
**A Perfect Storm:
Sustaining Canada's Economy During
Our Next Demographic
Transformation**

Andrew Ramlo and Ryan Berlin

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U R B A N F U T U R E S
Strategic Research to Manage Change

A Perfect Storm: Sustaining Canada's Economy During Our Next Demographic Transformation

Andrew Ramlo and Ryan Berlin

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A Perfect Storm: Sustaining Canada's Economy During Our Next Demographic Transformation.

INTRODUCTION

Since the times of Aristotle and Plato we have endeavoured to separate things from their context, classifying and ordering them into different taxonomies to gain a better understanding of the whats, the hows, and the whys. Categorization and separation are the basis of research and scientific analysis, from the biologist's classification of living things to the economist's *ceteris paribus*.

While such compartmentalization is essential in developing a deeper understanding of individual parts of a greater whole or process, it is also necessary, from time to time, to put the parts back together to develop a better understanding of *a*) the whole itself and *b*) the interrelationships among the parts. Re-integration is particularly important during periods where one or more parts of a process are undergoing such significant change that it may result in fundamental changes to other parts of the system.

Over the coming decades the thirty percent of Canada's current population born between 1946 and 1965 will age into the third (and final) major stage of their lifecycle, one that is dramatically different from the first stage – the twenty years of their childhood that were concerned with getting through school and entering the workforce – and from the second stage – the forty years of establishing homes, families, and careers. No part of Canadian society will be unaffected by these changes, directly or indirectly, as Canada enters its third great demographic transformation. Today, almost ten million Canadians are between the ages of 40 and 59, comprising the infamous baby boom generation that was born between 1946 and 1965. Trends in life expectancy would see roughly 6.4 million (65 percent) of Canada's current boomers still being alive, and being thirty years older (between the ages of 70 and 89), in 2035. As there are only 2.9 million people between the ages of 70 to 89 today, in 2005, the aging of Canada's demographic bulge over the next three decades would more than double (2.2 times) the number of people in this older age group. A full half century from now, the aging baby boomers will play role in Canada's demography, with a million of them still alive – all 90 years of age and older by 2055.

Having said this, in an even longer time frame, in any society where long-term birth rates are below the replacement level of an average of 2.1 children per woman during her lifetime and life expectancies are high enough for retirement to be a reality for a significant portion of the workforce, the issues raised by an aging population will have to be dealt with, regardless of whether it ever had a baby boom. Thus Canada, which has had a below the replacement level birth rate since 1970 and which enjoys life expectancies which are among the longest in the world, must prepare itself for a reality

that its population will, from domestic sources, just keep on getting older well after the baby boomers have aged out of Canada's population. What the aging of the baby boomers will do is accelerate the process, compelling Canada to begin to deal with the reality that it will not be forever young.

It is the doubling of the older segments of the Canadian population over the next half century that will drive social and economic changes that will ripple throughout Canadian society over the coming decades. The most direct changes arising from this aging will be seen in the size and composition of the Canadian labour force and in our spending on issues related to health and wellness.

In the context of labour supply, participation in the labour force begins to decline once the age of 55 is reached, with one-third of the 55 to 59 age group leaving the workforce before they age into the 60 to 64 age group, and two-thirds of the 60 to 64 age group retiring before they reach the 65 to 69 age group. This pattern of declining participation in the labour force, combined with rapid growth in the number of people entering these age groups, means that unprecedented absolute and relative levels of retirement must be anticipated in the coming years. Thus, in an economic context, Canada must deal with issues of labour supply not only to meet the needs of a growing and changing economy, but also to replace the large number of people who are currently working who will exit the workforce over the coming three decades.

While participation in the labour force declines through the later stages of the lifecycle, participation in the health care system increases, as both the utilization of health-related services, and per capita spending on health care, are both positively correlated age. The lifecycle pattern of participation in the health care system is characterized by age specific per capita health spending doubling for each decade one gets older after the age of 55. Given the aging of Canada's population, we should also anticipate unprecedented absolute and relative levels of demand for health care services in the coming years, and hence the requirement for increased resources – both financial and human – to meet these growing demands.

The intersection between the supply and the demand for labour and for social services involves two dimensions of Canadian society: its economy and its demography. Traditionally these two dimensions have been studied separately, with population dynamics divorced from economics, and economic analysis separated from demographic factors. In this report we argue that it is now essential to study these two parts together, in order to understand both the tensions and the resolutions that emerge from meeting the demands, needs, and wants of Canadian society.

In order to demonstrate the importance of a synthesis between economic and demographic analyses and projections, we begin by maintaining the traditional disciplinary separation between demographics and economics. In Part One, the changing demography of Canada is projected to 2055, based on trends in vital rates and migration, with trends in labour force participation applied to the population projection to establish a demographically based projection of the future labour supply in Canada.

In Part Two a projection of where historical trends in economic activity would take Canada's economy, measured in terms of real Gross Domestic Product (real GDP), employment, and productivity (which is herein measured as real GDP per worker) is presented.

Fitting these two independent trend based projections together is the task undertaken in Part Three. It shows the degree to which a trend projection of the future of Canada's demography is compatible with a trend projection of Canada's economic future. As might be anticipated, there is an enormous gap between where trends in Canada's population and trends in Canada's economy would take us. This leads to the closing sections of this report, which considers the magnitude to which Canada must change away from historical trends in order to achieve a resolution between our demographic and economic futures.

It is our hope that this report will stimulate much evaluation of both methodology and consequences. This should lead those who base their planning on demographic projections to empirically determine the economic future that their projections imply. It also should lead those who base their planning on economic projections to empirically determine the demographic future that would be necessary to attain their economic scenario. From such evaluations, a better understanding of the reality of Canada's future, and hence better projection, policy and planning, will hopefully result.

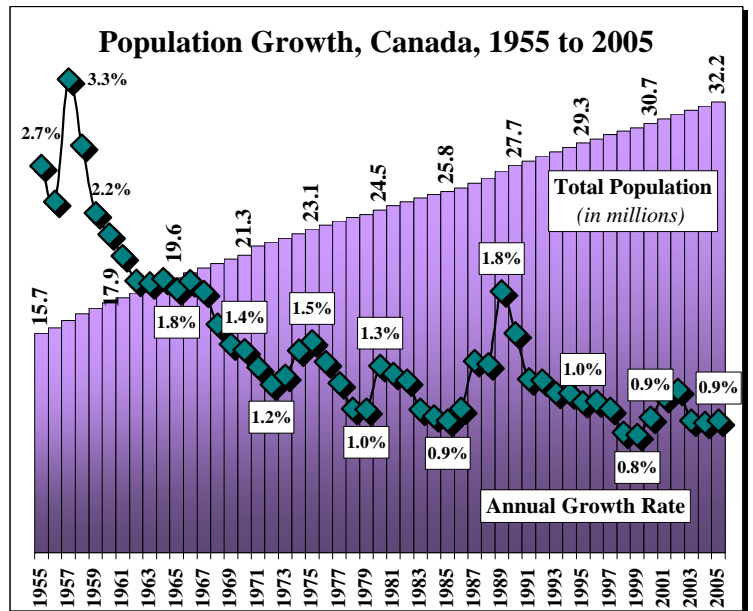
PART I: A TREND PROJECTION OF DEMOGRAPHIC CHANGE

This section presents a projection of growth and change in Canada’s population over the next five decades, given its current size and age composition and trends in birth, death, and international migration rates. It follows the traditional demographic approach of not explicitly considering the level of economic activity that may prevail over the projection period, confining its modeling to changes in demographic variables. Based on these demographic projections of change, historical trends in age and sex specific labour force participation rates are used to project future labour force participation levels to arrive at a demographic based projection of the future size and composition of Canada’s labour force.

1. The Past Five Decades of Demographic Change

Over the past fifty years Canada’s population has more than doubled, growing from 15.7 million in 1955, passing the 25 million mark in the early-1980s, and reaching 32.2 million by 2005 (Figure 1). Over this period annual additions to the population averaged 331,000 people, or 1.4 percent growth each year. That said, the observed year-to-year changes in the size of the population were far from consistent, as the relatively high growth rates in the two to three percent range that characterized the late-1950s during the birth of the post war boom was followed by a generally downward trend in the rate of population growth, reaching successive lows of 1.2 percent in 1972, 1.0 percent in 1979, 0.9 percent in 1985, and finally 0.8 percent in 1999. Over the past decade, annual population growth has been consistently below one percent, averaging 0.9 percent.

Figure 1

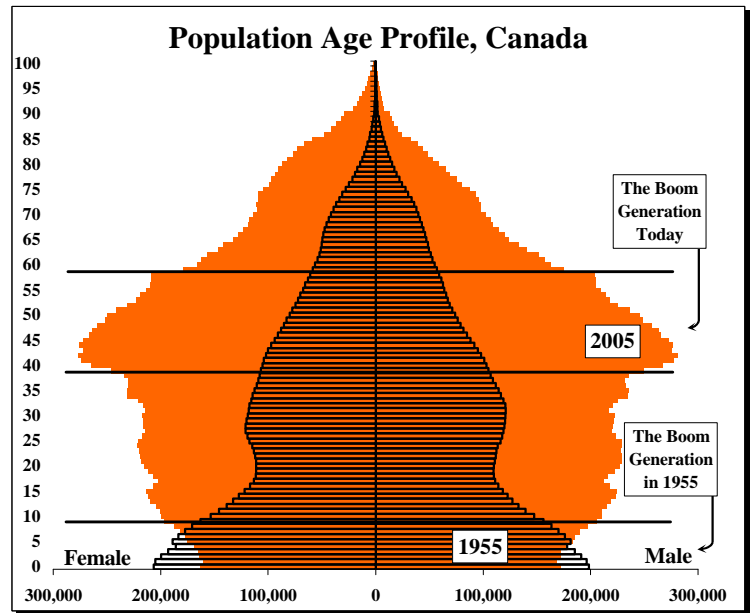


The fact that Canada’s population has been growing at an increasingly slower rate masks the much faster rate of compositional change that has, and will continue to, characterize our population. Figure 2 illustrates how dramatically the age composition of the Canadian population has changed over the past five decades.

In 1955, the profile of the Canadian population was decidedly young, characterized by a large base of an under ten population that reflected the births of the first half of the post World War II baby boom generation. The post World War II boom generation followed a smaller “boomlet” that occurred after World War I (represented by those between the

Figure 2

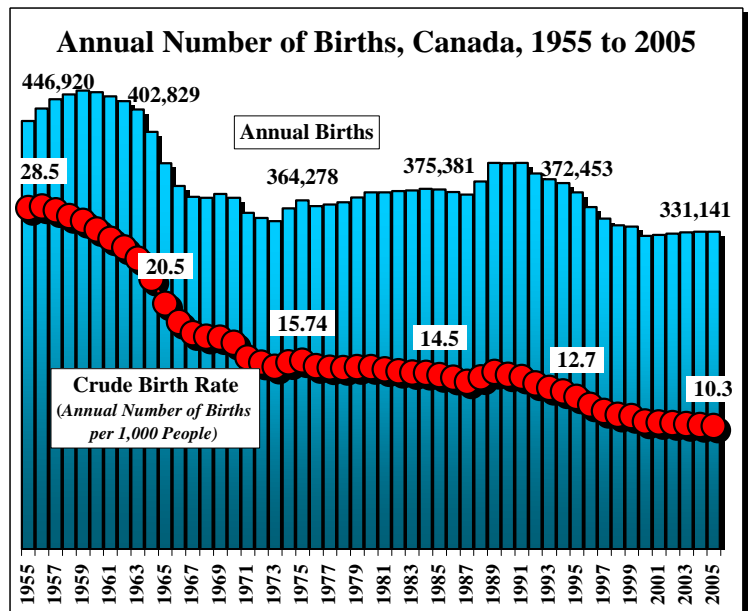
ages of 25 and 35 in the 1955 profile). The “waist” between these two bulges seen in the 1955 profile was the result of the very low level of births that occurred between 1925 and 1936 (as the Depression characterized most of the period), with the widening of the 1955 age profile in the 10 to 15 age group reflecting the recovery from the Depression and the beginning of the baby boom that effectively started in 1936.



