy-intensive industries should be a direct beneficiary of low natural gas prices and create more industrial demand. The significant price difference should encourage LNG exports to Europe, South America, and especially Asia, where strong demand continues to grow. In the long run, natural gas vehicles could provide a strong boost to gas demand, driven first by the conversion of fleet vehicles.

World Crude oil Demand
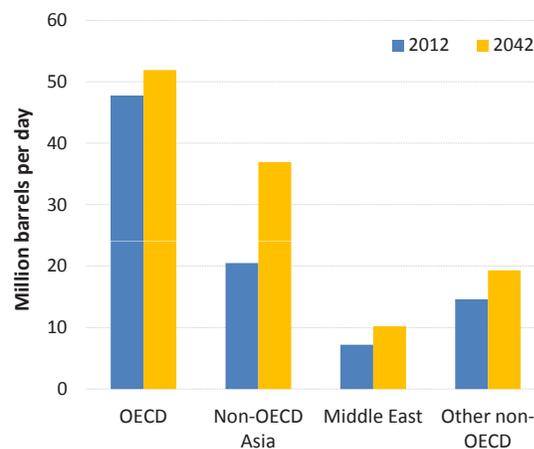
Source: U.S. Energy Information Administration; Corporate Economics

U.S. Oil Demand and Supply (1970-2042)
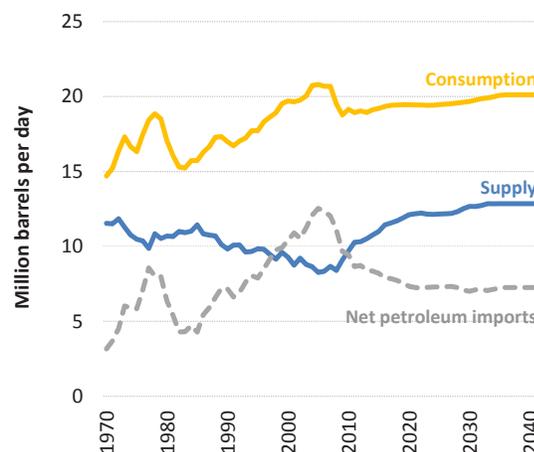
Source: U.S. Energy Information Administration; Corporate Economics

Total Liquids Production: U.S. and Canada
(2005-2042)
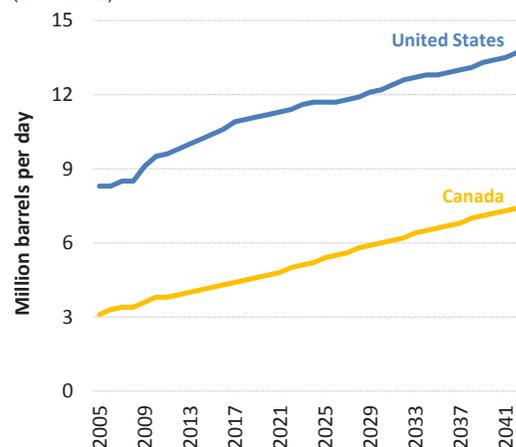
Source: U.S. Energy Information Administration; Corporate Economics

Natural Gas Demand (2012-2042)

Source: U.S. Energy Information Administration; Corporate Economics

Natural Gas Supply in North America (2012-2042)
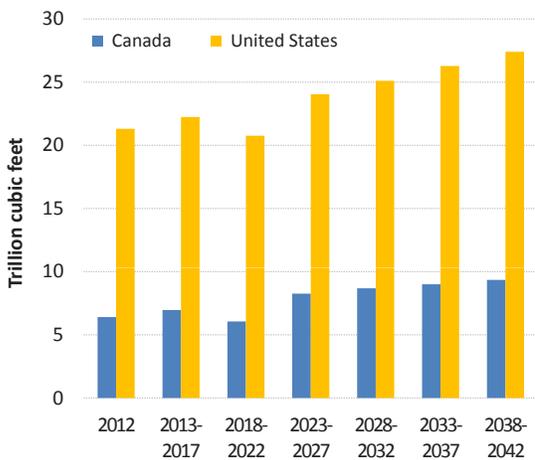
Source: U.S. Energy Information Administration; Corporate Economics

Energy Products Exports from Canada: Annual Growth

Source: Conference Board of Canada; Statistics Canada; Corporate Economics

Supply in North America

The largest production increases from now to 2042 are projected for North America, Middle East, and non-OECD Asia. In the U.S. and Canada, advances in the application of horizontal drilling and hydraulic fracturing technologies have made it possible to develop vast shale gas resources and more than offset declines in conventional production. Strong U.S. natural gas production growth has replaced the Canadian gas imports to the U.S. With the shale gas boom in the U.S. stranding gas supply in Canada, as well as Canada's own shale gas discoveries at the Horn River and Montney shales in northeast British Columbia and western Alberta, Western Canada should see an oversupply of natural gas and therefore depressed prices at both AECO and Henry Hub into the mid of the decade. Beyond that, production growth in Alberta should track the growth of LNG exports, tightening supply-demand balance in the U.S., and domestic demand increases particularly with oil-sands processing being a growth driver.

Energy Trade

Although natural gas production is expected to increase over the long term, exports should decrease due to excess supply in the U.S. Domestic demand will play a more important role and increase at a faster rate in Canada. Booming oil sands production should increase export capacity for crude oil. In the decade between 2006 and 2015, crude oil exports are expected to grow at 4.8 per cent annually. Beyond that, the growth rate should slow, rising slightly above 2 per cent until 2042. The environmental debate over oil sands production will continue to be a concern over the longterm. The available pipeline capacity should also constrain the development and exports of Canadian energy products. Overall, as the most energy abundant province in Canada, Alberta has great potential for satisfying Canadian and North American energy needs over the long term and will become a more important player in global energy markets.
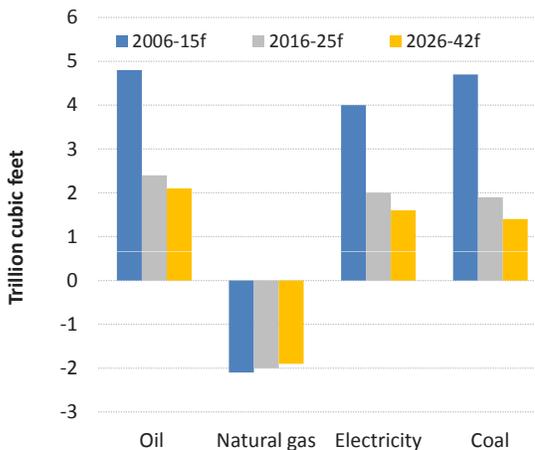
Box 4. Alternative Energy Sources

The rising price of oil and concerns for the environment continue to promote the search for alternate fuels, particularly for power generation. Most alternative energy sources come from renewable energy, which becomes the fastest growing source in the global energy market. Renewable energy sources (the U.S. Energy Information Administration, International Energy Outlook 2011) include: (1) solar energy from the sun, which can be turned into electricity and heat; (2) wind for mechanical power and electrical power; (3) geothermal energy from heat inside the Earth; (4) bio-fuels from plants, which includes firewood from trees, ethanol from corn, and biodiesel from vegetable oil; (5) hydropower from hydro turbines at a dam.

Renewable energy sources have positive environmental and energy security attributes compared with fossil fuels. Although most renewable technologies are not yet cost effective enough to compete with conventional fuels without government subsidies, it is possible in the future that renovation and reduction in production costs could bring down the price of renewable energy. Even under current technologies, renewable energy has a cost advantage in certain regions where electricity prices are especially high, where peak load pricing occurs, or where government incentives are available.

According to the U.S. EIA, renewable energy will show rapid growth in global electricity generation. The amount of global hydroelectric and other renewable electric generating capacity will rise 2.7 per cent per year through 2035, more than any other electricity generating source. In the forecast period, non-OECD countries should be the predominant source of renewable electricity growth. In most of the OECD countries, with the exception of Canada and Turkey, hydroelectric resources that are both economical to develop and also meet environmental regulation policies have already been exploited. As a result, most renewable energy growth in OECD nations should come from non-hydro sources, especially wind and biomass. Strong growth in hydroelectric generation is expected in China, India, Brazil, and several Southeast Asian countries.

Compared to other OECD economies, Canada has substantial renewable resources that can be used to produce energy. Natural Resources Canada estimates that renewable energy currently provides about 16 per cent of Canada's total primary energy supply. Hydroelectricity is by far the most important form of renewable energy produced in Canada. Bio-energy also makes an important contribution to Canada's energy mix. Several emerging resources, such as wind and solar power, are making much smaller contributions but are experiencing high growth rates.

Nuclear power generation will also contribute to global energy supply. Many nations have been working on developing nuclear power to diversify the fuel mix and reduce environmental pollution. Nuclear power has the comparative advantage in greenhouse gas emissions over fossil fuels. However, it produces radioactive waste that needs longterm management plans. Implementing timely nuclear waste disposal strategies will reduce uncertainties in the nuclear fuel cycle. With international cooperation on the implementation, nuclear energy should remain an important component of the world's power sources.

Alberta is not only rich in conventional energy, but also has great potential in developing renewable energy, including wind energy, solar photovoltaic energy, enhanced geothermal energy, bio-fuels and bio-refineries. Alberta is fortunate within the global context to have expertise with fossil fuel industries and in petrochemical processing, which can be used to develop new renewable opportunities in the future.

World Energy Consumption

2012

Nuclear 30.0
Renewables 60.6
Natural gas 120.1
Liquids 180.2
Coal 151.5

Units: Quadrillion BTU

2042

Nuclear 56.0
Renewables 120.3
Natural gas 191.2
Liquids 238.8
Coal 229.4

Units: Quadrillion BTU

Source: U.S. Energy Information Administration; Corporate Economics

Population growth by age trend in Canada (1971-2011)

Source: Statistics Canada; Corporate Economics

Components of population growth in Canada (1971-2010)

Source: Statistics Canada; Corporate Economics

Source region of immigrant to Canada (1971-2011)

Source: Statistics Canada; Corporate Economics

Canadian Economy

Summary

▶ The source of Canada's population growth shifted from natural increases to international migration in the 1990s.

▶ Asian countries have replaced Europe and the U.S. to become the main-source regions of international immigrants to Canada since the 1980s.

▶ Total population in Canada should grow at a slower pace over the next five decades. Total population in Canada is projected to reach 42 million by 2031 and 53 million by 2061.

▶ The growth rates of youth (age 0-14) and the working age population (age 15-64) are expected to be much slower than that of older population (age 65+).

▶ Over the next twenty years, the acceleration of baby boomer retirements should sharply increase the old-age dependency ratio (or retiree/worker ratio) in Canada, from 21 per cent in 2011 to 37 per cent in 2031.

1. Demographic trend in Canada (1971-2011)

Over the past four decades, the population in Canada grew moderately in response to declining fertility rates. Change in the demographic structure was driven by two factors: below replacement level fertility rates since the 1970s, and longer life expectancy as a result of improvements in health care. The 2011 Federal Census shows that Canada had a total population of 34 million, an 11 per cent increase from 2001 with 16 per cent of the population aged 0-14 and 14 per cent aged 65 and above[7]. This is in sharp contrast with the country's demographic picture in 1971, when 29 per cent of Canada's population were youth (age 0-14) and only 8 per cent were 65 and over.

The source of Canada's population growth shifted from natural increases to international migration in the 1990s. Natural increase (births minus deaths) was the main source of Canada's population growth in the 1970s and 1980s, accounting for a share of total growth between 56 and 79 per cent. Since the 1990s, international migration has increased in importance as a source of population growth in Canada. In 2010, a quarter of a million immigrants accounted for 63 per cent of the country's population growth. A big challenge for the federal government is to keep population and labour force growth by attracting immigrants, especially skilled workers from other countries which are also facing aging population problems.

Asian countries have replaced Europe and the U.S. to become the main

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7   Canada remains one of the youngest countries among the G8 group. Japan has the highest percentage (22%) of older population (age 65+) in the world.
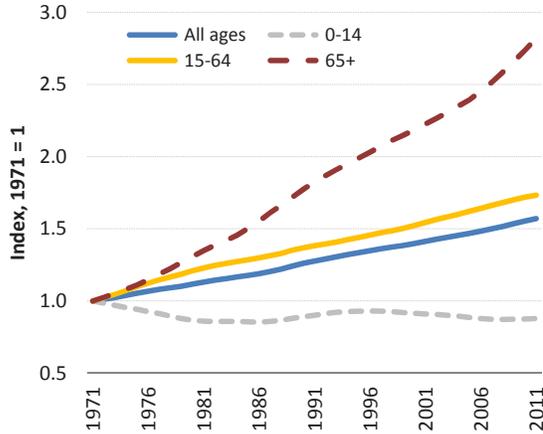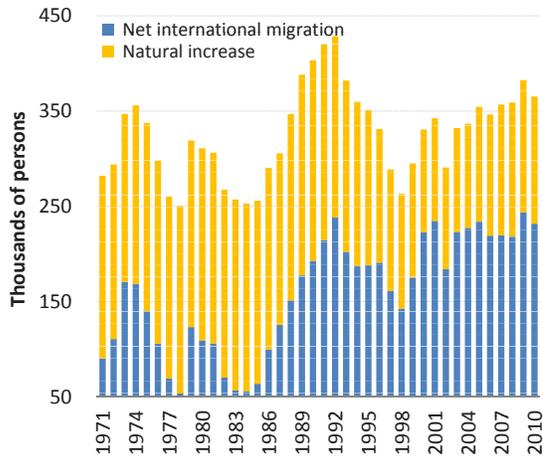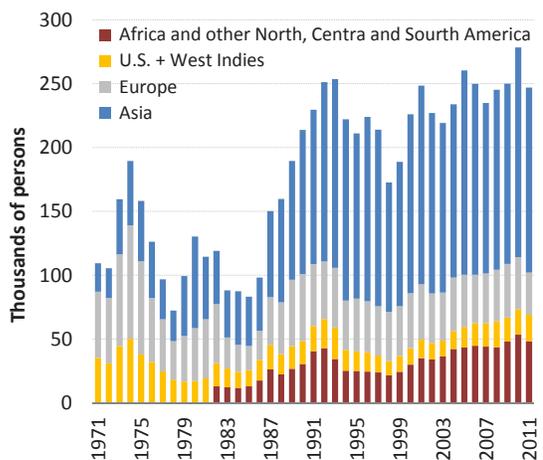
source regions of international immigrants to Canada since the 1980s. For example, in 1971, 47 per cent of the total 109,000 immigrants to Canada came from European countries and 32 per cent came from the U.S. and West Indies. Since early 1971, the share of Asian immigrants to Canada has increased steadily from 20 per cent to 59 per cent in 2010.

2. Population projections by Statistics Canada (2010-2061)

Based on Statistics Canada's latest population projection[8], total population in Canada should grow at a slower pace over the next five decades. Total population in Canada is projected to reach 42 million by 2031 and to 53 million by 2061[9]. The growth rates of youth (age 0-14) and working age population (age 15-64) are expected to be much slower than that of the older population (age 65+), due to the low fertility rate and high life expectancy. Population aging should accelerate over the next twenty years when baby boomers are expected to retire.

Canada's demographic structure is projected to change dramatically over the next fifty years, driven by the ageing of the country's baby boomers (born 1946-1965). In 2011, 9.6 million boomers who accounted for 29 per cent of the total population in Canada were in their prime work ages (age 45-64). By 2031, the majority of the boomers will have retired, and by 2061 the survival of boomers should contribute to a historic record of centenarians. The smaller size of generations after the boomers including the baby-bust generation (born 1966-1971), the children of boomers generation (born 1972-1992), and generation Z (born 1993-2011), are expected to cause supply shortages in the future labour market, which would constrain the potential for Canada's long-term economic growth.

