Strathmore
UNIVERSITY

THE RELATIONSHIP BETWEEN IMMIGRATION AND THE LEVEL OF PRICES IN CANADA

Martha Okumu
REG NO. 72151

Submitted in partial fulfilment of the requirements for the Degree of Bachelor of Business Science in Financial Economics at Strathmore University

School of Finance and Applied Economics
Strathmore University
Nairobi, Kenya

November 2015

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

Martha Okumu

Martha ..... [*Signature*]

17/11/15 ..... [*Date*]

This Research Proposal has been submitted for examination with my approval as the Supervisor.

Dr. Caroline Kariuki

..... [*Signature*]

17/11/2015 ..... [*Date*]

School of Finance and Applied Economics

Strathmore University

Abstract

There has been a decline in fertility rates in Canada over the past few years. This has brought about a decrease in the supply of labour in the country. To deal with the shortfall in labour, the Canadian government has put in place policies aimed at encouraging immigration into the country. This study seeks to investigate the impact of the increased immigration on the level of prices of goods and services within the Canadian economy, which may take place through an increase in aggregate demand. To do this, the study aims at determining if there exists a relationship between immigration and prices in Canada. A VAR model is used to examine the dynamic relationship between the two variables over the period of 1961 to 2014. The main variables under study are the price levels measured by the GDP deflator and economic immigrants. An analysis of the data reveals that a sudden increase in immigration has a 9% positive impact on prices; likewise 19% of shocks in immigration can be explained by shocks to prices. This result is in contrast with other empirical studies possibly due to the fact that it concentrates on high- skilled economic immigrants as opposed to low- skilled immigrants. In conclusion it is found that increased immigration has a small but positive impact on prices. However, further research that incorporates social immigrants needs to be conducted in order to get a conclusive outlook of the relationship between immigration and prices.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

CIC Citizenship and Immigration Canada

CPI Consumer Price Index

GDP Gross Domestic Product

GNI Gross National Income

IRFs Impulse Response Functions

VAR Vector Autoregression

Chapter 1: Introduction

1.1 Background

Immigration has been an integral part of the global economy throughout history. Some people immigrate to escape political strife within their countries, others immigrate to find better employment opportunities or to join their family in a foreign country. Economists advocate for immigration on the premise that it induces economic growth. Ridout (2006) argued that an increase in immigration increases investment in the economy and consequently leads to economic growth. The author claims that the increase in population boosted by immigration would lead to an increase in demand for houses and infrastructure, which will stimulate the level of investment and consequently economic growth. Similarly, Hanson (2012)posited that immigrants contribute to innovation in an economy by developing technology that can lead to growth in the economy. This is in line with the Solow growth model, which asserts that technological progress increases output within the economy.

An increase in the level of output produced in an economy measures economic growth. The level of output entails a multitude of factors comprising of aggregate consumption by households, investments by firms, government expenditure and net exports. These factors represent aggregate expenditure in the economy. There has been extensive research done on the relationship between an increase in immigration and economic growth. According to Needleman (1966) increased immigration increases aggregate demand and exports produced by a country. This in turn leads to an increase in the level of output. The claims that immigrants will need to consume goods and services thus increasing consumption in the economy. Moreover, the labour provided by the immigrants will increase productivity leading to an increase in exports.

Canada has a long history of immigration, with an estimated 4 million Europeans arriving in the country in the early 20th century. Over the years people from diverse racial backgrounds have settled in Canada giving it its multicultural characteristic. Canada accepts three types of immigrants: economic immigrants, refugees and other immigrants i.e. those who immigrate to Canada to join their family members. As of

2013, the Canadian government accepted 258,953 permanent residents: 49.5% from Asia and the Pacific, 25.1% from Africa and the Middle East and the rest from other parts of the world.