One of the most striking features revealed in comparing the 1955 and 2005 profiles is that there were 12 percent *more* people under the age of five in Canada in 1955 than there are today (2005). Also noteworthy is the upward shift in the age profile: in 1955 the typical Canadian was a new born, as there were more people under the age of one than at any other age. This was true for every year from 1946 to 1959, as the record levels of births that were established every year during this period made the *baby* Baby Boomer the typical Canadian (Figure 3). After 1959, the annual number of births declined, slightly at first and then rather dramatically. Soon the typical Canadian was the *aging* Baby Boomer: by 2005 the typical Canadian was 42 years old, with there being 178 percent more 42 year olds in 2005 than there were in 1955 (557,400 in 2005 versus 200,500 in 1955).

Figure 3

Thus in the future, just as they have in the past, the aging of Canada’s most typical resident and the generation to which they belong will bring significant change to the composition of the Canadian population for the next half century. The aging of Canada’s most typical resident will also bring with it a shrinking proportion of the population in the younger age groups, the result of declining fertility rates combined with the aging of the baby boomers into the lowest-fertility – and no-fertility – stages of the lifecycle.



2. The Next Five Decades of Demographic Change

The changes undergone by Canada’s population over the past five decades provide a context within which we can consider the changes that we may see in the near- and long-term futures. As each component of population change – births, aging, deaths, and migration – has contributed in its own particular way to shaping our population, it is instructive to consider historical and projected trends for each component individually.

2.1. Births

Since the peak of the baby boom, the trend in fertility in Canada has been one of rapid and significant decline, falling from a peak in the late-1950s of an average of almost four kids born per woman during her lifetime to below the replacement level of 2.10 kids (the number of births required to replace a set of parents) in the early-1970s and further to only 1.42 today (Figure 4).

While the total fertility rate in Canada declined by 64 percent over the past five decades, more recent history shows that the fertility rate has begun to stabilize, with the average number of children born per woman during her lifetime remaining in the range of 1.40 kids since 2000.

Although the total fertility rate is a useful index of propensities for women to have children, it is not directly used in these population projections. The total fertility rate represents the sum of age specific birth rates across all individual ages comprising the childbearing stage of the lifecycle, or the annual age-specific births rates that are used in demographic projections. As these age specific rates reflect behaviour at each age, they also provide insight into when during the lifecycle births occur, something that is indeterminable from the total fertility rate measure. Figure 5 shows that in addition to declines in age specific fertility rates, there has also been a noticeable

Figure 4

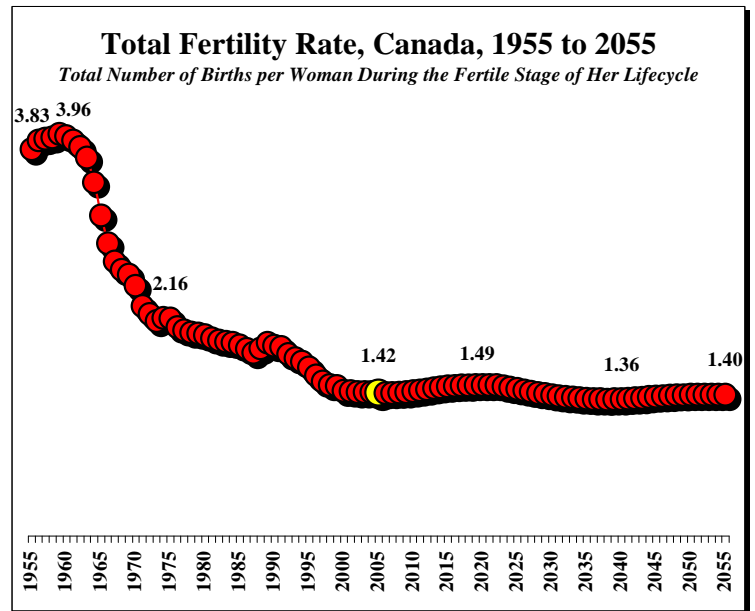
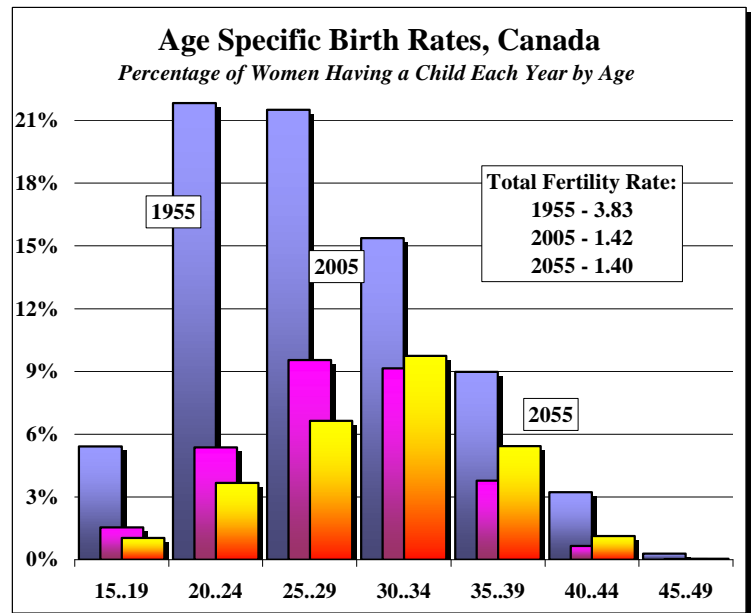


Figure 5



postponing in the timing of births over the past five decades, with women in the 20 to 24 age group having the highest propensity to give birth in 1955, and women in the 30 to 34 age group – a full decade older – having the highest propensity by 2005.

The recent general stabilization of the total fertility rate supports a projection of relative stability over the coming decades, rather than a continued decline as might be projected on the basis of the pattern observed over the course of the past five decades. On this basis, the prevailing total fertility rate in Canada is projected to fall to 1.40 by 2055 from 1.42 children per women today (Figure 4). The pattern of postponement is projected to continue, with age-specific birth rates for women aged 30 and over increasing by an average 19 percent between 2005 and 2055, and those for women under 30 declining by 30 percent. The short-term impacts of this postponement are seen in the total fertility rate increasing slightly (to 1.49) by 2025 before declining to 1.36 children per woman in 2035 and then increasing to 1.40 in 2055.

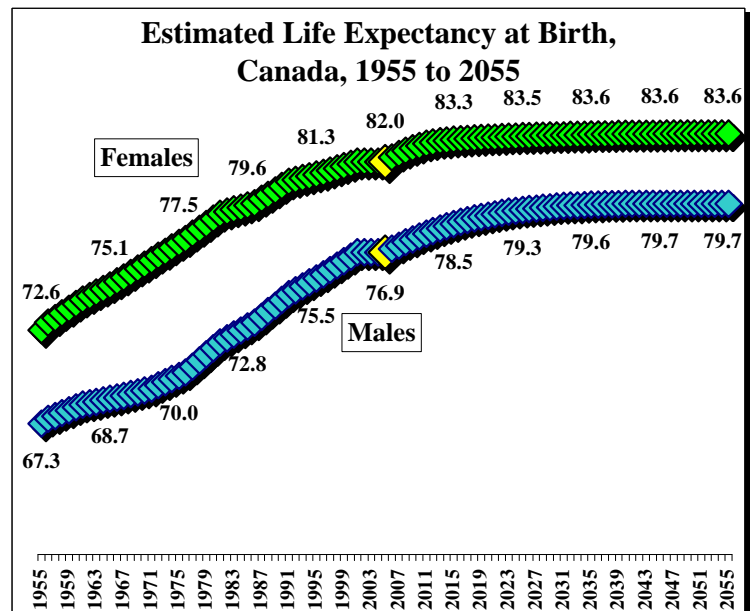
As a parenthetic comment, changes in age specific birth rates within a reasonable range in the future will have a smaller relative impact on the total annual number of births than they would have had in the past as a consequence of the shifting demography of Canada. From 1960 to 1985 the first members of the baby boom generation were in the peak childbearing range of 15 to 40 years of age: between 1980 and 2005 the last members of the baby boom generation were. From 2005 onward, therefore, there will be a declining share of women in Canada’s population in the highest childbearing stages of the lifecycle.

2.2. Life Expectancy

In much the same way that the total fertility rate serves as a useful index of the magnitude of change in age specific birth rates, life expectancy serves as a useful – and slightly more cheerful – index of the magnitude of change in age specific death rates that are used in conducting demographic forecasts.

As a result of advances in medical technology, improvements in workplace safety, and changing lifestyles, the probability of dying within a twelve month period for both males and for females of every age has declined significantly over the past five decades. These declines are revealed in the significant increases in life expectancy that have occurred over this period. For example, in Canada life expectancies at birth have increased by approximately ten years since 1955 (a full two years each decade): male life expectancy has risen from 67.3 years to 76.9 years, and for females from 72.6 to 82.0 years (Figure 6).

Figure 6



These changes are ongoing, with medical research and behavioural change incrementally reducing age specific mortality rates and increasing life expectancy in a way that we can reasonably anticipate, and project, future changes in the coming decades. That said, these achievements are governed by the law of diminishing returns, with each marginal increase in life expectancy requiring increasingly more resources and research to achieve. As such, annual decreases in age specific mortality rates (and hence annual increases in life expectancy) are projected to be more modest in the future than they have been in the past. Overall, under a trend projection of Canada’s population, and recognizing the law of diminishing returns, male life expectancy can be expected to stabilize in the neighbourhood of 80 years, while that for females would stabilize at approximately 84 years.

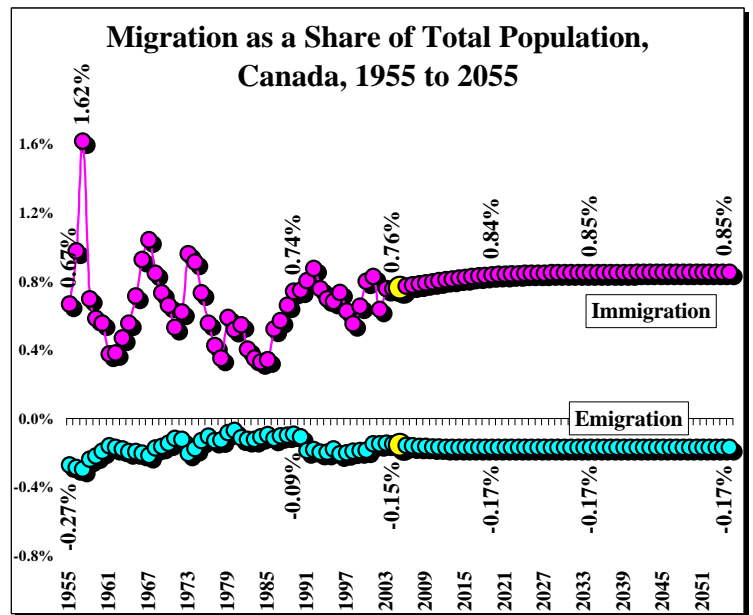
The past five decades have seen the post war baby boom generation age into and through both the childbearing and the low-mortality rate stages of their lifecycle. They are currently entering the stage where mortality rates begin to increase significantly with age: for example, between the ages of 42 (the most typical person in Canada today) and 60 (the leading-edge of the baby boom today) the mortality rate for males increases almost five-fold, from 1.9 deaths each year per 1,000 males aged 42 to 9.1 deaths per 1,000 males aged 60. For females the increases are similar in magnitude, going from 1.1 deaths each year per 1,000 females aged 42 to 5.3 per 1,000 aged 60. Between the ages of 62 and 85, where the majority of the boom generation will find themselves over the next five decades, age specific mortality rates increase nine times for males and 12 times for females. Thus, as with births, the annual number of deaths in Canada in the future will be impacted relatively more by the changes in the number of people in the older age groups than by changes in age specific rates themselves.