3. Challenges to the federal government

The federal government is faced with challenges of an aging population in the long-term. Over the next twenty years, the acceleration of baby boomer retirements should sharply increase the old-age dependency ratio (or retiree/worker ratio) in Canada, from 21 per cent in 2011 to 37 per cent in 2031. In other words, while a hundred workers supported 21 retirees in 2011, the same number of workers are expect to support 37 retirees in 2031. The retiree/worker ratio should reach 43 per cent by 2061. Higher old-age dependency ratios should bring budget challenges to all levels of government, given increasing gaps between slower growing tax bases and faster growing demand for government services such as health care and old age security. Pressures on public finances have forced the federal government to reform the retirement system and improve efficiency of public services. Several such initiatives such as changes in the old-age security programme were announced in the 2012/13 federal budget.

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8   Statistics Canada 2009 Population Projection Scenario M1: medium-growth, historical trends (1981 to 2008)

9   Assuming a total fertility rate of 1.7 births per woman, life expectancies at birth reaching age 84 for male and age 88 for female, and immigration rate at 7.5 per thousand persons.

Population projections by Statistics Canada (2012-2061)
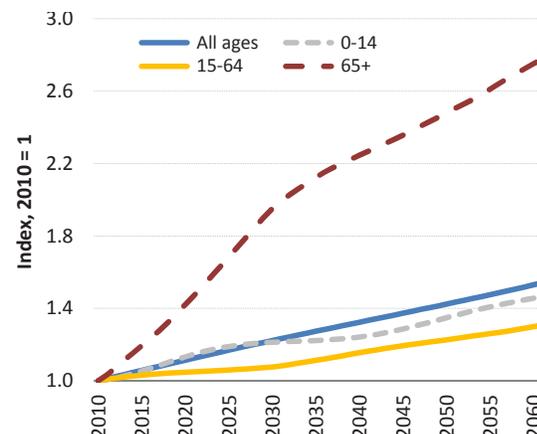
Source: Statistics Canada; Corporate Economics

Population by age and sex (2011, 2031, 2061)
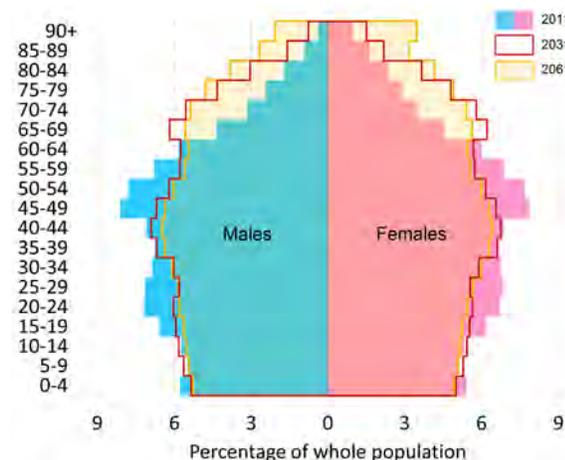
Source: Statistics Canada; Corporate Economics

Dependency ratio (2010-2061)
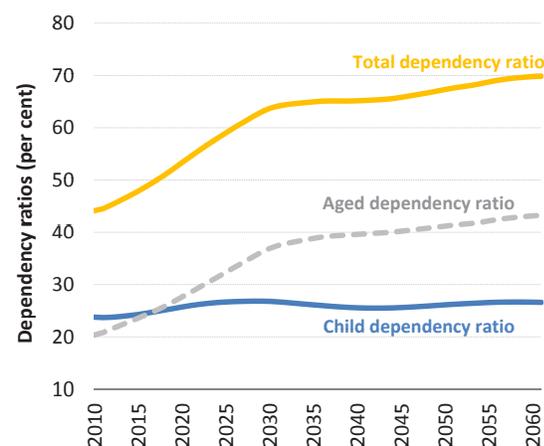
Source: Statistics Canada; Corporate Economics

Box 5. Canada's Retirement System: Status Quo and Changes

1. Current retirement system in Canada

Currently in Canada, there are three main sources of retirement income that retirees may be able to draw from: 1) government pension benefits, 2) personal savings and investments, and 3) employer pensions. Depending on their employment histories and life-styles, many Canadians don't have all three sources.

Government pension benefits in Canada include: the Canada Pension Plan (CPP) retirement pension; the Old Age Security (OAS) pension; the Guaranteed Income Supplement (GIS); and the Allowance and the Allowance for the Survivor.

▶ *The Old Age Security (OAS)* pension is a monthly benefit available, if applied for, to most Canadians 65 years of age or over who meet legal status and residence requirements. An applicant's employment history is not a factor in determining eligibility, nor does the applicant need to be retired.

▶ *The Guaranteed Income Supplement (GIS)* is a monthly benefit paid to eligible residents of Canada who receive a basic, full or partial OAS pension and who have little or no other income.

▶ *The Canada Pension Plan (CPP)* retirement pension is based on contributions during one's employment. Both the length of time and the amount of earnings on which the pensioner contributed (up to the maximum each year) are factors of benefit payments.

As of 2012, the maximum annual amounts of pension payment are: $8,868 for OAS, $6,540 for GIS and $11,840 for CPP. The government pension benefits provide a modest base retirement income to eligible retirees. For most retirees to maintain their pre-retirement lifestyle, they have to rely on other sources of retirement income including personal savings and investments, and/or employer pensions.

Personal savings and investments for retirement include: money in savings accounts, investments in stocks and bonds, and accumulations of residential property or financial/business assets. To encourage savings for retirement, the Canadian government provides tax-saving incentives through Registered Retirement Savings Plans (RRSPs), Registered Retirement Income Funds (RRIFs) and Tax-Free Savings Accounts (TSAs).

Employer pension plans are registered pension plans sponsored by employers to help their employees save for retirement. There are two main types of registered plans: 1) a defined benefit plan (DB) that provides a retiree with a pre-determined percentage of his/her working salary when he/her retires; and 2) a defined contribution plan (DC) that provides with a pension benefit based on the accumulated contributions from both a employee and his/her employer and investment income from the pension administrator. Not all Canadians have this type of pension plan. According to the Bank of Montreal (BMO), today only one-third of working Canadians are part of an employer-sponsored pension plan, down from 41 per cent in 1991.

2. Changes to current retirement system

Canadians are living longer and healthier lives. There will be nearly twice as many seniors in 2030 as there were in 2011, growing from 5 million to 9.4 million. This should place significant pressure on the public pension system. In response to these challenges, the Canadian

Government introduced changes to the CPP in 2010 and changes to the OAS/GIS in 2012.

▶ Changes to CPP will encourage retirees to take CPP benefits later than age 65, and to continue contributions between age 65 and 70, if they choose to work while receiving CPP benefits.

▶ The age of eligibility for the OAS pension and the GIS will be gradually increased between the years 2023 and 2029, from 65 to 67. Anyone born in 1957 or earlier will not be affected. Anyone born in 1963 or later will be eligible for the OAS and GIS benefits at the age of 67.

▶ A voluntary deferral of the OAS pension will give people the option to defer take-up of their OAS pension by up to five years past the age of eligibility, and subsequently receive a higher, actuarially adjusted pension.

In employer pension plans, the trend of change is to move from a defined benefit (DB) model to a defined contribution (DC) model. The main reason behind this is the reluctance of employers to be their employees' retirement income guarantors in times of low interest rates, uncertain market returns and increasing longevity.

3. Implication of changes to future retirees

Changes in the pension system have important implications for future generations of retirees in Canada. With the population aging and dependency ratio rising, a pay-as-you-go model (that current taxpayers pay for current seniors, and the taxpayers of tomorrow will pay for tomorrow's seniors) is not applicable and is unfair. If tomorrow's retirees would like to enjoy the same standard of living as they have today, they need to plan ahead while still working: to contribute more to their pension plans, and to save and invest more. However, this should be challenging in times of prolonged low interest rates, reduced market returns, while life expectancy has increased.

U.S. population growth (1910-2010)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S. population projection (2010-2050)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S. source of population growth projection (2010-2050)

Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S. Economy

Summary

▶ Total population in the U.S. is projected to grow at a slower pace over the next four decades. Total population in the U.S. should increase to 399 million persons by 2050, a 29 per cent increase from 309 million in 2010.

▶ Over the next four decades, the main source of population growth in the U.S. would shift from natural increase to net international migration.

▶ Population aging in the U.S. is expected to accelerate over the next twenty-five years, as baby boomer attain retirement age.

▶ The slower growth of the working age population relative to the total population implies an increase tax burden on the working age population.

1. Demographic trend in the U.S. (1910-2010)

Over the past century, total population in the U.S. increased from 92 million in 1910 to 309 million in 2010. The 2010 Census reported a total population of 309 million in the U.S., a 9.7 per cent increase from 282 million in 2000. The 9.7 per cent increase over the past decade was the second lowest since 1900, following the 7.3 per cent growth in the 1940s due to World War II.

From 1946 to 1964, the births of baby boomers in the U.S. contributed to the second wave of population growth over the past century. Since the 1970s, birth control and increasing labour force participation rates of women caused lower fertility rates and smaller numbers of new births.

2. Population projection by the U.S. Census Bureau (2010-2060)

Total population in the U.S. is projected to grow at a slower pace over the next four decades[10]. Total population in the U.S. should increase to 399 million persons by 2050, a 29 per cent increase from 309 million in 2010. Annual population growth is expected to peak in 2014 at 2.6 million. The slowing in population growth after the peak would be caused mainly by declining natural increases from a larger number of deaths.

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10   This based on the U.S. Census Bureau 2009 population projection, constant international migration scenario.
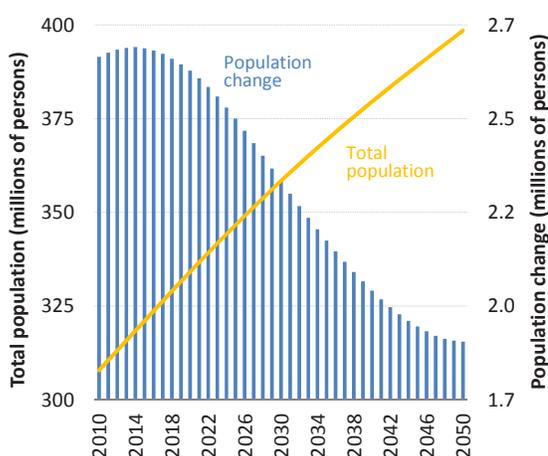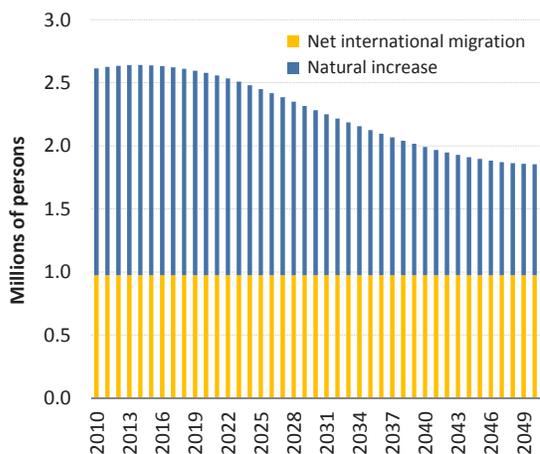
Over the next four decades, the main source of population growth in the U.S. would shift from natural increase to net international migration. Natural increase would decline from 1.6 million in 2010 to 0.8 million in 2050, due to a combination of higher growth in deaths and marginal growth in births. Net international migration is assumed to be constant at an annual rate of 1 million over the next 40 years, a conservative assumption compared to Canada's expectations. Starting from 2041, net international migration would replace natural increase as the major source of population increase in the U.S.

The Hispanic population is expected to increase substantially over the next four decades, thanks to its younger demographic structure and higher fertility rates. The median age of the Hispanic population in the U.S. was 28 in 2010, much younger than the national average of age 39. The Hispanic population is the only racial or ethnic group projected to maintain total fertility rates that are above replacement level[11]. As a result, the Hispanic population as a share of the total U.S. population should increase from 16 per cent in 2010 to 28 per cent by 2050.

Population aging in the U.S. is expected to accelerate over the next twenty-five years as baby boomers attain retirement age. Beyond 2035, the share of retirees to total population should stabilize at around 21 per cent. The older population (65 years and over) is projected to more than double from 40 million in 2010 to 84 million in 2050. Its share of the total population should increase from 13 per cent to 21 per cent over the same period. The population under 18 years should increase from 74 million in 2010 to 89 million in 2050. Its share of the total population should decline from 24 per cent to 22 per cent over the same timeframe. The working age population (age 18-64) should increase from 194 million in 2010 to 225 million in 2050. Its share of the total population should decrease from 62 per cent to 56 per cent over the same period.

3. Challenges to the U.S. federal government

The U.S. federal government should face similar challenges from an aging population, as other industrialized countries do. Slower growth of the working age population relative to the total population implies an increased tax burden on the working age population. Larger growth of the older population should require more government services such as health care and old age security. Given today's high levels of public debt in the U.S., the federal government should be constrained by the lack of fiscal capacity to tackle the aging population problem. As a result, reforms in public finance and retirement systems are expected in the forecast period.

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11   The replacement level is generally defined as a total fertility rate of above 2.1.

U.S. population by Hispanic origin projection (2010-2050)
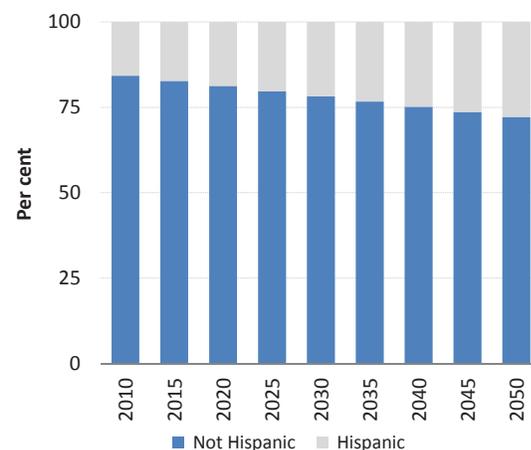
Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S. population by age projection (2010-2050)
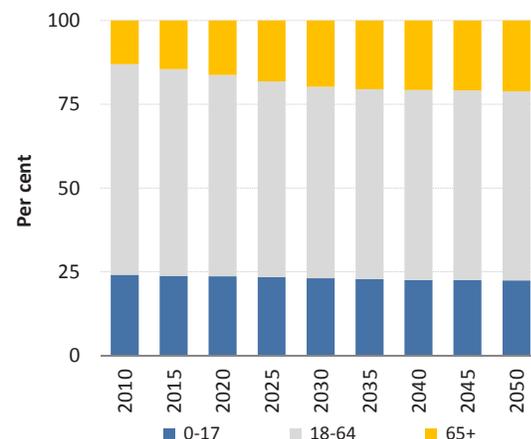
Source: Federal Reserve Bank of St. Louis; Corporate Economics

U.S. population by age and sex (2010, 2050)
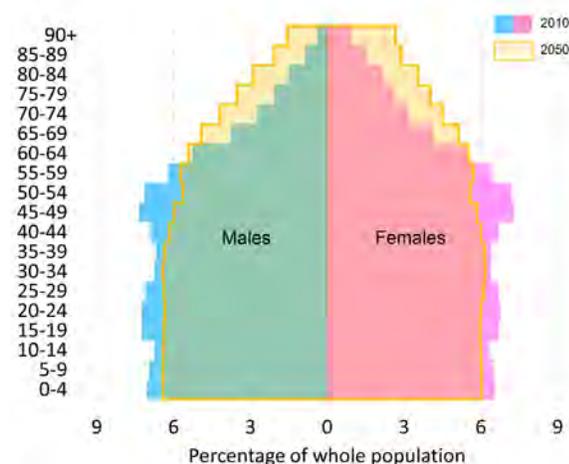
Source: Federal Reserve Bank of St. Louis; Corporate Economics

Box 6. Demographic Shifts[12]
Population Aging and Falling Fertility Rates: "Changing of the guards"

Economic growth relies on a population which replenishes the existing labour force. In the production process we need resources like capital and labour, and increasing these resources enables increasing output. Assuming the economy is on a desired growth path, holding all else constant, then an increase in investment would cause capital stock to rise. To remain on this desired path, labour would have to increase, and if there isn't sufficient labour then output growth will fall.

Underlying all of this is "fertility rates"; the consequence of a falling fertility rate is the inability to replenish an existing labour stock.

The percentage of particular cohorts (baby-boomers) moving out of the labour force into retirement age will constrain growth of the labour force. The increasing old age dependency ratio, which is the ratio of cohorts over 64 to the working age population, tells us that we are unable to maintain historical levels of labour force growth required to keep this ratio constant. A possible solution is to increase net migration above historical norms to maintain desired levels of the labour force. In the long-run, most nations will find themselves in a similar predicament with increased competition for "net migration". This is the scenario currently facing most industrialized nations, and some emerging economies that have embarked on prudent management of population growth. China is an example of a nation that practised birth control with its one family one child policy.

The retirement of the baby-boomers from the labour force began in 2011 and will continue until about 2030. This shift will have wide ranging economic and socio-economic implications ranging from an underscored labour force to increased health care requirements, alternative mobile infrastructure, financial market swings based on retirement packages, some of which are market based.

Some Statistics:

World population: 6.896 billion in 2010 and projected to grow to 9 billion by 2050. Within this period the over 60 age cohort is expected to add 1.25 billion more people and another 1 billion more people for the under-15 age cohort. The working age population in the age cohort 15-64 is expected to remain around 3 billion people. This implies that while the old age dependency ratio and the dependency ratio are both rising, the old age dependency ratio is projected to double by 2050.

We look at China and India as case studies, given the unprecedented economic growth within the last decade. These two countries are in no way an exhaustive representation of the population age distribution. However, a reasonable representation of comparative advantage across these two countries can be made with respect to the population age distribution resource given the comparable population size.

India is poised to surpass China's population by 2030. China is currently at 1.34 billion and India's population is at 1.21 billion as of 2010, which will increase to 1.46 billion and 1.48 billion respectively. The working age population between the countries in 2030 is at a one to one ratio but the 0-19 age cohort ratio is 1.36, indicating that for every one person in that age cohort in China there are 1.36 persons in India; for the over 64 age cohort there are twice as many old people in China as in India. The percentage of elderly in China in 2010 was 8.2 per cent of the population and projected to be 16 per cent (double) by 2030. India's old age population in 2010 was 5 per cent of the population and is projected to grow to 8 per cent of the total population by 2030. Therefore, India has a comparative advantage over China in the human resource development pool and has the potential for longer persistent economic growth in the long-run, all else constant.

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12   Key Terms: Baby-boomer generation (BBG); those born between January 1st 1946 and December 31st 1964, fertility rate; number of babies per woman, mortality rate; number of deaths per year, dependency ratio; the ratio of the sum of the population under 15 years and over 64 years divided by the working age population (16 years to 64 years), old age dependency ratio; the ratio of the population over 64 years divided by the working age population (16 years to 64 years).

13   The current population is comprised of the previous year's population plus the sum of net migration and natural increase. The working age population is a subset of total population. The labour force portion of the working age population that is either working and or unemployed.

The figure below is a representation of the three age-cohort distribution for Canada from 1952 to 2042. Notice the dip or slowing down in the working age population beyond 2012 and the steady rising of the old age cohort relative to the future labour force. This is in stark contrast to Japan's age-cohort distribution where we observe a future dwindling labour force. The current (working age) decline in the labour force and an increasing old age cohort, which started around 2005, is projected to continue along this path into 2042.

Population distribution: aged 0-19, 20-64 and over 64
(1950-2050)
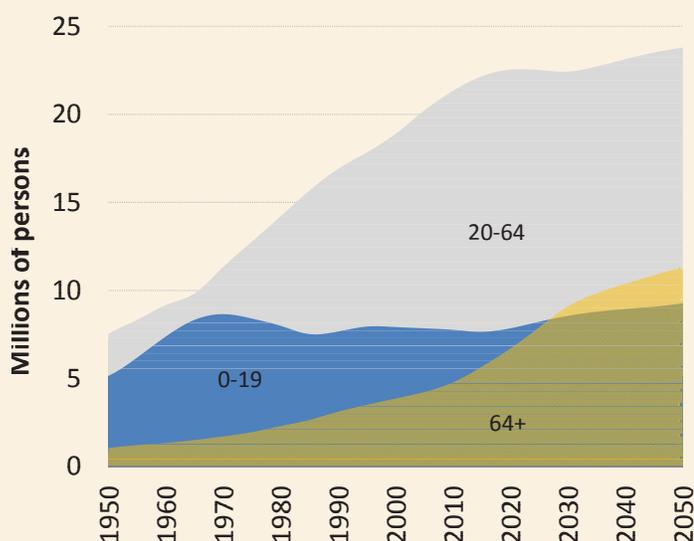
Source: United Nations, World Population Prospects - 2008 Revision.

Lessons for Calgary:

The wave of retirements currently underway from the baby-boomer generation, which began January 1st 2011, will create a significant shift in the tax base and will impact revenue streams to the federal and provincial governments. Consequently, this will affect transfer payments among various orders of government. The change in population age distribution could also change the distribution of housing structure mix and may therefore, create the need for some alternative services and structures (due changes in preferences induced by longevity).

Increase in the types of city services for the elderly will be essential and the need for alternative motorable infrastructure encouraged, enabling less dependence of the elderly on private vehicles.

The need to have the required skilled labour force to close up the employment gap will be a consequence of potential mass exodus of the baby-boomers, and will require creative solutions from the public and private sector employers.

External: Provincial and National Policies

Provincial programs designed to encourage tapping into the underutilized working age groups (like the natives) who already live in the province.

Improving the connections between the labour force market and the education industry is essential in developing the required skilled labour force.

National programs aimed at improving the immigration process for skilled labour absorption.

Box 7. Urbanization: Outflow of People from Rural to Urban Areas

The growth of urbanization in the developing and emerging worlds creates a drag on fertility rates as a consequence of the environment, which over time becomes relatively more expensive as child bearing and rearing becomes expensive. The migration from rural areas driven by the quest for better economic opportunities drives out younger cohorts and increases the old age dependency ratio, thereby increasing the cost of managing a household in rural areas. This is intense in developing and emerging worlds, where extended families are an additional economic cost which drives the activities of the urban dweller. The increase in net migration from rural to urban areas creates further pressures in the urban core for additional services as the need for employment, accommodation and a host of other demands increase. Farming is typically carried out in rural areas where there are vast lands. The continuous depleting of the existing labour stock due net migration of youth has posed challenges for the agricultural industry. Farming is increasingly left to the elderly whose productivity is now in diminishing stages due to lack of speed and the inability to acquire capital to substitute for the dwindling labour stock in the rural area.

This phenomenon of mass exodus of youth from the rural areas can also be attributed to increasing awareness and use of social media which has further empowered and broadened the quest for economic opportunities. Unlike any other time in history, the information base to the citizenry is phenomenal and the potential for future increase in falling fertility rates compared to historical is more than likely due to the mass exodus and increasing costs in urban areas.

Urbanization is essentially a characteristic of industrialization and a path which emerging and developing countries travel on their way towards industrialization.

Some Statistics:

In 1960 the fertility rate was 4.91 children per woman while fifty years later the fertility rate has dropped to 2.45 children per woman, a fifty per cent drop or a one per cent drop each year on average. During this process urbanization grew from 32.8 per cent of the population to 50.7 per cent, a 54.6 per cent growth over fifty years or an average of 1.1 per cent a year. The figure on the right illustrates the inverse relationship that exists between world fertility rates and world urbanization articulated above.

Lessons for Calgary:

Urbanization creates local demand for large numbers of goods and services and increases significantly the demand for energy usage in housing, production and transportation. Alberta is in a unique position to deliver both goods and services - being a major exporter of energy commodities, metals, lumber and agricultural products, and with Calgary being the headquarters to most of the companies responsible for such goods and services - The city stands to gain from significant spinoffs in employment.

The falling world fertility rates imply that the competition for a sustainable labour force across the globe is becoming eminent and international migration polices will become increasingly essential in the competition for skilled labour. The flight of human capital across borders will become a major fight. What does this spell for Calgary? The city needs to improve on the ability to attract in-house labour from within the borders of Canada and initiate more skilled based work-related programs with learning institutions. The city should also continue to improve on the quality and numbers of amenities that aid in the quality of life.

The Province of Alberta needs to introduce improved supports systems (cost cutting measures) for child rearing and tax incentives to improve fertility rates; which reduces the increased reliance on net migration.

World urbanization and fertility rates (1960-2010)
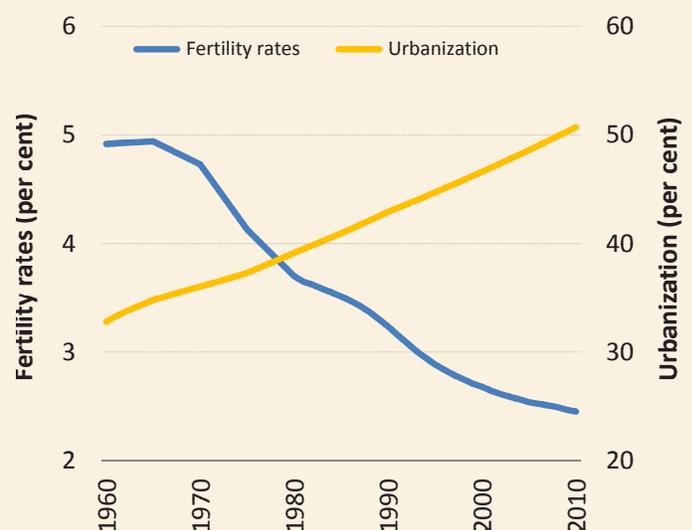
Source: World Bank

World Economy

The demographic shift in population age distribution across the globe brought about by falling fertility rates and increased longevity poses a significant challenge to policy makers. As the world population ages; i.e. as the proportion of the population age-over-64 increases significantly faster than the under 15 age cohort, it till hinder the tax base necessary for the revenue generating scheme that is essential to provide goods and services to citizens. The strategy of policy makers to manage this phenomenon needs to be holistic and to be self-sustaining.

Calgary and Region
Economic Outlook 2012-2017
with Long-Term Economic Trends 2018-2042

Forecast Tables

Table 1A - Selected Economic Indicators (1987-1995)

Rest of the World, United States, Canada, Alberta, Calgary Economic Region (CER) & Calgary Census Metropolitan Area (CMA)

FORECAST COMPLETED: August 2012

	1987	1988	1989	1990	1991	1992	1993	1994	1995
ASSUMPTIONS									
Global Economy									
World Gross Domestic Product (annual % change)	3.8	4.5	3.8	3.2	2.2	2.2	2.1	3.4	3.3
The United States									
U.S. Real Gross Domestic Product Growth (chained 2005 dollar) (%)	3.2	4.1	3.6	1.9	-0.2	3.4	2.9	4.1	2.5
Canada									
Canada Real Gross Domestic Product Growth (chained 2002 dollar) (%)	4.3	5.0	2.6	0.2	-2.1	0.9	2.3	4.8	2.8
Prime Business Loan Rate (%)	9.5	10.8	13.3	14.1	9.9	7.5	5.9	6.9	8.6
Exchange Rate (US$/Cdn$)	0.75	0.81	0.84	0.86	0.87	0.83	0.78	0.73	0.73
Alberta									
Gross Domestic Product (%)	2.0	8.0	1.4	2.2	0.5	0.9	7.2	6.2	3.1
Total Employment Growth (%)	N/A	3.1	2.3	2.2	0.7	-0.3	0.5	2.7	3.2
Unemployment Rate (%)	9.6	8.1	7.3	6.8	8.1	9.4	9.7	9.0	7.8
Housing Starts ('000 Units)	8.4	9.2	12.3	14.4	10.1	15.5	15.1	13.9	10.5
Inflation Rate (%)	4.0	2.7	4.2	5.7	5.8	1.5	1.1	1.5	2.3
Crude Oil Price - WTI (US$/bbl)	19.2	16.0	19.6	24.5	21.5	20.6	18.5	17.2	18.4
Alberta Natural Gas Price - AECO/NIT ($/GJ)	1.8	1.7	1.6	1.6	1.5	1.7	2.1	1.8	1.1
FORECAST									
Calgary Economic Region (CER)									
Gross Domestic Product (%)*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Population**	777	789	805	831	850	861	873	886	899
Total Employment ('000 Persons)	391	402	414	420	422	417	420	431	453
Total Employment Growth (%)	N/A	2.8	3.0	1.4	0.4	-1.1	0.7	2.6	5.0
Unemployment Rate (%)	8.8	7.6	6.9	6.6	8.2	9.8	10.3	9.3	8.1
Inflation Rate (%) (CMA)	3.8	2.7	3.9	6.2	6.0	1.3	1.4	1.4	2.3
Building Permits ($billion)	0.8	0.8	1.2	1.2	1.0	1.1	0.9	1.1	1.1
Low Forecast	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
High Forecast	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Housing Starts ('000 Units) (CMA)	3.5	3.8	6.2	7.0	4.8	7.0	6.6	6.9	5.7
Non-Residential Building Price Inflation (%) (CMA)	0.6	5.6	10.4	4.9	-0.8	1.0	0.4	1.8	3.3

Numbers may not add up due to rounding

* Source: Centre for Spatial Economics, Corporate Economics, ** Total population, census divisions and census metropolitan areas, 2001 Census boundaries
*** Canada GDP (CANSIM380-0017)

Table 1B - Selected Economic Indicators (1996-2004)

Rest of the World, United States, Canada, Alberta, Calgary Economic Region (CER) & Calgary Census Metropolitan Area (CMA)

FORECAST COMPLETED: August 2012

	1996	1997	1998	1999	2000	2001	2002	2003	2004
ASSUMPTIONS									
Global Economy									
World Gross Domestic Product (annual % change)	3.8	4.1	2.6	3.6	4.7	2.4	2.9	3.7	4.9
The United States									
U.S. Real Gross Domestic Product Growth (chained 2005 dollar) (%)	3.7	4.5	4.4	4.8	4.1	1.1	1.8	2.5	3.5
Canada									
Canada Real Gross Domestic Product Growth (chained 2002 dollar) (%)	1.6	4.2	4.1	5.5	5.2	1.8	2.9	1.9	3.1
Prime Business Loan Rate (%)	6.1	5.0	6.6	6.4	7.3	5.8	4.2	4.7	4.0
Exchange Rate (US$/Cdn$)	0.73	0.72	0.67	0.67	0.67	0.65	0.64	0.72	0.77
Alberta									
Gross Domestic Product (%)	2.5	8.1	4.7	2.1	6.5	2.0	1.7	3.3	5.5
Total Employment Growth (%)	2.8	3.4	3.8	2.3	2.5	2.9	2.7	3.3	2.6
Unemployment Rate (%)	6.9	5.9	5.6	5.7	5.0	4.7	5.4	5.1	4.6
Housing Starts ('000 Units)	16.7	23.7	27.1	25.4	26.3	29.2	38.8	36.2	36.3
Inflation Rate (%)	2.2	2.1	1.2	2.5	3.5	2.3	3.4	4.4	1.4
Crude Oil Price - WTI (US$/bbl)	22.2	20.6	14.4	19.3	30.3	25.9	26.1	31.1	41.4
Alberta Natural Gas Price - AECO/NIT ($/GJ)	1.4	1.7	2.0	2.8	5.3	5.2	3.9	6.3	6.2
FORECAST									
Calgary Economic Region (CER)									
Gross Domestic Product (%)*	N/A	N/A	4.3	1.9	8.7	1.3	2.6	1.6	4.5
Total Population**	920	949	968	996	1,022	1,048	1,076	1,096	1,119
Total Employment ('000 Persons)	478	497	532	549	576	598	611	623	643
Total Employment Growth (%)	5.5	4.1	6.9	3.2	5.0	3.8	2.1	1.9	3.1
Unemployment Rate (%)	6.9	6	5.1	5.5	4.7	4.5	5.6	5.3	5.0
Inflation Rate (%) (CMA)	2.1	2.2	1.5	2.6	3.7	2.4	3.7	3.5	1.7
Building Permits ($billion)	1.3	2.0	2.8	2.1	2.5	2.5	2.9	3.0	3.1
Low Forecast	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
High Forecast	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Housing Starts ('000 Units) (CMA)	7.1	11.2	12.5	10.6	11.1	11.3	14.3	13.6	14.0
Non-Residential Building Price Inflation (%) (CMA)	1.5	2.5	2.8	2.1	4.5	3.3	2.2	3.1	6.7