2.3. International Migration: Immigration and Emigration

While it is popular for discussions of international migration to focus only on the immigration dimension, projection requires consideration of both immigration and emigration. This is particularly important in the Canadian context as the number of people emigrating from Canada – currently in the 49,000 per year range – offsets a portion of immigration, which is currently in the range of 246,000 per year. Net immigration to Canada in 2005 was therefore in the range of 196,000.

Immigration and emigration are more directly determined by policy than are other demographic variables (such as births and deaths), and as such finding trends in international migration rates is

Figure 7

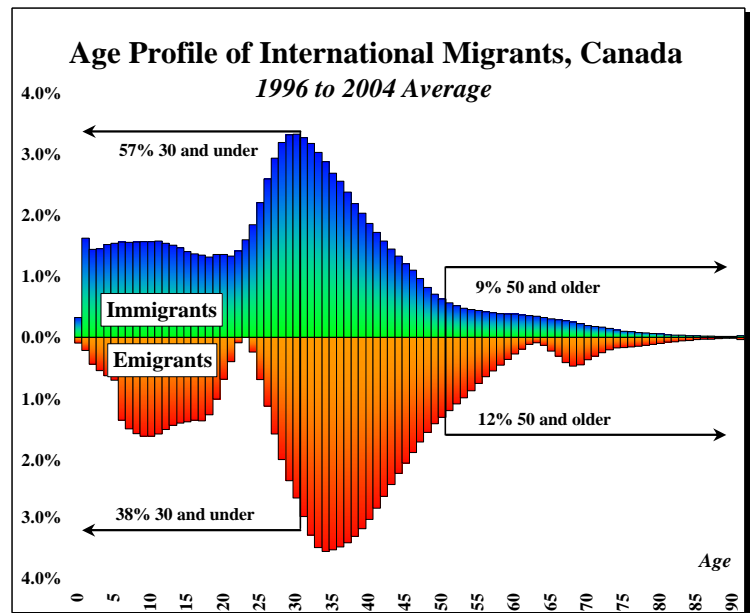


often difficult. Having said this, while rather cyclical, a general trend of a modest increase in immigration's share of Canada's total population has been seen over the past five decades (Figure 7). The 0.76 percent immigration rate seen in 2005 was above both the long-term average of 0.65 percent, and the experience of the past decade where the immigration rate averaged roughly 0.71 percent of total population. Continuing this trend into the future would see the total immigration rate increase from its current 0.76 percent to 0.80 percent by 2015, stabilizing in the 0.85 percent range over the long-term projection horizon.

Relative to the immigration rate, the emigration rate has been more stable over time and, as such, is expected to remain close to its current level of 0.16 percent of total population for the coming five decades. This rate of emigration, while falling below the 0.20 percent range seen in the late-1990s, is consistent with emigration rates seen in Canada during the 1980s and early-1990s.

Equally as important as the size of these migration flows is the age composition of them. While the projected number of immigrants and emigrants plays a significant role in determining the future size of the population, the age composition of these flows is fundamentally important because immigrants are typically much younger than Canada's domestic population. Thus, annual net immigration has not only added to the size of Canada's population, it has also made it younger than it otherwise would be, as the most typical immigrant is in their early-30s (as is the most typical emigrant) versus the most typical Canadian being in their early-40s (Figure 8).

Figure 8

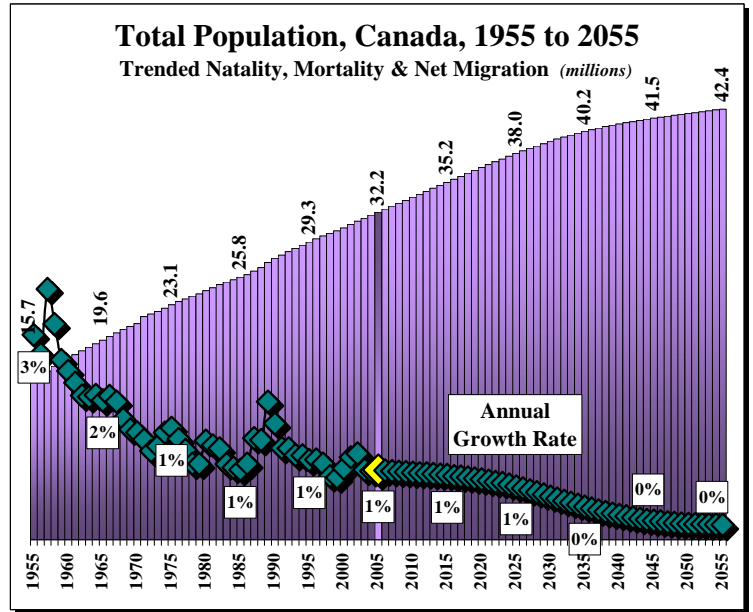


Combining all of the components covered thus far – projected rates and profiles of immigration and emigration, projected age and sex specific mortality rates represented by projected life expectancies, and projected age specific birth rates represented by the total fertility rate – with the current age and sex profile of Canada's population, a projection of the size and composition of Canada's population over the next fifty years can be made.

3. A Trend Forecast of Population Change in Canada

Figure 9

Given the current profile of Canada's 32 million people, plus trends in the projected components of change outlined above, Canada's population would pass the 40 million mark by 2034, to reach 42.4 million by 2055. Adding 10.2 million new residents (a 31 percent increase) would be associated with annual growth in the near term in the same 0.9 percent range that it has experienced over the past decade, with the annual growth rate then falling to the range of 0.5 percent by 2035, and to the 0.2 percent per annum range by 2055 (Figure 9).



With a relatively stable overall birth rate and a continuation of the postponing of childbearing, the annual number of births would remain generally constant over the next fifty years, in the range of the current 330,000 to 340,000 births per year. Within this context the aging of the boom generation out of the high fertility stage of the lifecycle would be offset by the additional younger population that would result from net immigration.

In contrast, in spite of declining mortality rates, the aging of the population would mean a steady increase in the annual number of deaths, increasing from 224,000 in 2005 to 558,000 by 2055. The difference between the annual number of births and deaths (historically called natural increase) would, after 2025, become natural *decrease*, as the annual number of deaths would outweigh the annual number of births.

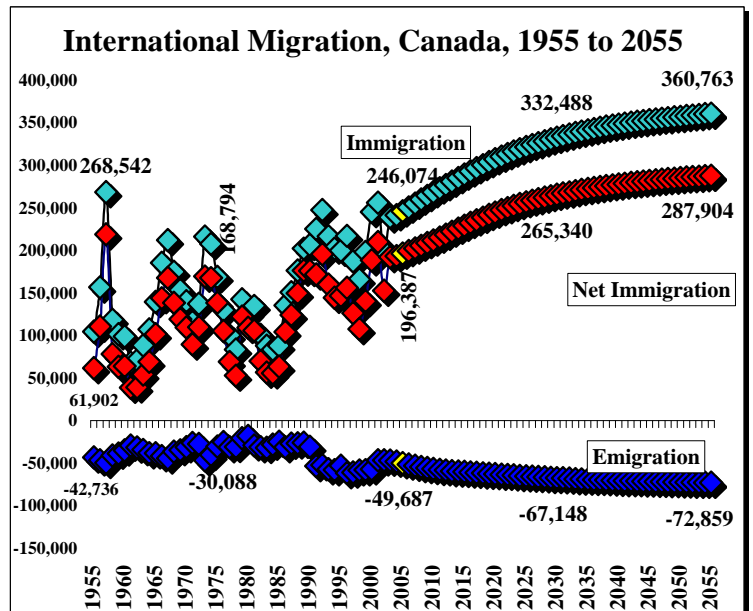


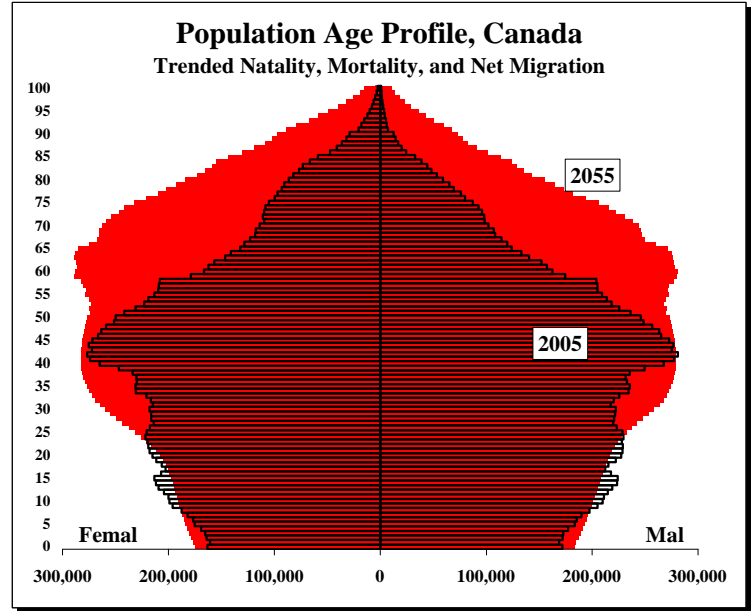
Figure 10

With a growing population, applying trend ratios of immigration and emigration to the total population would result in increases in both annual immigration and emigration (Figure 10). Immigration would increase from its current 246,000 to 332,000 by 2030 and 361,000 by 2055, while emigration would increase from 50,000 today to 67,000 by 2030, and further to 73,000 by 2055.

Figure 11

The two flows would combine to push net immigration to Canada from 200,000 in 2005 to 265,000 by 2030 and further to 288,000 by the end of the projection period.

While the population is anticipated to grow by an ever slowing rate over the next five decades, aging will result in changes to the composition of Canada's population that are much more significant. Figure 11 shows that the size of the population under the age of 25 would essentially remain constant over the next five decades, and that the older age groups would grow appreciably.



With what is a relatively small older population currently, the long life expectancies that will be enjoyed by today's under-40 population means that even after most of the post war baby boom generation has left the age profile, the 65 plus population in Canada will still be much larger (151 percent growth, 6.4 million people by 2055) than it is today. It is important, therefore, to note that the aging of Canada's population over the coming half century, while accelerated by the aging of the baby boom bulge currently aged 40 to 59, will continue long into the future. Simply put, the combination of a below the replacement level birth rate since the early-1970s and long life expectancies results in an ever-aging population.

The significant upward shift in the Canadian age profile, when considered relative to its stable base, portends pressure for changes in a wide range of contexts, from broad national issues such as health care and pensions to very local issues such as longer walk signals at crosswalks and larger print in newspapers, pressures for changes that will, cumulatively reflect the consequences of Canada's coming third demographic transformation. Of specific concern here is the implications of these changes for the future size and composition of Canada's labour force.