Numbers may not add up due to rounding

* Source: Centre for Spatial Economics, Corporate Economics, ** Total population, census divisions and census metropolitan areas, 2001 Census boundaries
*** Canada GDP (CANSIM380-0017)

Table 1C - Selected Economic Indicators (2005-2013)

Rest of the World, United States, Canada, Alberta, Calgary Economic Region (CER) & Calgary Census Metropolitan Area (CMA)

FORECAST COMPLETED: August 2012

	2005	2006	2007	2008	2009	2010	2011
ASSUMPTIONS							
Global Economy							
World Gross Domestic Product (annual % change)	4.5	5.2	5.4	2.8	-0.6	5.3	3.9
The United States							
U.S. Real Gross Domestic Product Growth (chained 2005 dollar) (%)	3.1	2.7	1.9	-0.3	-3.5	3.0	1.7
Canada							
Canada Real Gross Domestic Product Growth (chained 2002 dollar) (%)	3.0	2.8	2.2	0.7	-2.8	3.2	2.4
Prime Business Loan Rate (%)	4.4	5.8	6.1	4.7	2.4	2.6	3.0
Exchange Rate (US$/Cdn$)	0.83	0.88	0.93	0.94	0.88	0.97	1.01
Alberta							
Gross Domestic Product (%)	4.8	6.2	2.1	1.0	-4.4	3.3	5.2
Total Employment Growth (%)	2.7	4.9	3.8	3.1	-1.4	-0.4	3.8
Unemployment Rate (%)	3.9	3.4	3.5	3.6	6.6	6.5	5.4
Housing Starts ('000 Units)	40.8	49.0	48.3	29.2	20.3	27.1	25.7
Inflation Rate (%)	2.1	3.9	4.9	3.2	-0.1	1.0	2.4
Crude Oil Price - WTI (US$/bbl)	56.5	66.1	72.3	99.6	61.8	79.5	95.1
Alberta Natural Gas Price - AECO/NIT ($/GJ)	8.3	6.2	6.1	7.7	3.8	3.8	3.4
FORECAST							
Calgary Economic Region (CER)							
Gross Domestic Product (%)*	4.9	11.6	2.7	1.3	-4.3	2.8	3.1
Total Population**	1,152	1,188	1,230	1,251	1,296	1,338	1,362
Total Employment ('000 Persons)	649	718	745	768	765	755	776
Total Employment Growth (%)	1.0	8.0	3.8	3.1	-0.4	-1.3	2.8
Unemployment Rate (%)	3.9	3.4	3.2	3.3	6.3	7.0	6.2
Inflation Rate (%) (CMA)	2.0	4.6	5.0	3.2	-0.1	0.8	2.2
Building Permits ($billion)	4.3	6.0	7.1	5.1	4.5	3.8	5.5
Low Forecast	N/A	N/A	N/A	N/A	N/A	N/A	0.0
High Forecast	N/A	N/A	N/A	N/A	N/A	N/A	0.0
Housing Starts ('000 Units) (CMA)	13.7	17.0	13.5	11.4	6.3	9.3	9.6
Non-Residential Building Price Inflation (%) (CMA)	6.9	12.8	17.7	13.7	-7.7	-2.2	2.4

Numbers may not add up due to rounding

* Source: Centre for Spatial Economics, Corporate Economics, ** Total population, census divisions and census metropolitan areas, 2001 Census boundaries
*** Canada GDP (CANSIM380-0017)

Table 1D - Selected Economic Indicators (2012-2042)

Rest of the World, United States, Canada, Alberta, Calgary Economic Region (CER) & Calgary Census Metropolitan Area (CMA)

FORECAST COMPLETED: August 2012	BASE FORECAST										
	2012	2013	2014	2015	2016	2017	2022	2027	2032	2037	2042
ASSUMPTIONS											
Global Economy											
World Gross Domestic Product (annual % change)	3.5	4.1	4.4	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6
The United States											
U.S. Real Gross Domestic Product Growth (chained 2005 dollar) (%)	2.2	2.0	2.7	3.1	2.9	2.8	2.5	2.5	2.5	2.5	2.5
Canada											
Canada Real Gross Domestic Product Growth (chained 2002 dollar) (%)	2.0	2.1	2.5	2.4	2.4	2.3	2.0	2.0	2.0	2.0	2.0
Prime Business Loan Rate (%)	3.0	3.2	3.9	4.9	5.9	6.2	6.2	6.2	6.2	6.2	6.2
Exchange Rate (US$/Cdn$)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Alberta											
Gross Domestic Product (%)	3.5	3.1	3.4	3.2	3.0	2.9	2.6	2.4	2.3	2.2	2.1
Total Employment Growth (%)	2.7	2.1	1.8	1.7	1.4	1.2	1.1	1.1	1.1	1.0	1.0
Unemployment Rate (%)	4.9	4.6	4.5	4.3	4.2	4.2	4.4	4.4	4.4	4.2	4.2
Housing Starts ('000 Units)	31.7	29.9	31.0	30.5	29.8	29.7	28.7	28.2	28.2	28.0	28.0
Inflation Rate (%)	1.3	2.1	2.2	2.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0
Crude Oil Price - WTI (US$/bbl)	94.0	93.3	95.0	99.0	100.0	101.4	128.6	134.8	141.0	147.8	150.0
Alberta Natural Gas Price - AECO/NIT ($/GJ)	2.2	2.3	3.5	4.1	4.5	4.8	6.0	6.7	7.8	9.5	9.5
FORECAST											
Calgary Economic Region (CER)											
Gross Domestic Product (%)*	3.5	3.0	4.0	3.7	3.6	3.6	3.4	3.2	2.9	2.7	2.4
Total Population**	1,398	1,428	1,458	1,489	1,517	1,544	1,660	1,759	1,855	1,945	2,027
Total Employment ('000 Persons)	802	823	846	869	885	900	963	1,013	1,068	1,123	1,170
Total Employment Growth (%)	3.4	2.6	2.8	2.8	1.8	1.7	1.4	0.8	0.7	0.7	0.7
Unemployment Rate (%)	4.9	4.8	4.5	4.2	4.2	4.1	3.5	3.5	3.5	3.5	3.5
Inflation Rate (%) (CMA)	1.0	2.3	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Building Permits ($billion)	5.7	5.6	5.6	5.7	5.8	6.0	6.8	7.8	8.7	9.3	9.9
Low Forecast	4.8	5.0	5.0	5.1	5.2	5.4	6.1	7.0	7.8	8.4	8.9
High Forecast	6.0	6.2	6.2	6.3	6.4	6.7	7.5	8.6	9.5	10.2	10.9
Housing Starts ('000 Units) (CMA)	14.0	13.3	13.3	13.1	12.6	12.5	10.8	10.5	10.2	10.00	9.0
Non-Residential Building Price Inflation (%) (CMA)	4.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0

Numbers may not add up due to rounding

* Source: Centre for Spatial Economics, Corporate Economics, ** Total population, census divisions and census metropolitan areas, 2001 Census boundaries
*** Canada GDP (CANSIM380-0017)

Table 2A - Selected Indicators (1987-1995)

City of Calgary

FORECAST COMPLETED: August 2012

	1987	1988	1989	1990	1991	1992	1993	1994	1995
DEMOGRAPHY									
Total Population ('000 Persons)	647	657	671	693	709	717	728	738	749
Total Population Growth (%)	1.0	1.5	2.1	3.2	2.3	1.2	1.5	1.4	1.5
Net Migration ('000 Persons)	-1.6	1.6	5.3	11.9	6.3	-0.9	2.6	3.1	3.5
REAL ESTATE									
Residential Market									
Housing Starts ('000 units)	3.3	3.6	5.9	6.3	4.2	6.2	5.7	6.0	4.9
New House Price Inflation (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Building Permits mid point ($billions)	0.6	0.6	1.0	1.0	0.8	1.0	0.8	0.9	0.9
Low Forecast									
High Forecast									

Numbers may not add up due to rounding

Table 2B - Selected Indicators (1996-2004)

City of Calgary

FORECAST COMPLETED: August 2012

	1996	1997	1998	1999	2000	2001	2002	2003	2004
DEMOGRAPHY									
Total Population ('000 Persons)	767	790	819	842	861	877	905	922	933
Total Population Growth (%)	2.4	3.1	3.6	2.8	2.2	1.8	3.2	1.9	1.2
Net Migration ('000 Persons)	10.0	16.1	21.7	15.6	11.3	8.0	21.0	9.0	2.3
REAL ESTATE									
Residential Market									
Housing Starts ('000 units)	6.2	9.8	10.7	9.3	9.6	9.9	12.4	11.9	12.2
New House Price Inflation (%)	NA	NA	7.6	4.7	2.4	2.5	5.2	5.2	5.5
Total Building Permits mid point ($billions)	1.1	1.7	2.4	1.8	2.1	2.0	2.3	2.4	2.4
Low Forecast									
High Forecast									

Numbers may not add up due to rounding

Table 2C - Selected Indicators (2005-2011)

City of Calgary

FORECAST COMPLETED: August 2012

	2005	2006	2007	2008	2009	2010	2011
DEMOGRAPHY							
Total Population ('000 Persons)	956	992	1,020	1,043	1,065	1,072	1,091
Total Population Growth (%)	2.4	3.7	2.9	2.2	2.2	0.6	1.0
Net Migration ('000 Persons)	13.7	25.6	17.6	12.4	12.9	-4.1	9.6
REAL ESTATE							
Residential Market							
Housing Starts ('000 units)	11.7	14.1	10.9	9.6	5.0	7.3	7.7
New House Price Inflation (%)	7.0	43.6	16.2	0.7	-6.7	1.7	0.4
Total Building Permits mid point ($billions)	3.6	4.9	5.6	4.0	3.7	2.9	4.5
Low Forecast							
High Forecast							

Numbers may not add up due to rounding

Table 2D - Selected Indicators (2012-2042)

City of Calgary

FORECAST COMPLETED: August 2012	BASE FORECAST										
	2012	2013	2014	2015	2016	2017	2022	2027	2032	2037	2042
DEMOGRAPHY											
Total Population ('000 Persons)	1,120	1,144	1,169	1,194	1,217	1,239	1,332	1,411	1,488	1,560	1,626
Total Population Growth (%)	2.7	2.1	2.2	2.1	1.9	1.8	7.5	5.9	5.5	4.8	4.2
Net Migration ('000 Persons)	14.3	15.0	14.8	13.7	12.3	11.1	9.0	9.8	10.5	10.0	10.2
REAL ESTATE											
Residential Market											
Housing Starts ('000 units)	11.2	9.8	10.0	9.9	10	10	9	9	9	9	8
New House Price Inflation (%)	6.2	3.7	6.0	4.1	1.8	1.8	1.0	1.3	1.2	1.1	1.0
Total Building Permits mid point ($billions)	4.7	4.6	4.6	4.7	4.8	5.0	5.6	6.4	7.0	7.5	8.0
Low Forecast	4.2	4.1	4.1	4.3	4.3	4.5	5.0	5.8	6.3	6.8	7.2
High Forecast	5.2	5.0	5.0	5.2	5.3	5.4	6.2	7.1	7.7	8.3	8.8

Numbers may not add up due to rounding

Table 3A - City of Calgary Population Projection

City of Calgary

FORECAST COMPLETED: July 2012		BASE FORECAST				
	2011	2012	2013	2014	2015	2016
Total Population (as April)	1,090,900	1,120,200	1,144,300	1,169,100	1,193,600	1,217,000
Total Population Growth Rate (April - March)	1.81	2.7	2.2	2.2	2.1	2.0
Total Net Migration (April - March)	19,700	14,300	15,000	14,800	13,700	12,300
Total Births (April - March)	16,100	16,500	16,600	16,700	16,700	16,700
Total Deaths (April - March)	6,500	6,600	6,800	6,900	7,100	7,200
Total Natural Increase (April - March)	9,600	9,900	9,800	9,800	9,600	9,500
Total Households (as April)	422,300	433,900	444,200	454,700	465,100	475,000
Total Household Formation (April - March)	NA	11,600	10,300	10,500	10,400	9,900

Population by Cohort		BASE FORECAST				
	2011	2012	2013	2014	2015	2016
0-4	73,300	76,700	79,100	81,000	82,700	84,800
5-9	63,300	66,800	70,200	73,600	76,900	79,100
10-14	61,400	62,400	63,300	64,800	66,600	68,900
15-19	64,800	65,200	65,500	66,200	66,600	66,800
20-24	73,800	73,100	72,500	72,100	71,900	71,700
25-29	93,400	93,500	91,200	88,500	86,300	84,700
30-34	92,100	96,400	100,000	103,700	105,800	106,200
35-39	88,700	91,200	93,700	96,300	99,500	102,600
40-44	85,400	89,100	91,500	93,400	95,200	96,500
45-49	86,500	87,000	87,000	87,500	88,900	91,900
50-54	83,200	84,900	86,700	88,400	89,400	89,600
55-59	67,400	71,600	75,100	78,200	80,800	82,700
60-64	50,800	52,500	54,500	57,700	61,100	65,200
65-69	32,800	35,700	38,900	41,500	44,500	47,400
70-74	24,500	24,900	25,700	26,800	27,900	28,900
75-79	20,200	19,900	19,900	19,800	19,800	20,200
80-84	15,500	15,600	15,600	15,400	15,300	15,200
85-89	8,800	8,500	8,400	8,400	8,500	8,500
90+	4,900	5,200	5,500	5,800	6,000	6,100
Total	**1,090,800**	**1,120,200**	**1,144,300**	**1,169,100**	**1,193,700**	**1,217,000**

Numbers may not add up due to rounding

Forecast Tables

Table 3B - City of Calgary Population Projection (continued)

City of Calgary

	BASE FORECAST					
	2017	2022	2027	2032	2037	2042
Total Population (as April)	1,238,800	1,331,700	1,411,000	1,487,800	1,559,600	1,625,900
Total Population Growth Rate (April - March)	1.8	1.5	1.2	1.1	0.9	0.8
Total Net Migration (April - March)	11,100	9,000	9,800	10,500	10,000	10,200
Total Births (April - March)	16,600	15,800	15,400	16,300	17,700	18,900
Total Deaths (April - March)	7,400	8,400	9,800	11,900	14,000	16,300
Total Natural Increase (April - March)	9,200	7,400	5,600	4,400	3,700	2,600
Total Households (as April)	484,500	526,100	562,300	597,000	630,500	661,500
Total Household Formation (April - March)	9,500	7,700	7,000	6,900	6,700	5,900

Population by Cohort	BASE FORECAST					
	2017	2022	2027	2032	2037	2042
0-4	85,200	82,900	79,200	80,000	85,700	92,500
5-9	81,900	88,900	86,300	82,900	83,800	89,300
10-14	71,900	85,500	92,200	89,900	86,600	87,400
15-19	67,300	75,300	88,600	95,600	93,400	90,000
20-24	71,400	71,600	79,400	93,100	100,100	97,800
25-29	83,100	78,400	78,100	86,600	100,300	107,100
30-34	105,000	91,300	86,000	86,500	95,000	108,400
35-39	105,800	111,600	97,300	92,700	93,300	101,600
40-44	98,200	110,600	115,900	102,200	97,700	98,100
45-49	94,800	101,900	113,900	119,600	106,000	101,400
50-54	89,600	96,200	103,000	115,000	120,700	107,200
55-59	84,300	88,500	95,000	101,700	113,500	119,000
60-64	69,300	81,600	85,700	92,000	98,500	109,900
65-69	49,000	65,300	77,000	80,900	86,800	93,100
70-74	31,700	44,300	59,300	70,000	73,500	79,000
75-79	20,600	26,800	37,700	50,700	60,000	63,000
80-84	15,000	15,800	20,900	29,400	39,700	47,000
85-89	8,600	8,400	8,900	11,900	16,600	22,700
90+	6,200	6,700	6,800	7,100	8,600	11,400
Total	**1,238,900**	**1,331,600**	**1,411,200**	**1,487,800**	**1,559,800**	**1,625,900**

Numbers may not add up due to rounding

Table 4A - Calgary Economic Region Population Projection

Calgary Economic Region (CER)

FORECAST COMPLETED: July 2012		BASE FORECAST				
	2011	2012	2013	2014	2015	2016
Total Population (as April)	1,362,400	1,398,400	1,428,000	1,458,500	1,488,700	1,517,500
Total Population Growth Rate (April - March)	1.8	2.6	2.1	2.1	2.0	1.9
Total Net Migration (April - March)	24,600	17,800	18,800	18,400	17,100	15,400
Total Births (April - March)	19,600	20,000	20,200	20,400	20,500	20,600
Total Deaths (April - March)	8,100	8,300	8,500	8,700	8,900	9,100
Total Natural Increase (April - March)	11,500	11,700	11,700	11,700	11,600	11,500
Total Households (as April)	527,900	542,000	554,600	567,400	580,100	592,400
Total Household Formation (April - March)	NA	14,100	12,600	12,800	12,700	12,300

Population by Cohort		BASE FORECAST				
	2011	2012	2013	2014	2015	2016
0-4	91,600	95,000	97,300	99,100	101,100	103,400
5-9	80,900	85,100	89,000	93,000	96,600	98,300
10-14	79,000	80,100	81,200	83,000	85,100	84,500
15-19	83,700	84,200	84,400	85,100	85,600	82,400
20-24	92,200	92,500	92,500	92,300	92,400	89,600
25-29	111,300	112,000	110,300	108,300	106,700	103,700
30-34	110,800	115,700	119,700	123,900	126,400	126,700
35-39	108,200	111,100	113,800	116,900	120,500	124,800
40-44	105,600	110,000	112,800	114,700	116,600	118,400
45-49	108,400	108,500	108,300	108,700	110,200	111,800
50-54	105,100	107,300	109,300	111,300	112,400	111,100
55-59	85,700	90,900	95,200	98,900	102,100	105,300
60-64	65,100	67,000	69,600	73,600	77,900	84,200
65-69	42,600	46,400	50,200	53,500	57,100	62,300
70-74	31,200	31,900	33,200	34,700	36,200	39,500
75-79	25,200	24,900	24,900	25,000	25,100	27,100
80-84	19,000	19,200	19,300	19,100	19,100	20,100
85-89	10,800	10,400	10,200	10,300	10,400	11,200
90+	6,000	6,400	6,800	7,100	7,300	8,200
Total	**1,362,400**	**1,398,600**	**1,428,000**	**1,458,500**	**1,488,800**	**1,512,600**

Numbers may not add up due to rounding

Table 4B - Calgary Economic Region Population Projection (continued)

Calgary Economic Region (CER)

	BASE FORECAST					
	2017	2022	2027	2032	2037	2042
Total Population (as April)	1,544,400	1,659,600	1,759,000	1,855,300	1,944,800	2,026,700
Total Population Growth Rate (April - March)	1.7	1.4	1.0	0.9	0.7	0.7
Total Net Migration (April - March)	13,900	11,300	12,300	13,100	12,500	12,700
Total Births (April - March)	20,500	19,800	19,600	20,500	22,100	23,500
Total Deaths (April - March)	9,300	10,600	12,500	15,000	17,700	20,400
Total Natural Increase (April - March)	11,200	9,200	7,100	5,500	4,400	3,100
Total Households (as April)	604,100	656,200	701,900	74,550	787,200	825,200
Total Household Formation (April - March)	11,700	9,800	8,900	8,500	8,200	7,200

Population by Cohort	BASE FORECAST					
	2017	2022	2027	2032	2037	2042
0-4	104,300	103,100	99,800	101,200	107,600	115,300
5-9	101,500	108,800	107,200	104,500	105,900	112,100
10-14	91,400	106,000	112,900	111,800	109,100	110,400
15-19	86,200	95,700	109,900	117,300	116,200	113,400
20-24	91,900	91,600	100,800	115,500	122,900	121,600
25-29	104,900	100,700	99,800	109,800	124,500	131,600
30-34	126,500	115,200	110,100	110,200	120,300	134,600
35-39	127,500	134,800	122,700	118,600	118,700	128,500
40-44	119,800	133,400	140,100	128,800	124,700	124,700
45-49	117,100	124,500	137,500	144,800	133,600	129,400
50-54	111,700	118,900	125,800	139,000	146,200	135,100
55-59	106,500	110,400	117,400	124,300	137,200	144,200
60-64	87,900	103,100	106,900	113,700	120,400	132,900
65-69	62,700	82,900	97,400	100,900	107,300	113,700
70-74	41,200	56,600	75,300	88,500	91,600	97,700
75-79	26,400	34,900	48,300	64,400	75,900	78,600
80-84	18,800	20,300	27,100	37,600	50,500	59,500
85-89	10,600	10,400	11,400	15,500	21,300	28,800
90+	7,600	8,200	8,400	8,900	11,000	14,600
Total	**1,544,500**	**1,659,500**	**1,758,800**	**1,855,300**	**1,944,900**	**2,026,700**

Numbers may not add up due to rounding

Table 5A - Selected Commodity Prices (1987-1994)

City of Calgary

FORECAST COMPLETED: August 2012

	1987	1988	1989	1990	1991	1992	1993	1994
CONSTRUCTION COMMODITIES								
Iron and steel products	1.4	5.2	2.4	-1.3	-2.1	-5.8	3.4	11.2
Aluminum products	10.6	29.1	-9.0	-18.9	-15.0	0.0	2.4	27.8
Wood	11.6	8.6	0.9	-0.5	1.6	10.6	35.8	12.5
Asphalt**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OPERATIONAL COMMODITIES								
Rubber	13.5	6.8	-16.7	-8.8	-6.1	9.1	3.9	40.9
Diesel oil	N/A	N/A	N/A	N/A	5.5	-8.4	-1.8	0.4
Vehicle parts	2.8	2.8	4.3	4.8	5.1	-0.6	1.9	0.6

Numbers may not add up due to rounding

** Based on Ontario Ministry of Transportation Asphalt Price Index

Table 5B - Selected Commodity Prices (1995-2002)

City of Calgary

FORECAST COMPLETED: August 2012

	1995	1996	1997	1998	1999	2000	2001	2002
CONSTRUCTION COMMODITIES								
Iron and steel products	8.8	-2.4	1.5	1.2	-3.0	2.2	-4.0	1.8
Aluminum products	19.7	-13.4	7.5	-4.7	-0.3	5.1	-1.5	1.0
Wood	9.3	-7.3	-1.3	-15.4	3.9	4.6	-7.5	-1.3
Asphalt**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.4
OPERATIONAL COMMODITIES								
Rubber	37.3	-12.1	-23.3	-20.0	-7.0	0.6	-5.8	23.2
Diesel oil	3.5	3.8	5.5	-0.9	0.8	22.2	5.3	-8.1
Vehicle parts	3.2	1.0	1.1	1.1	1.5	2.2	6.6	5.9

Numbers may not add up due to rounding

** Based on Ontario Ministry of Transportation Asphalt Price Index

Table 5C - Selected Commodity Prices (2003-2011)

City of Calgary

FORECAST COMPLETED: August 2012

	2003	2004	2005	2006	2007	2008	2009	2010	2011
CONSTRUCTION COMMODITIES									
Iron and steel products	-1.8	20.1	2.4	-2.5	-2.3	15.7	-3.0	-0.9	1.9
Aluminum products	-3.3	2.9	-1.3	15.7	-5.5	-0.4	-19.8	10.3	4.3
Wood	-2.1	1.0	-9.6	3.7	8.7	-3.5	11.0	-1.6	2.0
Asphalt**	9.6	-9.0	4.9	51.1	9.1	61.8	-25.4	13.1	-0.7
OPERATIONAL COMMODITIES									
Rubber	21.0	22.0	3.9	29.9	2.0	13.0	-9.2	69.2	32.8
Diesel oil	8.2	8.5	29.3	1.9	8.1	26.4	-31.1	10.5	23.6
Vehicle parts	4.5	3.5	3.2	3.5	7.9	4.6	5.3	1.7	1.8

Numbers may not add up due to rounding

** Based on Ontario Ministry of Transportation Asphalt Price Index

Table 5D - Selected Commodity Prices (2012-2021)

City of Calgary

FORECAST COMPLETED: August 2012	BASE FORECAST									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
CONSTRUCTION COMMODITIES										
Iron and steel products	-0.3	1.3	3.1	-1.2	4.2	-1.7	3.6	0.3	6.9	4.1
Aluminum products	-4.6	-1.1	5.2	-2.1	-0.9	-3.5	1.0	-1.7	5.3	-6.4
Wood	-0.1	-3.2	-5.5	-4.2	-5.5	-3.3	-2.0	2.9	3.5	-1.4
Asphalt**	4.1	-7.0	-5.5	-1.4	-3.1	-1.8	0.1	2.8	3.6	1.4
OPERATIONAL COMMODITIES										
Rubber	0.4	-0.3	1.4	2.6	0.9	0.4	0.9	1.3	1.3	1.3
Diesel oil	-5.9	-0.4	0.1	3.3	2.8	1.4	0.3	1.6	2.5	0.8
Vehicle parts	1.3	1.9	6.0	5.3	3.7	2.6	2.2	2.4	5.9	3.1

Numbers may not add up due to rounding

** Based on Ontario Ministry of Transportation Asphalt Price Index

Table 6 - GDP by Industry (2012-2042)

Calgary Economic Region (CER)

FORECAST COMPLETED: July 2012

($Millions 2002)

Industry	BASE FORECAST										
	2012	2013	2014	2015	2016	2017	2022	2027	2032	2037	2042
Agriculture, forestry, fishing and hunting	236	239	249	258	267	275	319	366	416	471	525
Mining and oil and gas extraction	26,087	26,648	27,522	28,412	29,420	30,455	36,208	42,702	49,387	56,548	64,010
Utilities	1,193	1,214	1,245	1,266	1,285	1,309	1,445	1,614	1,793	1,992	2,181
Construction	6,059	6,125	6,332	6,526	6,725	6,931	7,985	9,134	10,305	11,567	12,844
Manufacturing	4,597	4,806	5,069	5,308	5,526	5,765	6,995	8,443	10,060	11,902	13,790
Wholesale trade	3,681	4,242	4,736	5,176	5,564	5,940	7,672	9,479	11,372	13,430	15,506
Retail trade	3,171	3,272	3,417	3,549	3,682	3,821	4,565	5,412	6,304	7,272	8,256
Transportation and warehousing	3,364	3,490	3,671	3,830	3,974	4,130	4,901	5,767	6,687	7,697	8,683
Finance and insurance, real estate and renting and leasing and management of companies and enterprises	14,459	14,901	15,487	16,105	16,750	17,393	20,659	24,140	27,657	31,402	35,240
Professional, scientific and technical services	4,263	4,214	4,272	4,339	4,413	4,518	5,150	5,945	6,806	7,759	8,685
Educational services	1,788	1,817	1,874	1,922	1,968	2,017	2,265	2,547	2,840	3,161	3,480
Health care and social assistance	2,914	2,920	3,002	3,086	3,171	3,260	3,704	4,188	4,681	5,215	5,749
Information and cultural industries	1,969	2,072	2,193	2,305	2,410	2,520	3,069	3,669	4,296	4,974	5,643
Accommodation and food services	1,275	1,318	1,367	1,416	1,456	1,501	1,715	1,949	2,193	2,459	2,714
Administrative and support, waste management and remediation services	6,314	6,513	6,741	6,930	7,104	7,280	8,134	9,096	10,118	11,269	12,442
Other services (except public administration)	1,434	1,475	1,513	1,555	1,584	1,625	1,838	2,116	2,435	2,799	3,139
Public administration	1,715	1,789	1,846	1,904	1,967	2,027	2,335	2,663	2,990	3,340	3,707
All GDP	**84,519**	**87,055**	**90,537**	**93,887**	**97,267**	**100,768**	**118,960**	**139,229**	**160,340**	**183,260**	**206,597**
Growth Rate (%)	**3.5**	**3.0**	**4.0**	**3.7**	**3.6**	**3.6**	**3.4**	**3.2**	**2.9**	**2.7**	**2.4**

Numbers may not add up due to rounding

Forecast Tables

Table 7 - Employment by Industry (2011-2042)

Calgary Economic Region (CER)

FORECAST COMPLETED: July 2012

(Thousands of persons)

Industry	2011	BASE FORECAST										
		2012	2013	2014	2015	2016	2017	2022	2027	2032	2037	2042
Agriculture, forestry, fishing and hunting	5.7	5.2	5.4	5.6	5.8	5.9	5.9	6.3	6.5	6.9	7.2	7.5
Mining and oil and gas extraction	53	65	66	66	67	67	68	71	74	77	80	84
Utilities	6	7	7	7	7	7	7	7	8	8	8	9
Construction	75	79	80	82	84	85	86	92	96	100	105	109
Manufacturing	53	55	58	60	62	64	66	74	81	90	99	108
Wholesale trade	32	33	34	34	35	35	36	37	39	41	43	44
Retail trade	85	89	90	91	92	93	93	97	101	105	110	114
Transportation and warehousing	42	46	48	50	51	53	54	58	62	66	71	74
Finance and insurance, real estate and renting and leasing and management of companies and enterprises	42	40	42	43	45	46	48	53	57	60	64	67
Professional, scientific and technical services	90	81	80	80	80	80	80	82	85	90	94	98
Educational services	44	43	44	45	46	46	47	49	51	53	56	58
Health care and social assistance	80	83	85	87	89	91	92	98	102	107	112	117
Information and cultural industries	36	37	39	40	42	43	44	48	51	54	57	60
Accommodation and food services	46	49	52	53	55	56	57	61	64	67	71	74
Administrative and support, waste management and remediation services	29	25	28	35	41	45	49	59	62	65	66	65
Other services (except public administration)	34	38	39	39	40	40	40	41	42	44	46	48
Public administration	25	26	27	27	28	28	29	30	32	33	34	36
Total employment	776	802	823	846	869	885	900	963	1,013	1,068	1,123	1,170
Growth Rate (%)	NA	3.3	2.6	2.8	2.8	1.8	1.7	1.4	1.0	1.1	1.0	0.8

Numbers may not add up due to rounding

Calgary and Region
Economic Outlook 2012-2017
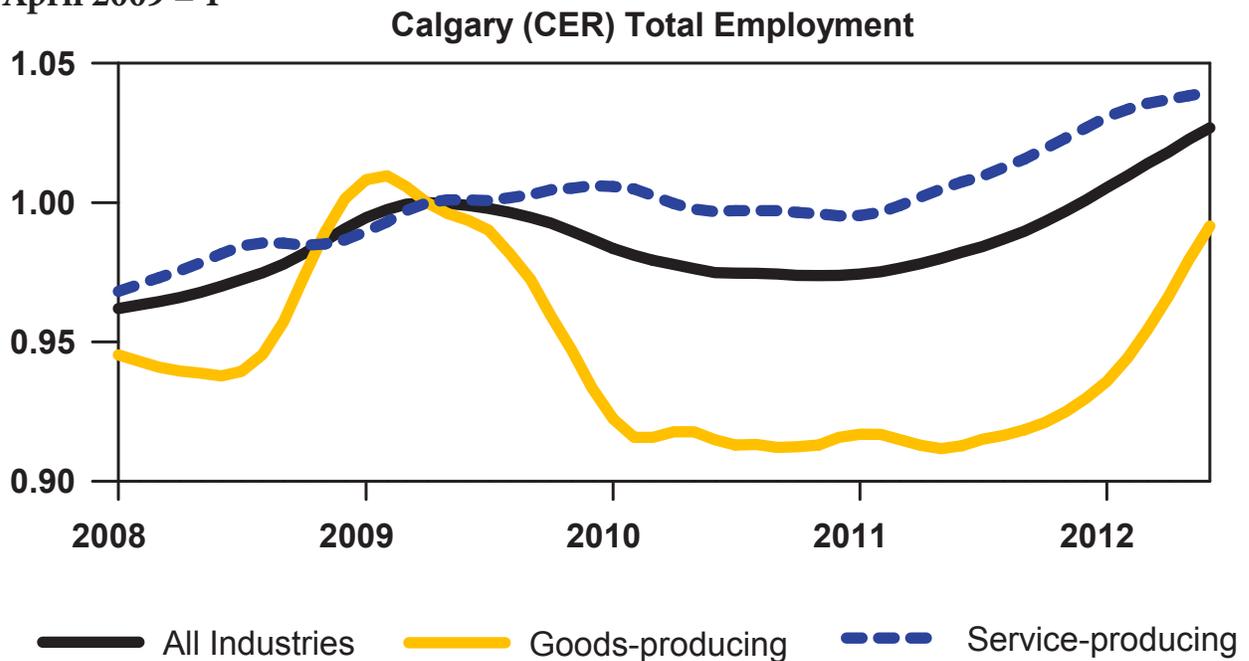## with Long-Term Economic Trends 2018-2042