4. Labour Force Participation

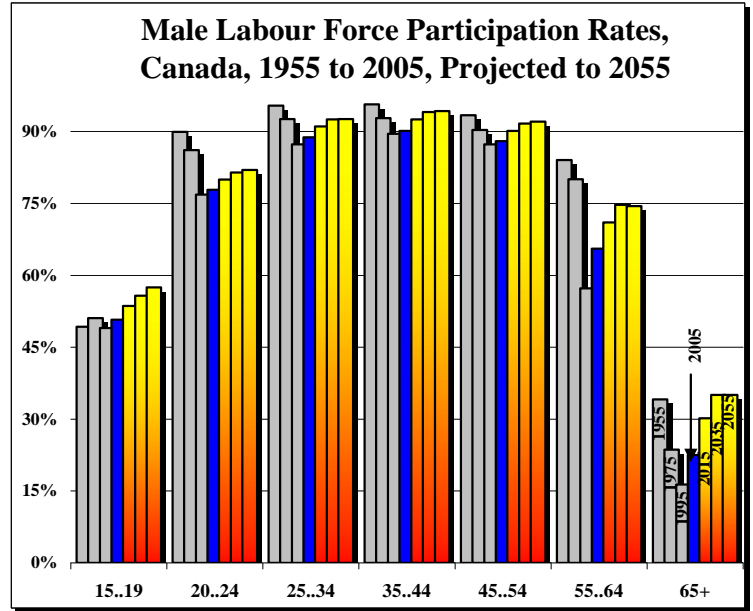
The strong and distinct lifecycle pattern to participation in the labour force has changed over the past five decades, modestly for males and dramatically for females. As would be expected, both are projected to change significantly in the future (Figures 12 and 13).

The general pattern of change in male participation in the labour force between 1955 and 1995 was one of modest declines in the younger age groups and significant declines in the older age groups. More recently (1995 to 2005) there was a reversal in this pattern of decline, as participation increased in every age group. By 2005, although participation

Figure 12

rates for most age groups were lower than they were in 1955 (the exception being the 15 to 19 age group), all were higher or equal to those of a decade earlier.

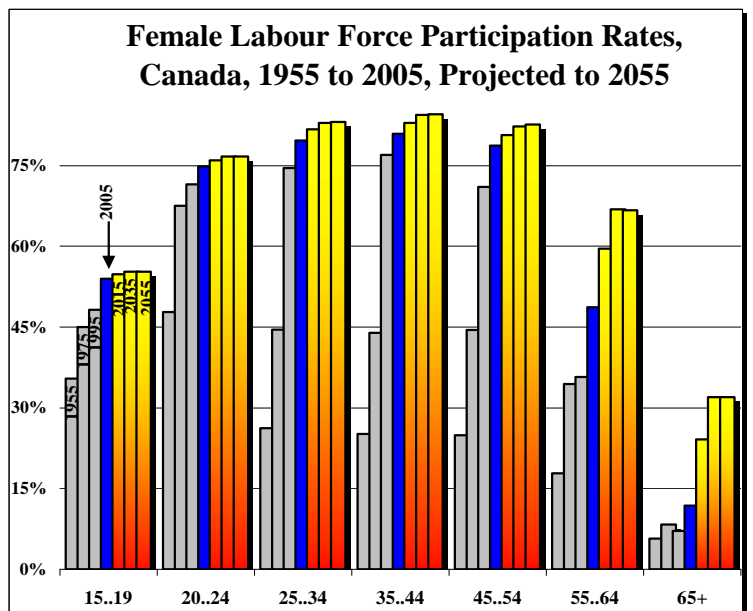
Recognizing the recent pattern of increasing participation, the projection is for continued increases in male labour force participation (Figure 12). Given relatively high participation rates that already prevail for males from age 20 to 54, the greatest relative increases will be for males 55 years of age and older. Based on recent trends of increasing participation rates, between 2005 and 2055 labour force participation for the 55 to 65 male population is projected to increase from 66 percent to 73 percent, while that of the population 65 and older will increase from 12 percent today to 20 percent.



It should be noted that long-term historical data are only available for the 65 plus age groups, and this aggregation has been used to present the pattern of changing participation. For modeling purposes, however, five year age groups up to age 69 and then for the 70 plus age group are used. When examined on this more detailed basis the projected increase in the older age groups is clearly shown, with the percentage of males aged 65 to 69 in the labour force increasing from its current 23 percent to 37 percent in 2055, and the rate for males aged 70 plus increasing from seven to 11 percent, based on recent trends in labour force participation in these age groups.

Figure 13

Contrasting the historical pattern of decline in male rates, female labour force participation rates have increased significantly over the past five decades, although the rate of increase slowed over the period (Figure 13). In all but the oldest age group female labour force participation rates in 2005 were significantly higher than in 1955, with many age groups seeing participation rates double over the past fifty years.



It is important to note that increases in female labour force participation rates over the past decade have been relatively small compared to the pattern over the

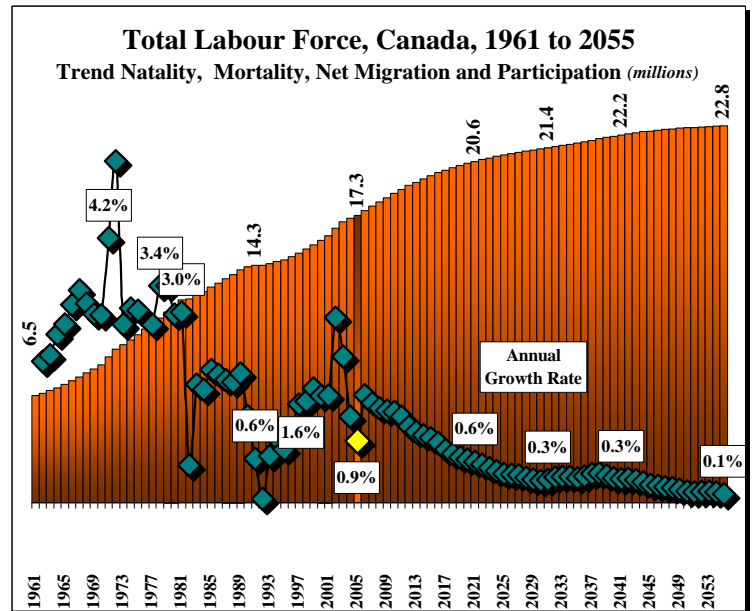
1955 to 1995 period. This pattern in part reflects the impact of diminishing marginal change shown in the demographic variables as their base values increase, but also a stabilization in birth rates which would also lead to a relative stabilization of participation rates as women take time away from the paid workforce to have kids.

As with the future pattern of change for males, female labour force participation rates are projected to continue to increase in every age group, with the most significant change coming to participation of the 55 plus population. With participation of the 20 to 44 age groups seeing relative increases of between one and three percent (reaching 80 to 86 percent), the two eldest age groups are expected to see more significant growth as participation for the 55 to 64 age group increases to 60 percent and the 65 plus to 15 percent.

As was done for the male population, in the preparation of labour force projections recent data on participation rates for women by five year age groups to age group 70 plus were used to capture changes that would be expected from behavioural changes within the older population. Comparison of the projected rates for women in these older age groups shows the extent to which rates would increase following recent trends, with the percentage of women in the labour force in the 65 to 69 age group rising from 12.1 percent to 32.1 percent, and those for women aged 70 plus increasing from 2.2 to 9.4 percent, over the next fifty years (Figure 13).

Combining the trend projection of population change for Canada and the projected labour force participation rates results in a projection of the size and composition of the labour force in the coming decades. As Figure 14 shows, the result is a projected increase in the Canadian labour force from its current 17.3 million participants to 22.8 million by 2055. Growing by 5.5 million net additional labour force participants (compared to population growth of 10 million more Canadians) indicates that in spite of significant increases in labour force participation rates by males and females, particularly in older age groups, there will be a significant slowing in the rate of growth in our labour force, falling from the one to two percent per year growth range recently experienced to under one percent by 2011 and further into the range of 0.1 percent per year by the end of the projection period

Figure 14



5. The Consequences of Demographic Trends

Extending trends in the factors that affect Canada's demography - essentially constant birth rates, increasing life expectancies, and increasing levels of immigration and emigration – result in a projection that would see Canada's population increase by 22 percent (adding seven million people) over the next 25 years, and 31 percent (adding ten million) over the next fifty years, to reach a population of 42.4 million by 2055. This projection implies the slowest long-term relative rates of population growth that the country will have ever experienced.

Projecting labour force participation rates based on recent trends results in record high levels in the percentage of the adult population participating in the labour force. In the case of the 15 to 64 population, total participation would be in the range of 81 percent, compared to its current level of 76 percent and its 1961 level of under 60 percent. In the case of the 65 plus population, participation rates would almost double, from today's eight percent to 15 percent of people aged 65 plus projected to be in the workforce by 2055.

Combining the projected levels of age and sex specific participation with the projection of Canada's changing demography results in a labour force that would grow by 4.0 million to 2030 (23 percent growth over 2005), and by 5.4 million by 2055 (31 percent over 2005) to reach 22.8 million in 2055. In spite of an aging population, labour force growth would be on par with projected population growth, the result of increases in participation just offsetting the impacts of an aging population.

PART II: A TREND PROJECTION OF ECONOMIC CHANGE

Two variables are widely used in analyses and projections of the economy: Gross Domestic Product (GDP), which is the sum of recorded economic activity during a year; and employment, which is the total number of people working for pay in the formal economy.

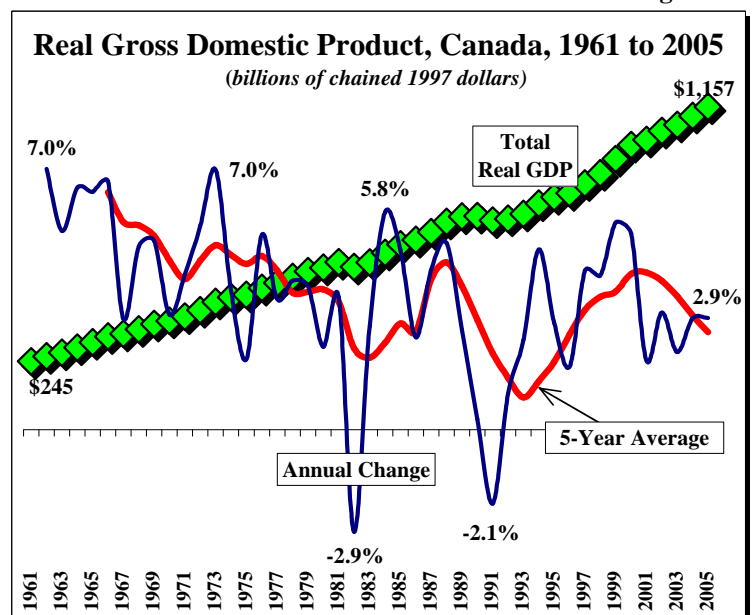
These two dimensions of the economy are almost always projected independently. Macroeconomic projections of GDP consider trends in output and prices, levels of consumption, government spending and investment, business spending and investment, and imports and exports; given the inherent reliance on prices and sectoral activities involved in this approach, GDP projections are rarely long-term, being generally limited to one to three year time horizons. Employment projections, in contrast, are often for one to ten years, and are the result of labour market analysis of recent trends in sectoral employment levels and unemployment rates. In both contexts, projections of demographic change are generally not explicitly considered, being captured, if at all, only implicitly. As noted in the Introduction, this report follows this convention in this Part.

The economic projection presented here considers trends in both GDP and employment, and what these trends portend for the future. As described in detail in the next section, the methodology for forecasting employment used here commences with the projection of real GDP in Canada based on both long-term and recent trends. The next step, given the observed historical relationship between real GDP and employment in the major sectors of the Canadian economy, is the projection of the employment implications of extending trends in real GDP growth. Given this approach, implicit in the relationship between real GDP and employment are changes in labour productivity (that is, changes in real GDP per employed person), something that is considered in Part 4 of this section.