Appendices

Appendix A - Calgary Employment

The CER-Job Market January 2008 to June 2012

index, April 2009 = 1

Calgary (CER) Total Employment

— All Industries　　— Goods-producing　　- - - Service-producing

This section shows how the economic recession affected the job market over the January 2000 to June 2012 period. Total employment grew steadily from 745,900 in January 2008 to 775,400 in April 2009. From the April 2009 peak of 775,400, employment declined to 755,000 in November 2010 before recovering to 776,100 by December 2011. The job market therefore lost about 20,000 jobs from peak to trough over a 20 month period and took 12 months to recover lost jobs. The majority of job losses were experienced in the goods sector, while the service sector experienced little job loss.
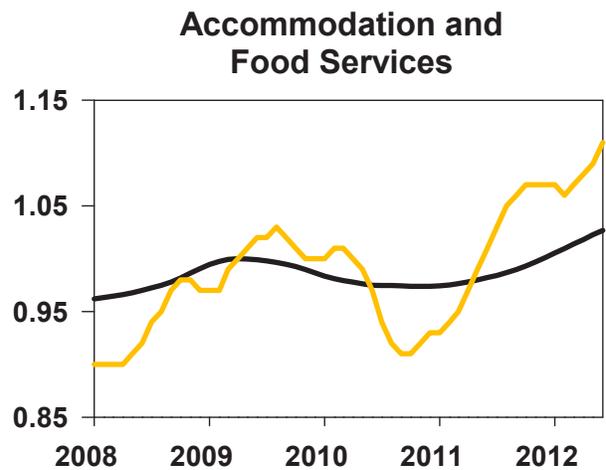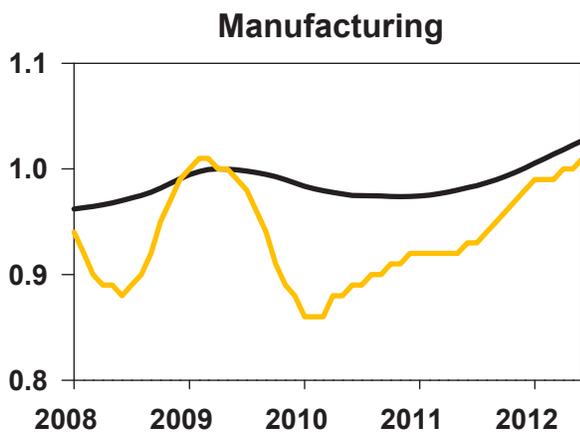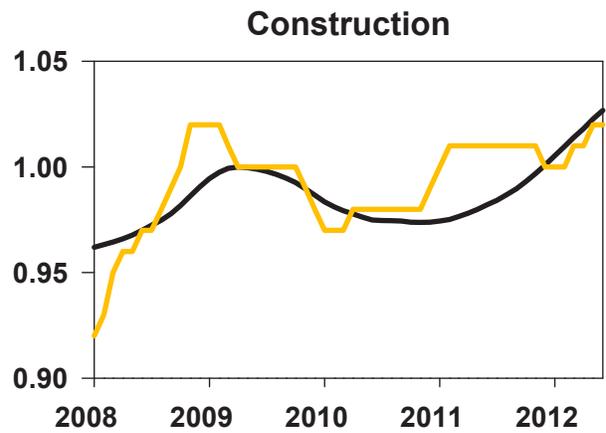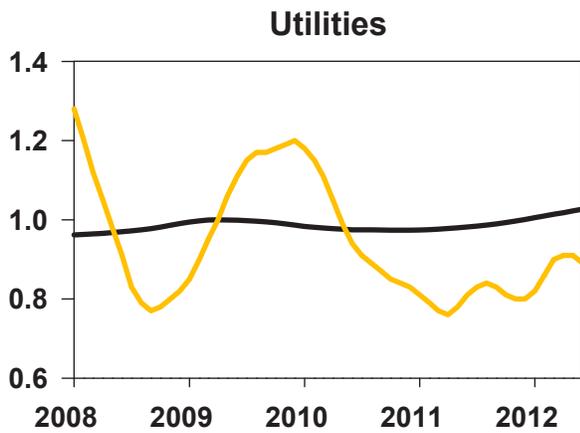
The analysis of employment data uses a 12 month moving average to compare employment levels across industries over time. The 12 month moving average data for total employment and employment by industry are converted into index numbers to allow for comparison across industries. April 2009 is defined as the base period and assigned a value of 1.0. For example, the index for total employment as at November 2010 was estimated at 0.9738 and indicates that the employment level was 2.62 per cent lower than the base-April 2009. The graphs that follow show how various industries behaved over this period.

Employment by Industry, index, April 2009 = 1

Monthly data (January 2008 - June 2012) were gathered from Statistics Canada and were tabulated by Corporate Economics.

— All Industries   — Selected Industry

Agriculture

Forestry, Fishing, Mining, Oil and Gas

Utilities

Construction

Manufacturing

Accommodation and Food Services

Employment by Industry, index, April 2009 = 1

Monthly data (January 2008 - June 2012) were gathered from Statistics Canada and were tabulated by Corporate Economics.

—— All Industries   —— Selected Industry

Retail Trade

Transportation and Warehousing

Finance, Insurance, Real Estate and Leasing

Professional, Scientific and Technical Services

Business, Building and Other Support Services

Educational Services

Employment by Industry, index, April 2009 = 1

Monthly data (January 2008 - June 2012) were gathered from Statistics Canada and were tabulated by Corporate Economics.

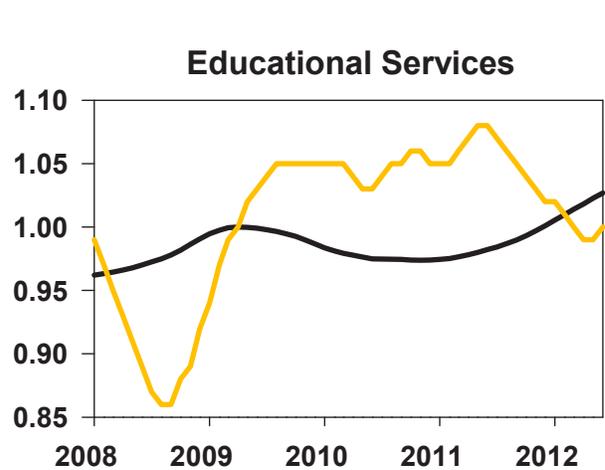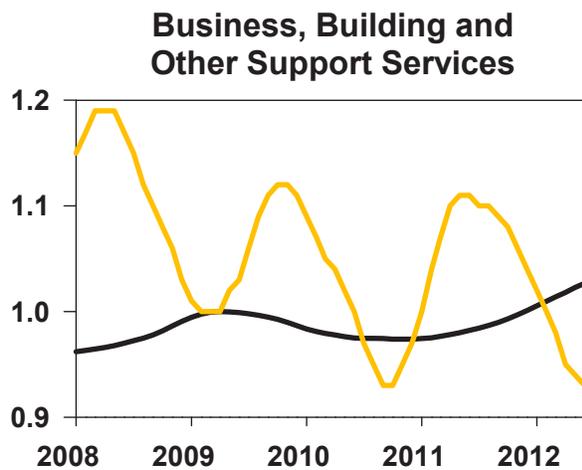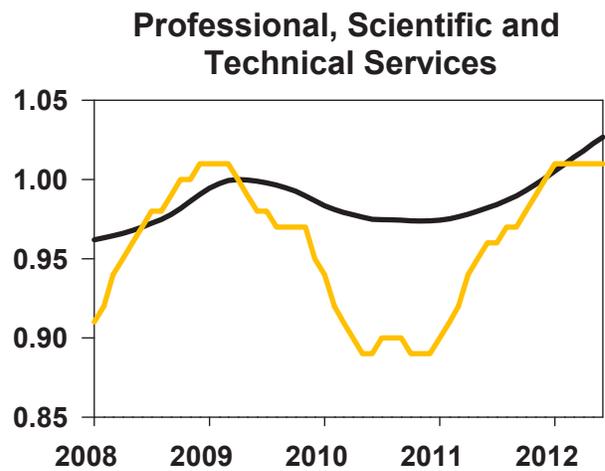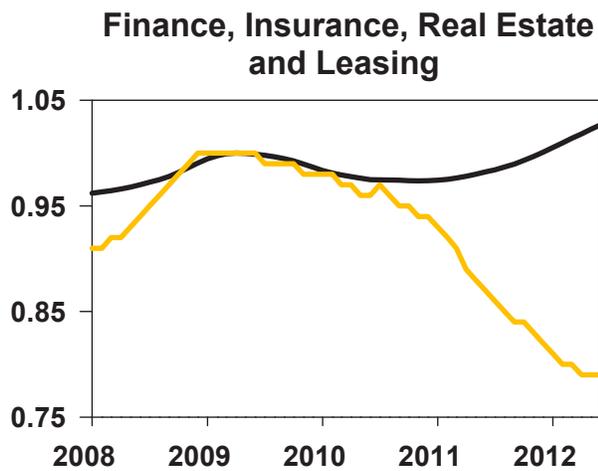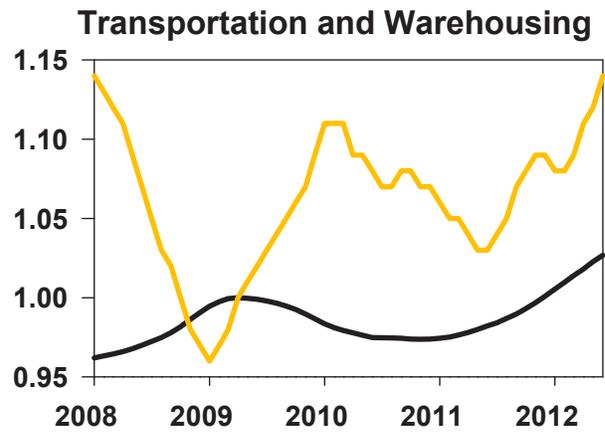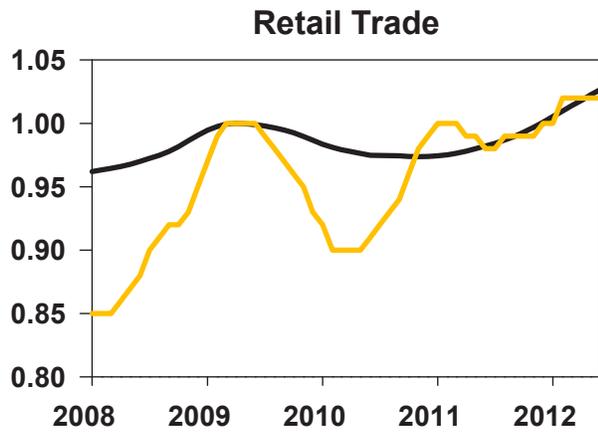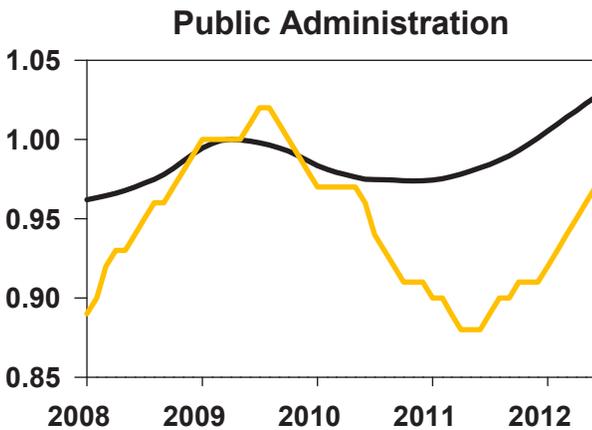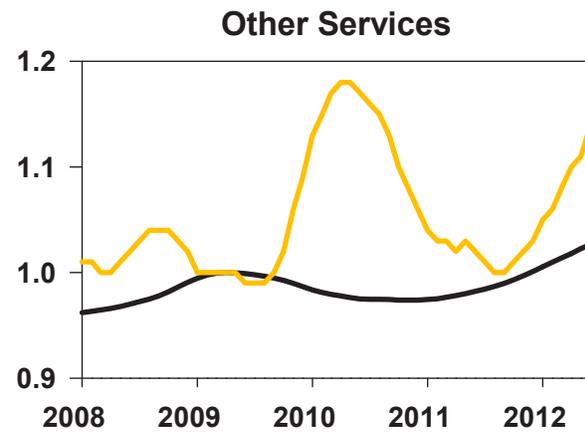— All Industries   — Selected Industry

Health Care and Social Assistance

Information, Culture and Recreation

Wholesale Trade

Other Services

Public Administration
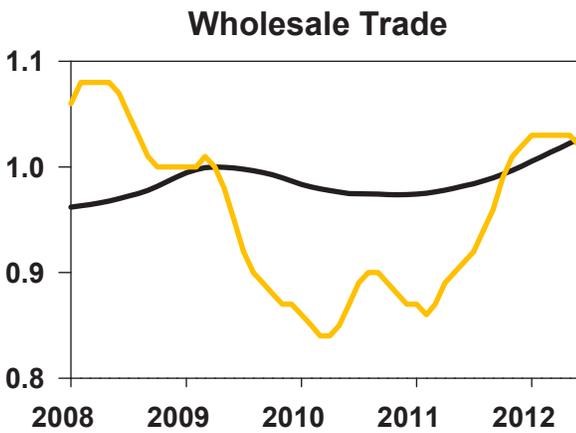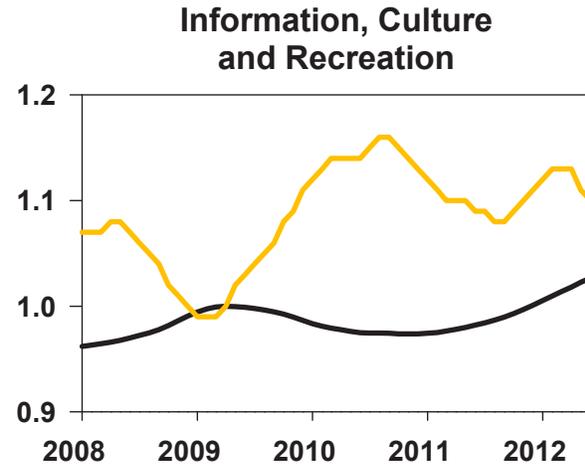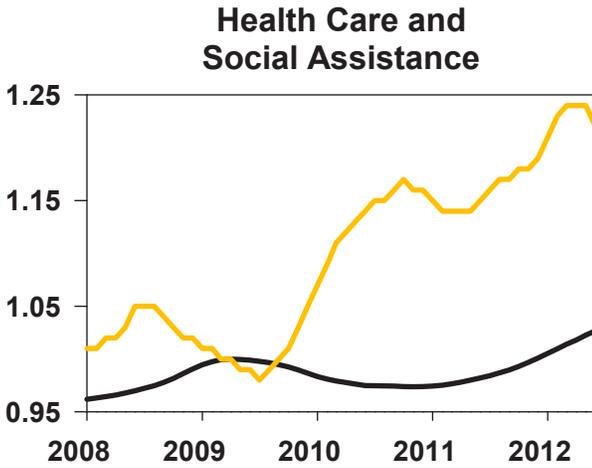
Appendix B - Demographic Demand for Dwellings in Calgary

Summary

We present a demographic demand model for housing demand by type of dwelling in Calgary. Our model uses preferences revealed in the 2011 Calgary Civic Census as well as the City's own demographic population projections 2012-2042 to generate this forecast. In summary, the model shows a slowly declining construction market in Calgary with single family falling from 6,700 units today to 2,400 by 2042. Single family remains the dominant demanded style of dwelling throughout the forecast though there is some room for more Townhouse activity.

Introduction

Every year since 1971 the City of Calgary has conduced a Census of its residents. Total population is counted every year as well as total dwellings by type. Additionally, in the Census the City reports on the number of dwellings by the categories: Single Family, Duplex, Apartment, Townhouse, and Conversion. The remainder may be classified as "Other", which includes things like retirement homes and shelters. About every 5 years age cohort information is also reported, as it was in the 2011 Census (5).

Typically researchers use "household headship rates" to analyze housing demand over the long range. Ideally, in order to analyze the housing demand in Calgary the age cohort breakdown by different dwelling type is needed but not published in the Census.

Appendix B

Instead of using headship rates, we utilize non-linear Baysian Monte Carlo simulation to reveal the missing information on age cohorts dwelling in different types of dwellings in Calgary. We then use this revealed data and our current population forecast, by age cohort, to produce a first-best forecast of housing demand, by dwelling type, in Calgary 2012-2042.

Data

We use the following tables out of the 2011 Calgary Civic Census in our analysis:

- 2011 Age Distribution by Community
- Dwelling Summary by Community
- Population and Number of Dwellings by Select Structure Type.

We combined the data from these tables into one master table. In some instances data was published for a community in one table but not another. Due to incomplete data these communities had to be deleted from our master table. In a few other instances we deleted communities from our master list for being either of an industrial nature with very few residents or in cases where new communities had very few dwellings or residents. We were left with a data set of 190 communities representing 99.45% of the population of Calgary.

Methodology

Usually in long term housing demand forecasts "headship rates" are used (1, 2, 3, 4). In this method the total population, by age cohort, is first forecast using standard life-cycle models. Then a sample of households are surveyed to find out the age and sex of the oldest inhabitant. Finally, the housing demand is estimated by looking at the future projected population of people who

are the oldest inhabitants (3). It is generally accepted that though economic events may impact market performance in any particular year, the best method for long term forecasts of housing demand are based solidly on demographic factors like headship rates. (4)

There are several drawbacks to the headship rate method. One is that it ignores the possibility of multiple family households such as exist in houses with basement suites. Another drawback is that this methodology provides no information on household dynamics, that is, there is no information on who, other than the "head of the household" is living in each type of dwelling.

Alternatively, we propose to generate a table which shows the age breakdown of the population of Calgary by housing type. This method avoids issues with surveying to find out who the head of the household is and reveals dynamic information about the housing market as well. Similar information was provided by Statistics Canada to Stantec when they forecast housing demand for the City of Windsor (3). In their study this was referred to as "household demand propensies" and it was noted, "... household demand propensies for individual age groups are generally assumed to be relatively stable according to CMHC findings and methodology" in reference to the CMHC Canadian Housing Observer (2003) (p. 3.5)

We set out to statistically estimate the "household demand propensies" for Calgary using Calgary Census data. Unlike the Windsor study, in this study, we include all age categories. As it seems a stretch to refer to a "demand propensity" for a newborn baby, we adopt the title. "Percent of population age cohort in type of dwelling"

The statistical formulas in our model start out simple enough as a system of linear equations where each equation represents a housing type, which is dependent

upon each age cohort. The unknowns estimated are the proportions of each age cohort residing in each dwelling type. One equation is needed for each dwelling type so we have 6 equations; single family, duplex, apartment/condo, townhouse, conversion, and other.

Estimation of this simple model yields disappointing results. It is immediately obvious that we must impose regularity conditions upon the model. The first regularity condition that must be imposed is that the proportions must be positive and lie between zero and one. The next condition that must be imposed is that the population be completely distributed across the housing types.

These regularity conditions can be imposed by combining three statistical restrictions on the model. First, and easiest is that each equation should be divided by the average person per household observed across the data set. This is also published in the Civic Census for 2011 as: 2.87 for Single Family, 2.33 for Duplex, 1.38 for Apartment/Condo, 2.12 in Townhouse, 1.27 in Conversions and 5.59 in "Other". The second restriction is that all proportions summed across equations equals one. This ensures that 100% of the 0-5 yr-olds, etc., get metered out to each housing category. The last regularity condition that we need to impose is that each proportion

be positive. This is accomplished by squaring the proportions and using non-linear estimation technique to estimate the resulting system of equations. The resulting set of equations and regularity conditions yields a system of 16 nonlinear equations with 60 unknowns and 190 observations.

To estimate the model we use Shazam V. 10.0 econometrics software for its two main virtues, it is powerful and inexpensive.

We utilize nonlinear three-stage least squares estimation technique with convergence criteria set to 0.00001. In testing the model we found that more precision led to extreme increases in computational time without noticeable increase in parameter estimate accuracy. Less precision resulted in significantly greater variability in parameter estimates.

We performed a Monte Carlo simulation of the model with 8,000 runs with convergence criteria set to time out at 10,000 iterations. In none of the runs did the simulation time out. The runs, however, were computationally expensive requiring 209 hours.

We averaged the results of the 8,000 runs to produce the following table of results:

Percent of population age cohort in type of dwelling										
Type	Age Cohort									
	0-4	5-14	15-19	20-24	25-34	35-44	45-54	55-64	65-74	75+
Single Family	43%	58%	47%	63%	56%	66%	70%	52%	37%	34%
Duplex	17%	7%	10%	3%	2%	4%	4%	12%	7%	9%
Apt/Condo	10%	13%	23%	19%	37%	20%	14%	20%	19%	22%
Townhouse	16%	6%	8%	6%	2%	6%	8%	11%	32%	28%
Conversion	2%	1%	1%	6%	2%	1%	1%	1%	2%	4%
Other	11%	16%	12%	3%	2%	3%	3%	4%	4%	3%

As a result of the analysis we reveal a discrepancy in the number of persons per household per dwelling type. As stated earlier the persons per household by dwelling type are published in the Census. This methodology reveals a significant discrepancy in those numbers particularly among the Single Family and Apt/Condo categories.

	PPH CENSUS	PPH computed
Single Family	2.87	2.39
Duplex	2.34	2.35
Appt/Condo	1.42	2.41
Townhouse	2.13	2.19
Conversion	1.27	1.13
Other (multi)	4.55	12.73

In total the discrepancy accounts for about 125,000 inhabitants. There are a few explanations for this discrepancy:

First, we note that our methodology makes no allowance for vacant dwellings whereas the Census does.

Second is the possibility of Secondary Suites

If the differential is the result of people avoiding reporting their living in an illegal basement suite when Census takers show up at the door then we can use the results of this model to estimate the number of basement suites in Calgary.

The computed PPH figures of this model imply that there are 53,045 basement suites in Calgary housing 126,528 individuals. This seems congruent with previous estimates of the number of basement suites, which were in the 50,000 range. (http://www.cbc.ca/news/canada/calgary/story/2007/03/20/bylaw-suites.html) Further, our model indicates that if these basement suites were not available in the market then the demand for other dwelling units would be higher. In particular there would be increased demand for:

▶ 24 Duplexes housing 57 people,

▶ 38,663 Apt/Condo units housing 93,198,

▶ 1,288 Townhouses housing 2,816 individuals and

▶ 3,030 dwellings in the Other category housing 38,561 (mostly large families so the most demanded type of structure would likely be mobile homes, though there would be increased demand for communal / assisted living facilities for the aged as well).

▶ Although there would also be 1,597 fewer conversions with 2,202 fewer tenants in converted properties.

Note, this adds up to 132,430 people, 5,901 more than we estimated who are currently renting basement suites in Calgary. 5,901 is our estimate of the number of individuals who currently own and reside in single family dwellings who could not afford to do so without collecting rent from tenants. If the practice of renting out basements was disallowed and fully enforced these individuals would find other accommodation (already included in the above bullets) and 2,469 single family dwellings would be for sale.

With regard to the reliability of the computed PPH rates, we note that there are very few bachelor apartments in the Calgary apartment market while there are significantly more 2 -bedroom units. Indeed, the usual practice in industry is to publish the average rent for a two-bedroom apartment as the standard for making comparisons across Canadian cities and across different properties within a City. As the City Census reported person per household in the Apt/Condo category is only 1.42 while our computed population density is 2.41 we believe our

numbers are more representative of the Calgary market. Also, our computed population density for the Other category (mostly communal type dwellings) is 12.7 compared to the Census number of only 4.6. As such, our computed PPH seems more reflective of the Calgary market.

Forecast

We utilized our current population forecast for the City of Calgary as included previously in this report.

To test the reliability and accuracy of our model we benchmarked it against 2011 actuals. We multiplied our computed "Percent of population age cohort in type of dwelling" table with the observed 2011 census age cohorts as published in the 2011 Civic Census. This generated a forecast of the number of dwellings, by housing type, in the Calgary market in 2011. The forecast accuracy was +0.02% for Single Family, -0.14% for Duplex, -0.03% for Apt/Condos, -0.036% for Townhouses, +0.01% for Conversions and +1. 27% for "Other".

The total absolute error of the forecast was 507 dwellings out of 450,952 yielding an accuracy of 99.888% while the mean error was 11 units, yielding an average accuracy of 99.998%.

Combining the population forecast and the computed Percent of population age cohort in type of dwelling yields the following forecast of dwelling demand in Calgary 2012-2042.

Appendix B

Demographic Driven New Housing Demand in Calgary by Housing Type

Type	Year									
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Single Family	6,732	5,418	5,646	5,597	5,318	5,032	4,581	4,235	4,025	3,807
Duplex	966	854	876	870	869	780	740	709	647	571
Apt/Condo	2,398	1,797	1,835	1,715	1,543	1,332	1,189	1,084	1,079	1,094
Townhouse	1,408	1,381	1,354	1,415	1,435	1,397	1,448	1,495	1,521	1,537
Conversion	274	203	199	196	185	137	136	141	140	146
Other (multi)	141	124	132	130	125	125	116	109	104	97
Total	11,919	9,777	10,042	9,923	9,475	8,803	8,210	7,773	7,516	7,252

Type	Year									
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Single Family	3,539	3,304	3,135	3,046	3,012	2,976	2,963	2,958	2,950	2,902
Duplex	553	526	515	519	522	511	477	457	492	544
Apt/Condo	1,082	1,145	1,183	1,170	1,151	1,211	1,251	1,312	1,353	1,432
Townhouse	1,517	1,493	1,512	1,521	1,520	1,491	1,481	1,460	1,392	1,272
Conversion	187	225	249	270	299	350	384	409	414	382
Other (multi)	88	78	70	65	62	50	43	38	37	41
Total	6,966	6,771	6,664	6,591	6,566	6,589	6,599	6,634	6,638	6,573

Type	Year									
	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Single Family	2,886	2,784	2,679	2,533	2,423	2,322	2,287	2,269	2,291	2,365	2,406
Duplex	516	511	495	512	509	522	544	550	511	459	432
Apt/Condo	1,493	1,532	1,545	1,534	1,477	1,581	1,542	1,484	1,413	1,309	1,222
Townhouse	1,189	1,159	1,167	1,182	1,224	1,152	1,087	1,046	1,041	1,043	1,043
Conversion	419	403	383	377	386	327	302	281	252	217	193
Other (multi)	29	29	29	31	33	35	39	43	46	51	54
Total	6,532	6,418	6,298	6,169	6,052	5,939	5,801	5,673	5,554	5,444	5,350

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Assumptions

We must note that some assumptions are implicitly buried in the model.

The first implicit assumption is that the preferences for housing type, as people age, remains unchanged throughout the forecast horizon. That is, it seems that single family dwellings are the preferred choice, while apt/condos are next most preferred while a large minority of 25-34 Yr old cohorts select this housing type. It is assumed these preferences, whether they be economic or lifestyle in nature, continue throughout the forecast horizon.

The second implicit assumption is that these housing choices will continue to be available. As the city continues to grow, continued demand for single family dwellings imply increased need for land space and over the next 30 years that may mean opening communities further and further away from major employment centres. That can impose higher costs in terms of travel time which may impact peoples' preferences in housing type. This analysis implicitly assumes that sufficient housing choices can be made available without impacting relative choices either by A) increased use of freeways with more lanes at ground level or elevated spans, B) increased service of rapid public transit from outlying areas though expanded LRT or through the introduction of bullet train service, C) reallocation of current industrial land near the city core, D) conversion of current green and brown spaces within the current city limits, or any combination of these options.

Finally, we wish to note that our forecast contains an implicit assumption on the practice of renting "basement suites". The implicit assumption is that the practice will continue with the same market penetration. That is, currently we estimate that about 11% of the population lives in a "basement suite" and the model operates on the implicit assumption that in the future 11% of the population will continue to reside in "basement suites".

Analysis

We tested the impact of our net migration assumptions on the population model. Changes in the number of net migrants in our population model resulted in changes in the total demand for housing, but the relative preferences between housing types were unaffected.

We would like to emphasize that the model used in this analysis is a purely demographic model and as such it lacks the nuances that a more specific housing demand model would have. In particular, the model is useful for forecasting the long term demand for housing in Calgary but not useful for predicting the timing of the fulfilment of that demand. Fulfilment of demand will depend upon general economic conditions of the day; wages, inflation, prices and interest rates. Calgary's history is one of boom and bust cycles with land investors/speculators frequently playing their part. We anticipate these cycles will continue and recognize that the model used in this analysis shows the future trends but does not accurately predict the market outcomes in any particular year in the forecast period.

Even with this limitation, the model robustly shows that the single family structure continues to be the dominant demanded dwelling type. A total of 108,425 single family homes were predicted by the model to be needed over the next 30 years in Calgary. That represents a 42% increase over the current housing stock for single family homes.

In second place is a tie between Apt/Condos and Townhouses with demand for 43,500 in each of these

categories over the next 30 years. This represents a 46% increase in the Apt/Condo stock, comparable to the single family market. However, this represents a 89% increase in demand for Townhouses. The increase in demand for Townhouses is expected as baby boomers age and look to downsize their real estate holdings while meeting these criteria: A) all living amenities on one floor within the dwelling, B) sufficient space for grand children to visit, C) some green space for either gardening or simple enjoyment though it is likely condo type services to maintain lawns and shovel driveways/walks would be included in preferred properties.

The Duplex market is also expected to see some increased demand both from retiring baby boomers as this type of dwelling can meet their desires but also from a growing population of young families who are pressed for funds but still want some dedicated and fenced green space for young children. The model shows an increase in demand for duplexes of 18,500 dwellings (9,250 buildings) over the next 30 years, but for there to be a general downward trend from today onward. Though total demand is expected to total 63% more than the current housing stock, demand is expected to wane from about 800 units annually to about 400 units annually by 2042.

Epilogue

This analysis shows the sheer size of the dwelling market in Calgary over the next 30 years. Compared to recent years when even 15,000 dwellings per year was considered normal, our forecast of 5,000 per year is much more modest. However, over 30 years the growth is a staggering 49%, with 222,500 new dwellings in addition to the already existing 450,000.

Current city area structure plans are sufficient to accommodate this growth, however, construction of these dwellings will require significant upgrades to existing transportation infrastructure like the road network in the downtown core as well as highway infrastructure, which may include more lanes or even elevated lanes in certain areas.