1. Real GDP: Past, Present and Future

In 2005, Canada's real GDP reached \$1.157 trillion (chained 1997 dollars), 4.7 times the \$245 billion output of 1961, and reflecting an average annual growth rate of 3.6 percent over the period (Figure 15). Given the cyclical nature of Canada's economy, and particularly its historical sensitivity to commodity and resource cycles, this average does little to reveal the wide swings and long run pattern of change experienced over the past four and a half decades. Annual growth of up to seven percent has been contrasted by contractions of as much as 2.9 percent. There were no less than ten noticeable reversals in direction of

Figure 15

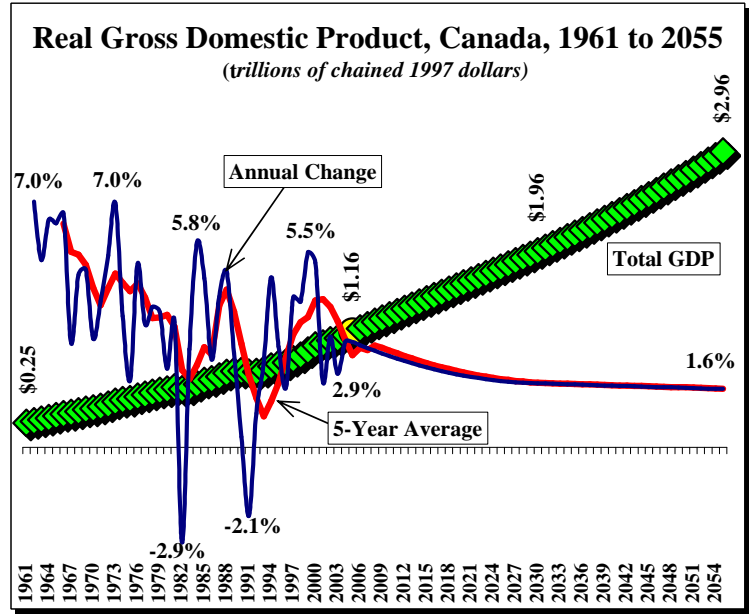


economic change in Canada over the past 45 years, for an average cycle of less than five years.

Using a five-year moving average of change in real GDP facilitates observation of a long-term general trend in real GDP change: real GDP growth in Canada is growing, albeit at a slowing rate: in the 1960s real GDP growth averaged 5.6 percent; in the 1970s, 4.3 percent; in the 1980s 3.1 percent; and in the 1990s 3.3 percent.

A trend based projection of future real GDP reflects this slowing of long-term growth: the mathematical extension used here results in the five-year average real GDP growth rate stabilizing in the range of 1.6 percent per year (Figure 16). This in turn would result in a \$2.96 trillion economy in real terms by 2055, more than twice the size of the current economy, implying an average annual growth in real GDP of 1.9 percent. This average would be the result of growth rates in the two percent plus range over the course of the first part of the projection period and below two percent in the second.

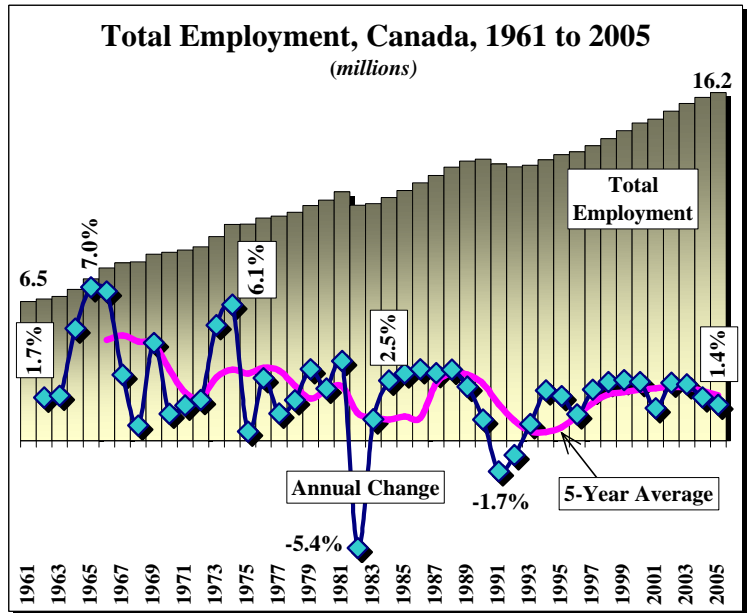
Figure 16



2. Employment Changes in Canada

There has been significant growth in employment in Canada over the past half century, with the total number of people employed in the formal and paid economy increasing from 6.5 million in 1961 to 16.2 million in 2005 (Figure 17). This two and a half times increase, representing the addition of almost ten million people to the workforce in Canada, implies an average annual growth rate of 2.1 percent per year. Again, this overall average does not adequately describe the variations in employment change experienced over the past four and a half decades, which ranged from growth of seven percent to declines of more than five percent.

Figure 17

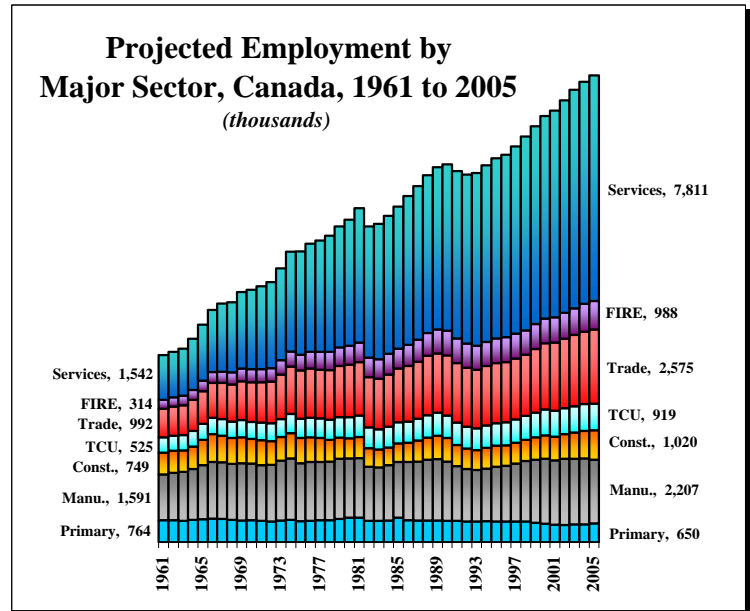


Further, it does not reflect the slowing of the employment growth, with the 1960s

Figure 18

recording five-year moving averages of annual employment growth in the range of 4.5 percent and the 1970s of 2.5 percent; the past decade has seen these five-year averages in the range of only 2.0 percent.

Just as employment change has been highly variable over time, so too has it varied across sectors of the economy (Figure 18). As a general observation, the goods-producing sectors grew most slowly, goods-handling sectors increased moderately, and service-producing sectors increased most rapidly. Since 1961 employment in the primary industries in Canada declined by 15 percent, from 764,000 jobs in 1961 to only 650,000 in 2005, while employment in manufacturing grew by 39 percent and in construction by 36 percent. Employment in the transportation, communication and utilities (TCU) industries increased by 75 percent, from 525,000 in 1961 to 919,000 in 2005, with employment in the trade based sectors (wholesaling and retailing) increased by 160 percent. The highest growth rates occurred in the finance, insurance and real estate industries (FIRE), which grew by 215 percent from 314,000 jobs in 1961 to 988,000 in 2005, and in services (both private and public) which increased by 407 percent.



Given this differential pattern of growth in sectoral employment, it is important, to the degree permitted by the disaggregation of historical data, to project the employment for each of these sectors and then aggregate them to obtain a projection of total employment.

3. GDP and Employment

In order to link the projection of the size of the Canadian economy as described by its future real GDP to a projection of the employment that will accompany this level of economic activity, it is necessary to use the historical relationship between real GDP and employment, in this case, in each of the major industry sectors.

Table 1 shows that there has been a strong correlation between annual real GDP and annual sectoral employment. This correlation is particularly

Table 1

Correlation between Annual Sectoral Employment and Real GDP, Canada, 1961 to 2005			
Sector	y-intercept	Slope	Correlation
Primary	847.01	-0.00017	-0.72
Manu.	1718.25	0.00043	0.67
Const.	788.59	0.00000	0.00
TCU	428.30	0.00045	0.99
Trade	746.06	0.00162	0.98
FIRE	179.89	0.00075	0.96
Services	-7.47	0.00722	0.99

noticeable in the service-producing and goods-handling sectors, where correlation coefficients between real GDP and sectoral employment are in the range of 0.96 and higher. Employment in the manufacturing and primary sectors does not move as closely with real GDP, with correlations in of 0.67 and 0.72, respectively. Finally, there is little correlation between employment in the construction sector and real GDP, with the number of construction jobs neither increasing nor decreasing predictably with growth in real GDP over time.

The coefficients that describe these historical relationships between real GDP and sectoral employment are used, together with the projection of real GDP presented earlier, to project sectoral employment in Canada from 2005 to 2055. The result is a projection of employment in the service-producing sectors continuing to grow, with FIRE increasing by 124 percent, and the services sector by 149 percent (Figure 19). Employment in the trade industries is projected to increase by 99 percent, and in TCU by 78 percent. Manufacturing employment is projected to grow by only 30 percent, and employment in the primary industries to continue to decline, in this case by 40 percent over the next 50 years. Employment in the construction industry would also decline, by 23 percent, something that would be consistent with a situation where economic growth is projected to fall from its current 2.9 percent per year to only 1.6 percent per year, thereby almost halving the need to expand capital capacity on annual basis.

Aggregating the sectoral projections results in a projection of total employment in Canada growing from 16.2 million workers in 2005 to 35 million in 2055, a 117 percent increase (Figure 20). Adding 19 million jobs over the next fifty years would imply an annual rate of growth of 1.6 percent, well below the 2.1 per annum growth experienced over the past 45 years.

Figure 19

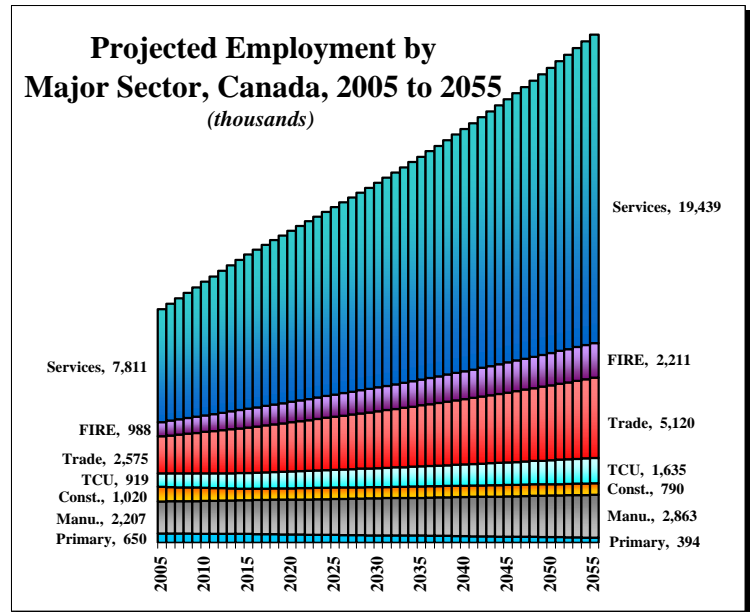
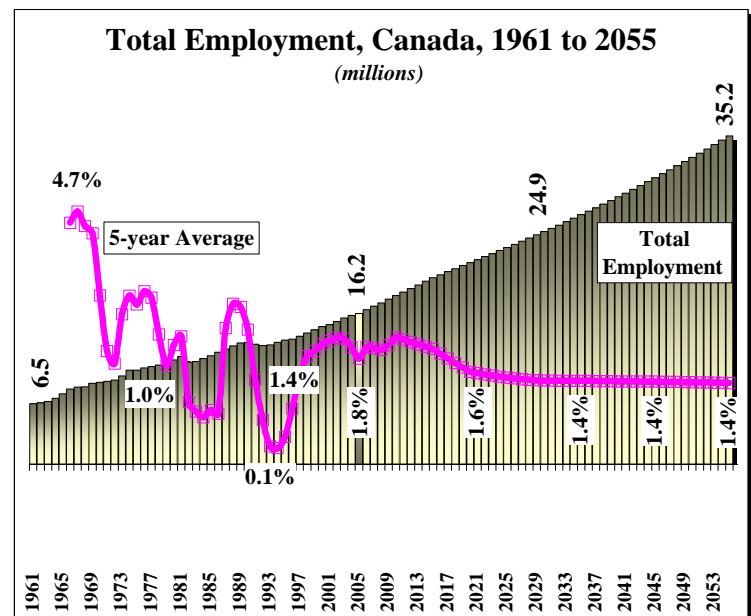


Figure 20



Note that using the correlations between sectoral employment and real GDP is not intended to imply causality. Rather, it is to state that given the historical relationships observed between real GDP and sectoral employment, and having produced a trend based projection of real GDP, if the historical relationship between sectoral employment and real GDP holds in the future, this would be the level of employment associated with the projected level of real GDP. There are many other approaches that might be used to project both long-term real GDP and sectoral employment, each with their own strengths and weaknesses: as such, it will be informative to see the comparison of these projections with the results of other projection techniques.

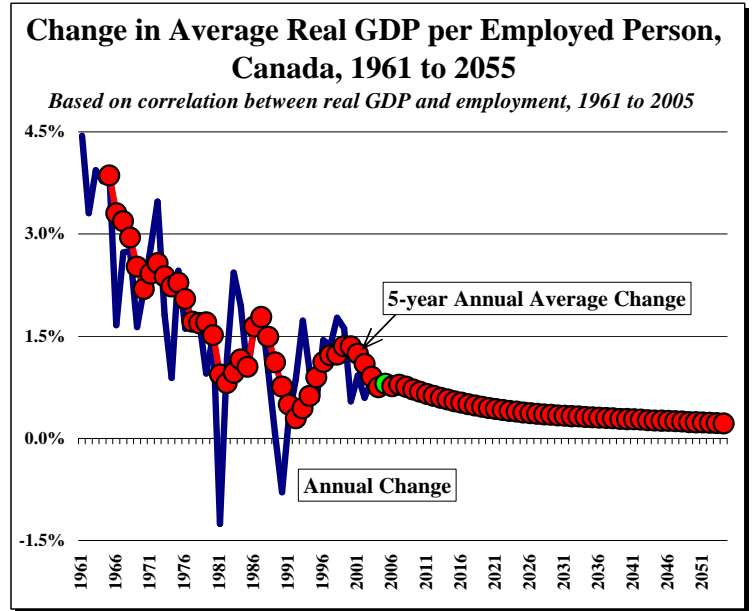
4. Productivity Change

Implicit in both the historical and projected real GDP and employment is the changing productivity of the employed labour force. Discussions with respect to changing productivity within the Canadian economy are wide and deep, attracting much attention and debate. Within this discussion, there is a general consensus that while productivity growth has been impressive over the past half century, much of it occurred in the 1960s and 1970s, with much smaller gains in productivity occurring since. For example, Statistics Canada, through its Canadian Productivity Review, recently published *Four Decades of Productivity Performance in Canada*¹, which describes labour productivity in the business sector growing by three and half percent per year in the 1961 to 1973 period, two percent per year in the 1973 to 1979 period, just over one percent in the 1979 to 1988 period, one and half percent per year in the 1988 to 2000 period, and just under one percent per year in the 2000 to 2004 period.

As Statistics Canada notes, it is a “*Herculean task to calculate summary statistics for productivity*”, a task that requires the data and resources of its National Accounts program. In the context of this report, such a detailed analysis is neither possible nor warranted. The definition of productivity used here is wider, and simpler, than that used by statistics Canada which tracks changes in productivity in the business sector considering variables such as changes in hours worked and capital inputs. Here productivity is defined as the average contribution of all employed persons to real GDP, a definition used for three reasons. First, as one of the fundamental purposes of this research is to consider the demand for, and supply of, labour, thereby linking the economy and demography of Canada, it is necessary to include all employment sectors in the projections. Secondly, inclusion of all sectors of employment implicitly gives consideration to the role of public infrastructure to economic change. Finally, consideration of the private sector alone ignores the impact of *de jure* or *de facto* privatizations and nationalizations on the denominator of the productivity calculations.

Figure 21

Empirical consideration of changing productivity here is done through the relationship between employment and real GDP used in the previous section to project future employment. In the historical context, the change in average GDP *per employed person* indicated by this equation and total real GDP shows the same general pattern as that described in the Statistics Canada's *Four Decades of Productivity Performance in Canada* report (Figure 21). In the 1960s, the five-year average change in real GDP per employed person moved in the range of 2.2 percent to 3.9 percent per year; in the 1970s this dropped to between 1.7 and 2.4 percent, followed by another drop to the 0.8 to 1.8 range in the 1980s, further to the 0.3 to 1.3 percent range in the 1990s, before moving up slightly to the 0.7 to 1.3 range thus far in the 2000s.



Using the employment generated by the projected growth in real GDP and the continuing relationship between this external variable and employment indicates a continuation of the decline in growth in productivity seen historically, with annual change in productivity dropping from its current 0.8 percent growth per year to 0.2 percent by 2055.

The fact that annual increases in productivity are declining does not mean that productivity increases will play a lesser role in economic growth in the future: quite the contrary, they will play a greater *relative* role than they have in the past. Using this measure of productivity, increases between 1961 and 2005 contributed one-third of the economic growth in Canada while growth in employment at constant productivity contributed the other two-thirds. Over the next five decades, increasing productivity (albeit at a slowing rate of increase), would contribute two-thirds of the economic growth with employment growth at constant productivity contributing only one-third. The reason for this reversal in sources of contribution to economic growth is the slow rate of employment growth generated by the very slow growth of real GDP; the end result being a greater relative role of increasing productivity in the coming decades.

5. The Consequences of Economic Trends

Given extension of the historical pattern in economic growth in Canada, real GDP growth was projected to average 1.9 percent per year over the next fifty years, compared to a historical average of 3.6 percent per year over the past half century and an average of 2.5 percent per year since 1990. This projected growth in the economy over such a prolonged period is extremely low – so low that it may be deemed as unrealistically low by some – but nonetheless it is where trends in real GDP change would take us.

Given the long-term historical relationship between real GDP and employment in Canada, this slowly increasing real GDP would be accompanied by slowly growing employment. The trend projection is for employment to increase by only 1.6 percent per year over the next fifty years compared to its 2.1 per year over the past 45, with projected employment reaching 35.2 million workers by 2055. Similarly, productivity would also increase more slowly in the future than in the past (again an extension of the slowing trend observed over the past forty plus years), growing by only 0.38 percent per year between now and 2055, compared to its average of 1.65 percent per year over the 1961 to 2005 period, and its 0.96 percent per year over the past twenty.

PART III: A PERFECT STORM – LABOUR SUPPLY AND DEMAND

The demographic projections for Canada's population show that with essentially constant birth rates, increasing life expectancies, and increasing (to record) levels of immigration, Canada's population would increase by 22 percent (adding seven million people) over the next 25 years, and 31 percent (adding ten million people) over the next fifty years, to reach 42.4 million people by 2055. While a reflection of the long-term and recent trends in Canada's demography, this projected growth implies the slowest long term relative rates of population growth that the country will have ever experienced.

Projecting labour force participation rates based on recent trends results in record high levels of labour force participation. In the case of the 15 to 64 population, total participation is projected to be in the range of 81 percent, compared to its current level of 76 percent, and its 1961 level of under 60 percent. In the case the 65 plus population, participation rates are projected to almost double, from today's eight percent to 15 percent of people aged 65 plus in the workforce by 2055. This would bring participation rates for the 65 plus age group back to the level that prevailed in the pre-CPP, pre-RRSP 1960s, before it dropped to the ten percent range in the early 1970s, the seven percent level in the 1980s, and the six percent level in the 1990s.

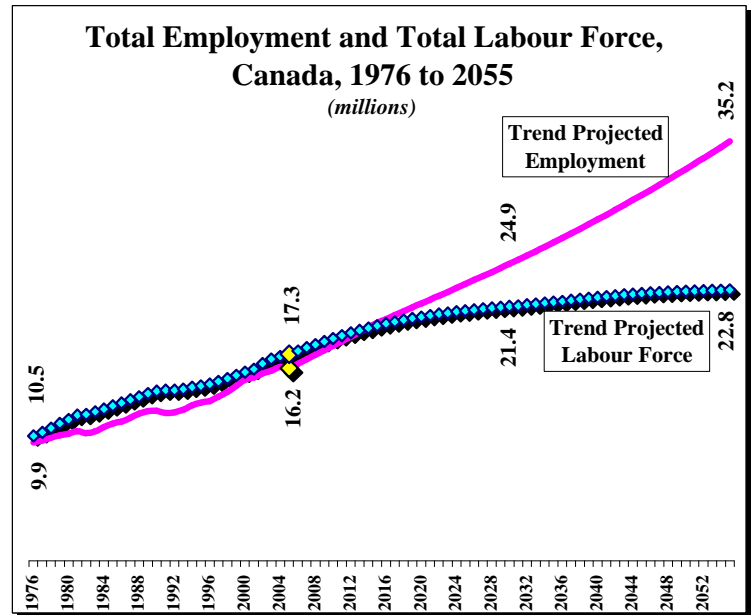
Combining the projected levels of age and sex specific participation with Canada's changing demography results in a labour force that is projected, based on demographic trends, to grow by 4.0 million to 2030 (23 percent growth over 2005), and by 5.4 million by 2055 (31 percent growth, reaching 22.8 million) by 2055. In spite of an aging population, labour force growth would be on par with projected population growth, the result of increasing in participation just offsetting the impacts of our aging population.

Independently, real GDP growth was projected to average 1.9 percent per year over the next fifty years, compared to a historical average over the past half century of 3.6 percent per year. Given the historical relationship between employment and real GDP, the consequence of this projected level of real GDP was employment which was also projected to increase more slowly in the future than has been seen historically, increasing by an average of only 1.6 percent per year over the next fifty years compared to its 2.1 percent per year average per year over the past 45. Projected employment was expected to reach 35.2 million workers by 2055.

Putting these two independent projections together – one based on demographic trends and one based on economic trends – shows the fundamental *incompatibility* between demographic and economic trends. From the perspective of economic trends, employment is projected to reach 35.2 million in 2055 – from the perspective of demographic trends, the labour force is projected to reach 22.8 million by the same year. The result is a situation where employment (the demand for labour) would *exceed* the labour force (the supply of labour) by 13.9 million workers by 2055 (Figure 22). That's right, in spite of record levels of participation and immigration, in spite of extremely slow economic growth, the demand for workers would exceed the supply of them by 2014, with an ever widening gap thereafter.

Figure 22

The reason for the widening gap, even with higher levels of immigration and participation and slow economic growth, is the reality that *a*) most folks want to quit work at some point in their lives so they can enjoy retirement and *b*) there will be a significant number of people reaching the point where this decision is made in the coming decades. Given this reality, the aging of Canada’s population, (the result of a long-term birth rate that is below the replacement level and long life expectancies compounded by the aging of the post war baby boom generation) will result in the gap between labour force entry and labour force exit narrowing, thereby slowing the rate of labour force increase to well below that which would be expected for employment given outlooks for economic growth.



Clearly, a situation where the demand for labour is greater than the supply of labour cannot occur: patterns of change will have to diverge from historical trends, either from a demographic perspective in terms of population or labour force participation, or from an economic perspective, in terms of economic growth or productivity. It is therefore important to assess the magnitude, and more importantly the likelihood, of changes away from historical trends that would be required to make the supply of and demand for labour consistent.