Also, we note that this analysis is with respect to new construction only. New construction occurs in greenfield locations, but can also be considered to occur in "infill" locations where one house is torn down and two are built on the old site. One of the new houses can be considered replacement of old stock while the other can be considered new construction for the purposes of this forecast.

Of final note we consider the major renovation market. Many of the dwellings currently in Calgary were constructed during "the first boom" of 1978-1983. Many of these dwellings will age beyond 50 years during the forecast period. Updating these properties will likely require more than carpet and paint replacement. Major renovations to kitchens, bathrooms, plumbing and wiring will be necessary for many of these structures. The size of the renovation and remodeling market may become as large or larger than the size of the new home construction market by 2030, though more work needs to be done to provide better estimates of the pending renovation surge.

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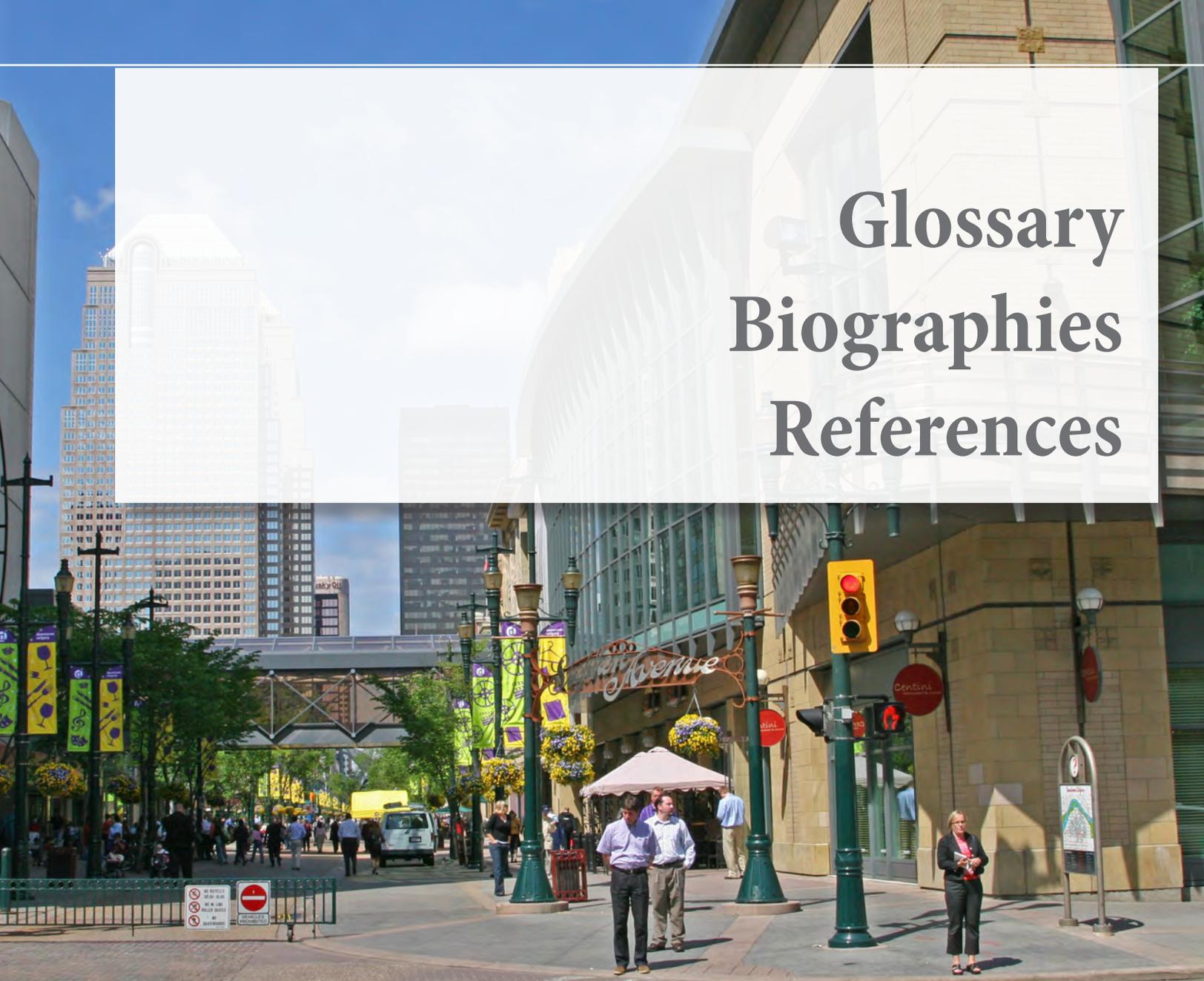
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GLOSSARY

AECO C

Is the central natural gas spot market price for Alberta, measured in CAN$ per gigajoule. Joule is the international measure of energy. One gigajoule corresponds to one billion joules.

Account surplus

Occurs when a nation's total exports of goods, services and transfers exceed its total imports of these items.

Advanced economies

Currently composed of 31 developed countries: Australia, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovenia, Spain, Sweden, Switzerland, Taiwan Province of China, United Kingdom and the United States.

Aggregate demand

The sum of consumer, government and business spending and net exports.

Baltic Dry Index (BDI)

The Baltic Dry Index (BDI) is a popular financial barometer to track worldwide international shipping prices of various dry bulk cargoes. It is a number issued daily by the London-based Baltic Exchange. The index provides an assessment of the price of moving the major raw materials by sea.

Baby-Boomer Generation (BBG)

Those born between January 1st 1946 and December 31st 1964.

Commodities

Goods usually produced and/or sold by many different companies. It is uniform in quality between companies that produce/sell it in the sense that we cannot tell the difference between one firm's product and another. Examples of commodities include oil, electricity, metals, cement and agricultural products, such as wheat, corn, rice.

Consumer Price index (CPI)

The Consumer Price Index (CPI) is an indicator of the consumer prices encountered by consumers. It is obtained by calculating, on a monthly basis, the cost of a fixed "basket" of goods purchased by a typical consumer during a given month. The basket contains products from various categories, including shelter, food, entertainment, fuel and transportation. Since the contents of the basket remain constant in terms of quantity and quality, the changes in the index reflect price changes. The CPI is a widely used indicator of inflation (or deflation) and indicates the changing purchasing power of money in Canada.

Core inflation rate

Rate of inflation in the Consumer Price Index excluding food and energy.

Defined benefit plan (DB)

A defined benefit plan provides a retiree with a pre-determined percentage of his/her working salary when he/she retires.

Defined contribution plan (DC)

A defined contribution plan (DC) provides with a pension benefit based on the accumulated contributions from both an employee and his/her employer and investment income by the pension administrator.

Glossary

Dependency Ratio

The ratio of the sum of the population under 15 years and over 64 years divided by the working age population (15 years to 64 years)

Double-Dip Recession

A double-dip recession refers to a recession followed by a short-lived recovery, followed by another recession. The technical measurement of double-dip is when gross domestic product (GDP) slides back to negative after several quarters of positive growth.

Economic region

The area generally correspondent to a region used by the province for administrative and statistical purposes.

Economy

The term economy refers to the institutional structures, rules and arrangements by which people and society choose to employ scarce productive resources that have alternative uses in order to produce various goods over time and to distribute them for consumption, now and in the future, among various people and groups in society. In a free-market economy like Canada's the laws of supply and demand determine what, how and where goods and services should be produced, who should consume them and when. A "strong' or "healthy" economy is usually one that is growing at a good pace.

Employment rate

The number of employed persons expressed as a percentage of the working age population.

Euro zone

Denomination given to the European Union members that adopt the Euro as their currency. As of 2007 there were 15 countries in the Euro Area: Belgium, Germany, Ireland, Greece, Spain, France, Italy, Cyprus, Luxembourg, Malta, The Netherlands, Austria, Portugal, Slovenia and Finland.

European Union or European Economic Community

Initially conceived as a way of avoiding war among European countries, it is currently the most sophisticated and advanced form of economic integration, encompassing the free movement of people, goods and services among its members which is presently at 27. Note that membership in the European Union does not automatically lead to adoption of the Euro.

Eurostat (Statistical Office of the European Community)

It produces data for the European Union and promotes harmonization of statistical methods across the member states of the European Union.

Emerging economies

This is a reference to countries that, due to growth performance, are considered in transition between developing and developed countries. The most important emerging economies are Brazil, China, India and Russia, sometimes referred to as BRIC.

Fiscal policy

Also called budgetary policy, the overall program for directing government spending and taxation for the purpose of keeping the actual Gross Domestic Product (GDP) close to the potential full employment GDP, but without overreaching that potential and causing inflation.

Fixed exchange rate

Sometimes called a pegged exchange rate, is a type of exchange rate regime wherein a currency's value is matched to the value of another single currency or to

a basket of other currencies, or to another measure of value, such as gold.

Goods-producing industry

Includes agriculture, forestry, fishing, mining, oil and gas extraction, utilities (electric, gas and power), construction and manufacturing.

Gross Domestic Product (GDP)

GDP is a measure of the value of all goods and services produced by the economy. Unlike Gross National Product (GNP), GDP only includes the values of goods and services earned by a region or nation within its boundaries.

Home market value

An indicator to compare houses across the country. This indicator is based on an 1,800 sq. ft., seven-room, three-bedroom, two-bath home in a suburban community where middle income Canadian families of four reside.

Housing markets

Consists of two markets: new house and re-sale markets referred to as MLS (Multiple Listing Service). Each is described by different parameters and followed closely by different statistical bodies: the Planning and Building Department with The City of Calgary and Statistics Canada for new houses, and The Canadian Real Estate Association for the re-sale market.

Housing units

A general term that refers to single-family houses, townhouses, mobile homes and/or condominiums.

Index

An economic tool that allows for data comparison over time. An index number is used to indicate change in magnitude (cost or price) as compared with the magnitude at some specified time.

Inflation rate

A measure of the percentage change in the Consumer Price Index for a specific period of time.

In-migrants

Persons currently living within a census metropolitan area (CMA), that five years earlier lived elsewhere in Canada or abroad.

Labour force

The working age population, which includes employed and unemployed people.

Labour force participation rate

The total labour force expressed as a percentage of the working age population.

Major advanced economies (G7)

Composed of seven countries: Canada, France, Germany, Italy, Japan, United Kingdom, and the United States

Migrants

Persons who lived in a different census subdivision (CSD) than the one they lived in five years earlier (internal migrants) or who lived outside Canada (external migrants or immigrants).

Monetary policy

Refers to government measures undertaken to affect financial markets and credit conditions with the ultimate objective of influencing the overall behaviour of the economy. Monetary policy is usually the responsibility of the central banks, such as the Bank of Canada.

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OECD

It is the acronym for Organization of Economic Cooperation and Development. It currently has 30 members, all from developed economies in Europe, North America, Asia and Oceania. It was created in 1961 and aims to foster prosperity and fight poverty through economic growth and financial stability.

Old Age Dependency Ratio

The ratio of the population over 64 years divided by the working age population (15 years to 64 years)

Reserve currency

A reserve currency, or anchor currency, is a currency that is held in significant quantities by many governments and institutions as part of their foreign exchange reserves. It also tends to be the international pricing currency for products traded on a global market, and commodities such as oil, gold, etc.

Service-producing industries

Includes trade, transportation and warehousing, finance, insurance and real estate, professional, scientific and technical services, management administrative and other support, educational services, health care and social assistance, information, culture and recreation, accommodation and food services, other services, and public administration.

Unemployment rate

The number of unemployed persons expressed as a percentage of the labour force.

West Texas Intermediate (WTI)

Also known as Texas Sweet Light, a type of crude oil used as a benchmark in oil pricing and the underlying commodity of the New York Mercantile Exchange's oil futures contracts. This oil type is often referenced in North American news reports about oil prices, alongside North Sea Brent Crude.

Working age population

Corresponds to all persons aged 15 years and over, with exception of the following: persons living on Indian reserves, full-time members of the regular armed forces and persons living in institutions.

Biographies

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Patrick Walters has an interest in applying quantitative methods to solve operational questions. He is experienced in building forecasting and simulation models and has presented to professional bodies such as the System Dynamics Society.

Before joining The City of Calgary, he served as Senior Economist and Economist with The City of Edmonton, the Alberta Government and Environment Canada. Patrick earned a Master's degree in Economics from York University with specializations in Labor Economics, Industrial Relations and International Economics. He has a bachelor's degree from the University of Toronto.

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Clyde's current focus is on econometric modeling, financial and public policy analysis. He has held various positions at The City and has represented The City at courts, tribunals, government agencies and departments, and before external stakeholders as analyst, prosecutor, counsel, negotiator, and official representative. He has provided analysis to various City business units to assist them with their budgeting needs and has overseen various intervention matters and projects. Clyde has a B.A. in Economics (1992), M.A. in Economics (1995), a LL.B. (2003) and was called to the Alberta Bar in 2004. When he is away from his desk you might find him hiking, biking or cross-country skiing.

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Ivy's current focus is on municipal finance, economic forecasting and policy analysis. She has authored several discussion papers in municipal finance and presented to the 45th Annual Conference of the Canadian Economic Association.

Before joining The City, Ivy worked as an engineer and a marketing manager in various industries in Beijing. She holds a MA degree in economics from the University of Calgary, a MBA degree from Tsinghua University, and a B. Sc degree in physics from Fudan University.

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Wendy currently focuses on system dynamic modeling, energy market analysis, econometric estimation, and public policy analysis. Her responsibilities include monitoring and forecasting Alberta economic growth and labour market trends, as well as energy price changes. Wendy delivers monthly presentations to assist business units to monitor key economic indicators. She also contributes to various municipal research projects including importance of cities, brownfield redevelopment, Calgary real estate market, population projection, diesel fuel price changes, system dynamic modeling and simulation, and parking problem in Calgary.

Brief Biographies

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Chukwudi Osuji's current areas of interest include urban and regional planning, econometric modeling; with emphasis on nonparametric and wavelet applications, and public policy. He taught at University of Michigan-Dearborn, Lawrence Technological University, Wayne State University and Imo State University, and worked for JD Powers and Associates in Troy Michigan as an Econometrician. Chukwudi Osuji has a Bs.c degree (1991) in Physics from University of Windsor, a M.A degree (1993) in Economics from the University of Windsor and a Ph.D degree (2001) from Wayne State University, Detroit, Michigan.

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Estella's interest is in monitoring national and regional economic behaviours. Her responsibilities include providing a common and current database for various analytical and forecasting models, and responding to inquiries from various parts of The City. She also prepares current statistical reports such as construction inflation and current economic indicators, and maintains a number of business unit publications and presentations. She is excited about the upcoming projects which include economic modelling and analysis.

Patrick Chen
Student Economist

Maria Cho
Student Economist

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Who We Are

Corporate Economics provides services in four areas: forecasting, information provision, policy analysis and consulting. We also monitor the current economic trends which allows us to develop unique insights on how external events are impacting the local economy and the Municipal government. We are experienced at researching different economic topics and developed reliable methods of forecasting and analysis.
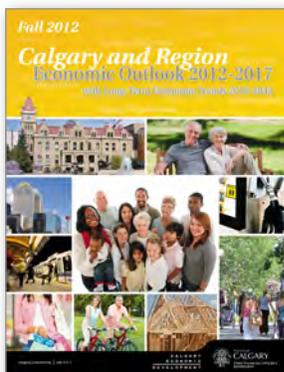
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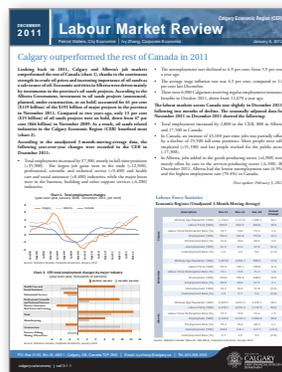
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- ▶ Labour Market Review
- ▶ Inflation Review
- ▶ Current Economic Analysis
- ▶ Construction Inflation

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- ▶ A Case of Fiscal Imbalance: The Calgary Experience
- ▶ Diesel Fuel Price Pass-Through in Calgary
- ▶ Calgary Residential and Commercial Real Estate Markets

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