1. Demographic Approaches to a Resolution

The demographic trend scenario already projects *labour force participation* to increase to record levels over the coming decades. With respect to participation of the 65 plus workforce, rates for both males and females have already been projected to almost double over the coming 50 years, increasing from eight percent today to 15 percent by 2055. If participation increased even more than that projected here, there would be a greater supply of labour, thereby reducing the gap between projected labour demand based on economic trends and projected labour supply based on demography. That said, age specific participation in the labour force cannot increase enough to come anywhere near eliminating the gap.

For example, if there was no unemployment and if 100 percent of the male and female population aged 15 plus – that’s right: 100 percent of the 15 year olds and 100 percent of the 99 year olds, be they male or female, were in the labour force and at work – there would be 31.3 million people employed in Canada by 2055, still leaving a gap of some 3.9 million between the demand for workers and their supply. Thus, while increasing labour force participation, and increasing it above the level dictated by recent trends, will

be a necessary part of closing the gap between the demand for labour and its available supply, increasing labour force participation alone will not be sufficient in itself to eliminate it.

If increasing participation will not do it on its own, would increasing population be able to do so? When population solutions to labour supply issues are raised, two quite different approaches – natality and migration – are generally suggested. Alas, *increasing birth rates* cannot, even conceptually, contribute to closing the gap over the next fifteen years, and would require an immediate, significant and sustained increase to record levels to resolve the challenge on their own thereafter.

The reason that increasing birth rates will not contribute to closing the gap between supply and demand for workers over the next decade and a half is that kids born today will not reasonably become labour force participants for another 15 (and more typically 20) years. Thus, any approaches to increasing population through natality holds no potential for increasing the number of people in the workforce during the next generation: in fact, increasing birth rates, while perhaps contributing to closing the gap in the long run, would make it worse in the short run as increased birth rates would actually *reduce* labour supply as parents take maternity leave to have and raise their children.

The level of increases in birth rates that must occur, starting today, to eliminate the gap by 2055 is dramatic. Birth rates would need to increase by five percent each year in the future from the current 1.5 children per woman range now to reach the replacement level of 2.1 children per woman in 2013 (a level not seen in Canada since 1969), the baby boom peak of 4.0 children per woman by 2028, 6.0 children per woman in 2037, and 6.8 by 2039 to, along with trended increases in participation and positive net immigration, generate enough labour force participants to eliminate the gap between the demand for labour and its supply by, but not before, 2055. The long-term result of this four-fold increase in birth rates would be a population of 64 million in 2055 required to generate the 36.7 million labour force participants necessary, at a four percent unemployment rate, to meet the demand for 35.8 million workers within the Canadian economy, under a trended increases in productivity and slowing economic growth scenario.

This presumes, however, that female participation in the workforce continues to increase as it does in the constant natality trend scenario. Assuming a birth rate solution, with women giving birth to twice as many kids (3.0) in 2021 as they do today, three times as many (4.5) in 2030, and four times as many (6.0) by 2037, it is unreasonable to assume that female participation in the workforce would increase. Rather it would be reasonable to assume that it would decline dramatically, thereby ensuring that the gap between the demand for and supply of workers was not eliminated. Thus, increased natality, while perhaps part of the solution to future challenges, cannot be the only solution.

Another often cited population approach to closing the gap between labour demand and supply is *increased immigration*. The trend labour force projection presented here included increasing immigration, with future levels based on trends in the ratio of immigration to total population. These trends would see an average of 320,000

immigrants come to Canada per year over the next 50 years, passing through the 300,000 per year level by 2018 to reach 360,000 by 2055. Given the currently projected increases in labour force participation rates and productivity, could even higher levels of immigration on their own bring enough people to Canada to ensure that it would have a sufficient number of workers to meet the employment demands of economy?

The answer is yes: mathematically-speaking, even higher levels of immigration could on their own offer a solution, but practically-speaking they could not do it. The magnitude of an immigration alone solution to labour supply would mean that Canada would have to attract an average of 720,000 immigrants per year over the next fifty years, more than twice the 320,000 in the trend projection, and almost three times the current 246,000 persons per year. This would imply a doubling of the immigration rate from the 0.85 percent of Canada's population in the trend projection to an average of 1.61 percent of the population per year. The demographic consequences of this approach would be a 2055 population of 64 million people in order to achieve the required labour force of 36.7 million workers that (again with a four percent unemployment rate) to satisfy the 2055 demand for 35.8 million workers. While this would resolve the employment and labour force projections, it is unlikely that Canada either would, or could, attract this level of immigration. Therefore, while immigration above the levels that would be observed given historical trends may be a necessary part of closing the gap between projected labour supply and demand, it too will not on its own be a sufficient one.

2. Economic Approaches to Resolution

No single demographic component can be realistically relied upon to eliminate the gap between labour supply and demand. This reality has led some to suggest that the solution does not lie within demography at all, but rather within the economy. One approach that often comes up in this context is the suggestion that these additional workers are in fact not needed, for with sufficient *increases in productivity* we could achieve the same level of GDP with far fewer workers. This raises the question of what increases in worker productivity would be required to reach the same level of real GDP in 2055 given the trend projection of labour force participation.

While also mathematically feasible, its practicality would come into question, as it would imply a reversal in the long-run trends in productivity's contribution to economic activity. To close the gap between economic and demographic projections through increasing the productivity of 2055's 21.8 million employees to achieve the output of 35 million would require average growth in productivity of 1.3 percent each year, more than four times the 0.3 percent per year projected by trend relationships.

To attain these results, productivity would have to increase immediately, from the 0.7 percent per year it has recorded over the past five years, climbing through the 1.3 range by 2020, a level not seen on a sustained basis since the 1970s, to reach an average of 1.5 percent annual growth by 2055. Note that this pattern of accelerating cumulative increases in productivity would also need to be achieved during a period of significant

population, and more importantly, workforce, aging, a set of conditions more generally associated with declining rather than increasing productivityⁱⁱ.

As the methods, and even the reasons, for attaining increased productivity are generally neither well known nor well accepted, the productivity approach is sufficiently vague to perhaps garner acceptance by those who might find the demographic approaches unpalatable. However, when the reality of what it will actually take to increase the productivity of the entire workforce by an average of 1.34 percent per year in an economy dominated by the service sector and an aging workforce, the limits to productivity gains as a sole solution to the economic/demographic trends gap will become apparent. As with the demographic approaches, increasing productivity growth above the trend rate will be a necessary but not sufficient component to the resolution of Canada's demographic and economic futures.

Finally, perhaps Canada may not need as much *economic growth* as trends indicate it will achieve – perhaps we could be content with the economic growth that would just employ the labour force that trends in its demography would produce, the 21.8 million employed workers that a workforce of 22.8 million people would provide at four percent unemployment. This level of employment, given the historical relationship between real GDP and employment, would come with a real GDP of \$1.66 trillion 1997 dollars, 40 percent above today's \$1.18 trillion, but 44 percent below where historical trends would point. With this level of real GDP and 21.8 million workers, the productivity per worker on a labour force basis would be \$76,136, 9.5 percent above today's level, implying an average annual growth rate of 0.18 percent.

Perhaps this is the route that Canada should go, recognizing the demographic trends but ignoring trends in economic growth, targeting for real economic growth in the range of 0.7 percent per year rather than the 1.9 projected or the 3.6 percent average of the 1961 to 2005 period. While this resolves the demographic and economic scenarios, it does not deal with the second major consequence of our aging population discussed in the introduction, that being the increasing demand for health care, and health care spending, that will go hand-in-hand with our aging population. The next section briefly considers the health care implications of achieving this scenario.

3. Health Spending and an Aging Population

Provincial government spending on health accounts for the overwhelming majority of health spending in Canada, with the second place held by private spending, and then federal government direct health spending. As shown in the most recent data (2003, Figure 23) on provincial spending, with every age after age ten, per capita age specific provincial health expenditures increase. While the increases are small for the under 55 population, increases are much more significant for the 55 plus population. For example, provincial per capita spending in 2003 in constant dollars for the 45 to 49 year old age group is 14 percent greater than that of the 25 to 29 year old age group (\$1,700 versus \$1,494 spent per person in each age group). Relative to the \$1,700 spent on each 45 to 49 year old, 1.8 times more is spent on each 60 to 64 year old (\$3,150 per capita), 3.7 times

Figure 23

more for each 70 to 74 year old (\$6,416), 6.6 times more for each 80 to 84 year old (\$11,257) and 11.3 times more for each person 90 or older (\$19,188).

Not only does the pattern of health spending increase with age, age specific spending has been increasing significantly over time (Figure 24).

Presented in four large age groups, between 1980 and 2003 there was an inflation-adjusted 44 percent increase in provincial government health spending for the 65 plus population (reaching \$8,438 per person aged 65 plus in 2003), representing an average annual increase, in constant dollars, of 1.6 percent per year. In the younger age groups, the increases were of similar magnitude, with an average annual increase of 1.3 percent in per capita spending, to reach \$2,224 per 45 to 64 year old in 2003, a 1.9 percent per year increase for the 15 to 44 age group to reach \$1,400, and a 1.3 percent per year increase in per capita spending for the 0 to 14 age group to reach \$1,217 in 2003.

As with other demographic variables, projection of future rates of provincial health spending is here carried out at the most detailed level, using the five-year age group data available for the 1996 to 2003 period, as shown on Figure 23, which shows recent constant dollar increases in the range of \$150 to \$400 (percentage increases in the range of 21 to 29 percent over the seven-year period) were seen in the under 55 population, contrasted by increases of between \$450 to \$2,700 per capita (percentage increases in the range of 15 to 25 percent) for the 55 and over population. On this detailed age group basis, the largest constant dollar absolute increases in age specific per capita between 1996 and 2003 was in the 85 to 89 year old age group, which increased from \$15,785 1996 to \$18,485 by 2003, a 17 percent increase. The largest percentage increase was a 29 percent increase in per capita spending in the 10 to 14 age group, from \$632 in 1996 to \$815 in 2003.

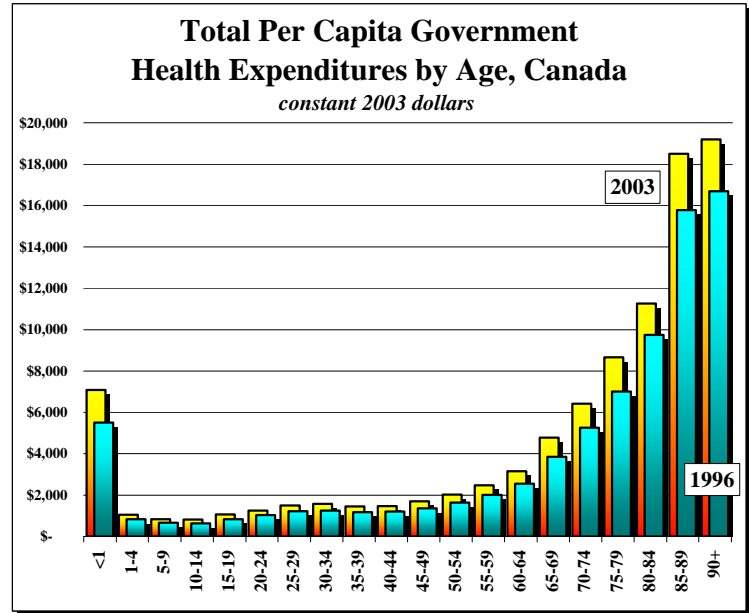
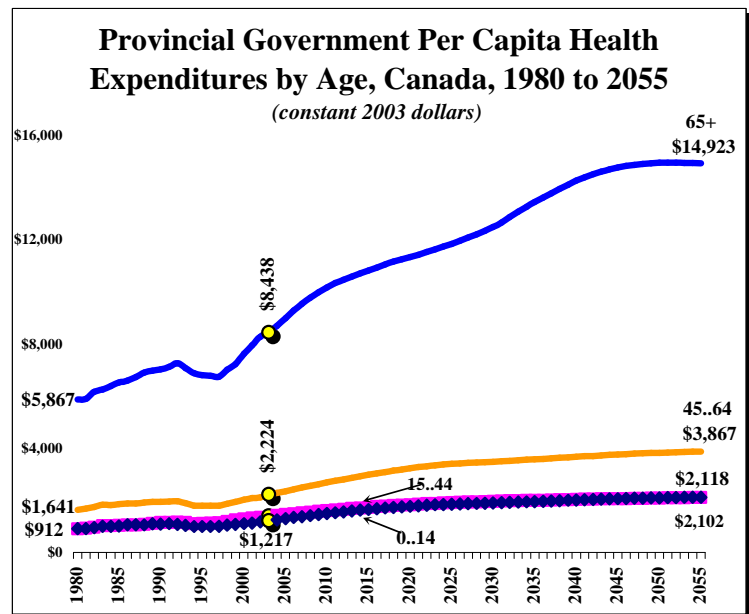


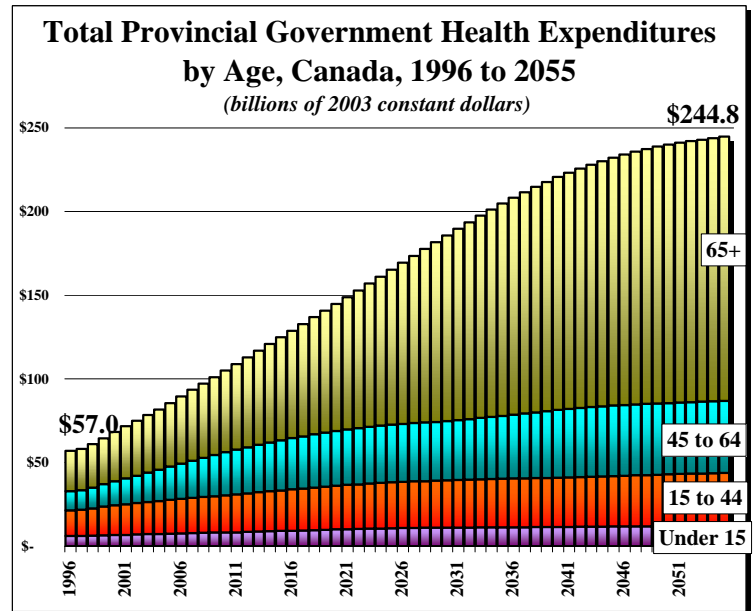
Figure 24



The projection of future age specific per capita provincial health spending on the basis of recent and long-term trends in spending is a stabilization in age specific rates by the end of the projection period. On a summary basis, this would result in per capita health spending stabilizing in the range of \$14,900 per 65 year old, \$3,900 per 45 to 64 year old, and \$2,100 per person in both the 15 to 44 year old and 0 to 14 year old age groups. These changes represent real increases in per capita spending for the 65 plus age group of 1.1 percent per year over the next fifty years (compared to 1.6 percent over the past quarter century), 1.1 percent per year for the 45 to 64 age group (compared to 1.3 per year historically), 0.8 percent per year for the 15 to 44 age group (1.9 historically), and 1.1 percent per year for the 0 to 14 age group (1.3 percent per year historically).

Figure 25

Combining the projected stabilization of age specific per capita provincial health spending (by five-year age groups) over the next fifty years with the projection of Canada’s future population by age and sex results in a projection of total provincial health spending by age, which, when aggregated, gives a projected total provincial health spending (Figure 25). The result of the projected changing demography and changing age specific health spending is a projected real increase in provincial health spending from \$85 billion in 2005 to \$245 billion in 2055, a 186 percent increase in spending (\$160 billion).



Of the \$160 billion increase in provincial government health expenditures, 75 percent would be the result of increased spending on the 65 plus population, 14 percent would be from spending on the 45 to 64 population, 7 percent would be from spending on the 15 to 44 age group, and 10 percent would be from spending on the 0 to 14 age group. The increase in spending on the oldest age group is a result of the combination of increased spending per capita and the more than doubling of the number of people in the age group. Spending on other age groups will not increase as much because while the per capita spending is increasing almost as much as it is for the oldest age group, the number of people in these age groups is not.

Continuing historical trends in age specific health expenditures (again on a diminishing increase basis) combined with an aging population would see total per capita expenditures increase, in constant 2003 dollars, from \$2,786 per person in Canada today to \$5,776 per capita by 2055, a 107 percent real increase. In terms of the labour force, the increase per labour force participant under the demographic trends projection (that would result in a 2055 labour force of 22.8 million) would be 118 percent, going from \$4,927 per labour force participant today (2005) to \$10,755 per labour force participant in 2055.

Adjusted for inflation, and with a labour force and health spending determined by demographic trends, each labour force participant would be asked to increase their real contribution to provincial health spending by 118 percent. Under this scenario, where the economy is constrained by demography, the productivity of each worker would increase by a total of 9.5 percent over the next fifty years. With the per labour force participant contribution to provincial health spending increasing by 118 percent, 12 times the growth of their productivity, and the growth in total health spending in constant dollars increasing by 186 percent, 4 times the 44 percent increase in real GDP, health care spending will command an increasing share of both the economy and of workers' productivity. This would leave significantly fewer resources for other sectors to earn, and for labour force participants to spend, on non-health care related economic activities, something that may not have the support of future generations of increasingly beleaguered workers.

As closing note, from time to time it is suggested that increases in health spending (which are primarily focused on the older population) can be made up for by decreases in spending of education (which are primarily focused on the younger population).

Historical data on spending on both K to 12 and post-secondary education per person in participating age groups indicates that after a long period of real increase in these per capita rates, they have stabilized in real terms in recent years. As demographic trends indicate a relatively constant younger population in the future, constant real per capita rates lead to constant real spending on education, and hence the sought after declines in education spending will not materialize: there will be no cookie jar to raid to further fund health spending.

Certainly if it was projected that there would be fewer young people in the future then total real education spending would decline, but so too would the size of the labour force, and hence the productive capacity of the economy. Further, given both the presumption of increasing productivity in the projection and its necessity to ensure that the economy can provide the resources needed to fund things like health care, we may be better advised to focus on increasing productivity, even at the cost of spending more – not less – money per capita on education.

To summarize, there are, simply put, no simple solutions to the inevitable need for change away from recent and historical trends, both demographic and economic, in order to shape a future that will provide the necessary resolution between Canada's future demography and its economy, in a way that meets the needs and aspirations of all generations of Canadians, both current and future.

V. CONCLUSIONS

The future that is implicit in the trends in Canada's demography are much different from those which are implicit in the trends in its economy. In spite of trends in increased labour force participation and increased immigration, the aging of the country's current population cannot generate a labour force large enough to meet the employment requirements of the economy even though it would grow more slowly than ever before. The gap between these independent trend projections must be resolved by changes that depart from both long-term and recent trends, as Canada's demography and economy, while often studied independently, are seamless parts of a whole.

Bringing these two independent projections together clearly reveals four fundamental truths about Canada's demographic and economic future. The first fundamental truth is the changes that Canada will unquestionably experience in future will not be simple extensions of recent trends, but rather will be *significant* accelerations of or deviations from them, either in direction or magnitude. Accompanying the demographic transformation that Canada will experience as a consequence of the aging of its population will be economic and behavioural transformations of matching significance.

The second fundamental truth is that while much is made about the aging of the post war baby boom generation as the driver of both change and the need for it, in reality the aging of this generation merely compounds a situation that will inevitably occur in any population characterized by long and increasing life expectancies and a below the replacement level birth rates. The aging of the baby boom generation merely makes an endemic situation of a divergence between economic and demographic trends more extreme: long after the baby boomers have completed their lifecycle, and thus exited the population, the consequences of an aging population as a result of long life expectancies and below the replacement level births will have to be dealt with.

The third fundamental truth is that in no case would reasonable changes in one component of Canada's demography or economy *alone* serve to resolve the differences between where economic and demographic trends would otherwise take Canada. No single approach – not radical increases in labour force participation, childbearing, productivity, or immigration – will resolve the gap between where trends in Canada's demography and its economy would take us. This means that a comprehensive approach will be required, one that sponsors above trend increases in labour force participation, birth rates, immigration, and productivity, and most certainly below trend increases in emigration, will be required.

The final, and perhaps most poignant, fundamental truth is that Canada's social services, particularly health care, have enjoyed a blessed environment over the past forty years of history that they have existed. With a relatively small beneficiary population and a relatively large contributory population, the transfers through a pay-as-you-go health care system from a relatively large working population in the low per capita health spending stage of the lifecycle to a relatively small older population in the high per capita stage of

the lifecycle afforded an ever-improving level of spending for care. The older population never had it so good – and may never have it as good in the future.

Without robust economic growth, the health care requirements of an aging population will increasingly erode the benefits from the growth in productivity that the working population might otherwise enjoy, with health care commanding an ever increasing share of the economy to the detriment of other sectors. Without robust economic growth, the contributory relationship between the beneficiaries of health care spending, predominantly in the older retired population and the contributors, those in the working population who will pay for this spending, will increasingly be under tension.

With robust economic growth, funding future health care requirements of an aging population will not be a major issue – generating the population, participation, and productivity required to fund it would be.

Given the dimensions of these challenges, Canada's future will, without question, be a changing one. How, and how effectively, these changes are managed will be the focus of much discussion and debate, but, ready or not, changes that depart significantly from the trends that we are accustomed to are on their way. While we anticipate many observations with respect to both the methodology used and findings presented in this report, hopefully these will be constructive, as it is our hope that this report will provide a launch-off point to discussions of how best to foster the changes that will be required to accommodate Canada's future.

IV: APPENDIX – DATA SOURCES

The historical data used in this analysis and presented in this report have been derived from an array of sources. As such, the process of integrating the data into consistent series for the purposes of projection and analysis involved adjustments to published values in some cases, and interpolation in others. Therefore, in some cases the values presented in this report may not precisely coincide with those published in the source documents.

Population

Historical data describing Canada's population have been derived from Statistics Canada's Annual Demographic Statistics and Census publications. Historical values for the total number of births and births by age of mother are derived from Statistics Canada's Annual Demographic Statistics, Statistics Canada's Births, Statistics Canada's Births and Deaths, and Statistics Canada's and The Dominion Bureau of Statistics' Vital Statistics for the period of time covered by these various publications. Historical values for the total number of deaths and deaths by age and sex are derived from Statistics Canada's Annual Demographic Statistics, Statistics Canada's Deaths, Statistics Canada's Births and Deaths, and Statistics Canada's and The Dominion Bureau of Statistics' Vital Statistics for the period of time covered by these various publications. Historical values for the level and age composition of immigration and emigration are from Statistics Canada's Annual Demographic Statistics and Immigration Canada's Facts and Figures: Immigration Overview for the period of time covered by these various publications.

Labour Force

Age and sex specific labour force participation data have been derived from Statistics Canada's annual Labour Force Survey publication, the Census, and Statistics Canada's Historical Labour Review.

Employment

Annual sectoral employment data have been obtained from Statistics Canada's Labour Force Survey and Survey of Employment, Payroll, and Hours.

Gross Domestic Product

Annual expenditure-based estimates of Canada's gross domestic product (in chained 1997 dollars) have been obtained from Statistics Canada's National Accounts database.

Health Spending

Data on the health and related expenditures have been derived from Health Canada's National Health Expenditures in Canada publication as well as from the Canadian Institute for Health Information.

ⁱ *Four Decades of Productivity Performance in Canada* : <http://www.statcan.ca/english/research/15-206-XIE/15-206-XIE2005001.htm>

ⁱⁱ The CD Howe Institute; *Slowing Down With Age: The Ominous Implications of Workforce Aging for Canadian Living Standards*: http://www.cdhowe.org/pdf/commentary_182_english.pdf