In the recent years there has been a decline in fertility rates in Canada coupled with an aging population. In a report released by Certified General Accountants Association of Canada (2005) it is estimated that by 2021 there will be almost 7 million people over 65 years of age making up 19% of the total population and that by 2041, seniors will represent an estimated 25% of the population. In addressing the impending labour and skill shortage caused by the aging population, the Canadian government has put in place policies aimed at encouraging immigration. The country lifted its permanent residents target from 265,000 a year to 285,000 in 2015. In addition, as of January 2015, Citizenship and Immigration Canada (CIC) put in place an electronic system, Express Entry, to support skilled immigrant workers seeking permanent residency in the nation. The increase in the number of skilled immigrants is likely to achieve Canada's goal of economic growth by providing labour necessary for increased productivity on condition that there is capital widening: capital per worker increases so as to reduce the impact of diminishing marginal returns of labour.

In the past few years researchers in Canada have investigated the effects of immigration on other factors. Moore (2003) studied the trend in income inequality and immigration in Canada between 1980 and 1995. This study will provide an insight into the relationship between immigration and the level of prices in Canada.

1.2 Problem Statement

In analysing the performance of an economy, economists use six key variables: Inflation rate, unemployment rate, real gross domestic product (GDP), exchange rate, interest rates and the level of stock market. Yabuuch (2008) studied the relationship between immigration and unemployment under certain conditions. The study established that an increase in immigration of unskilled labour given production subsidies and a low wage for unskilled labour reduced the unemployment of skilled

workers. Since unemployment and the level of prices in an economy have an inverse relationship in the short run as depicted by the Phillip's curve, other researchers have gone on to study the effect of immigration on prices.

There has been research conducted on immigration and economic factors in several immigrant- intensive countries such as Australia, Russia, Germany and the United States. In studying the consequence of increased migration from Russia to Israel, Lach (2007) found that there is a negative relationship between immigration and prices. The author attributed this relationship to increased search periods for the best prices by immigrants. Cortes (2008) provided more insights into this subject by studying the effect of low skilled immigration on the US prices and found that there was a decrease in the prices of services provided by low skilled workers.

Despite its long history of immigration, there has been a decline in the number of immigrants into Australia in the recent years with the Australian government putting restrictions on the number of immigrants entering the continental island. On the other hand, Canada's Express Entry system is likely to have the opposite effect on the country. This study will investigate the relationship between the level of prices and immigration in Canada thereby filling the gap that has been left by researchers in this area. To do so, this study will test for cointegration between the two variables thus describing interactions and co- movements between them. Further, a VAR analysis will be conducted in order to examine the interaction between immigration and prices. This will involve other tests such as pairwise Granger causality, impulse response and variance decomposition, which will provide deeper understanding of which variables have significant effects on each dependent variable, the effect of a shock to one of the innovations on values of the dependent variables and the comparable importance of each random innovations in affecting the variables in the VAR, respectively. In doing so, this analysis strives to determine the efficacy of Canada's immigration initiatives.

1.3 Research Objective

This research aims at investigating the relationship between immigration and price levels in the Canadian economy.

1.4 Research Questions

This study is guided by the question:

1. What is the relationship between immigration and price levels in Canada?

1.5 Significance

Studies on the level of prices are important for two reasons. One is that a persistent increase in the level of prices causes inflation, which is an indicator that an economy is not performing well. The second is that the level of prices of goods and services tend to affect other variables within an economy such as unemployment and the balance of payments.

A persistent increase in price levels (inflation) reduces the purchasing power of money in an economy. The uncertainty associated with inflation discourages savings and thus deters economic growth. Moreover, when there is an increase in the level of prices within an economy, the prices of goods produced for export become expensive and less competitive making their demand reduce and consequently leading to a weakening of the currency. This shows that inflation affects the balance of payment of an economy by depreciating its currency.

Due to its impact on economic variables, the stability of price levels is of concern to economists and policy makers. The relevance of this study is to possibly provide an understanding of immigration and the level of prices in an economy so as to enable policy makers make informed decisions about the optimal level of immigration and prices. Further, by providing information that aids in making decisions on the optimal consumption levels, this research can be of value to consumers. This study

can possibly provide a guideline for this by determining whether the increased immigration is likely to have an effect on prices in the Canadian economy. Since consumers prefer to optimize their living standards by maintaining a balance between their consumption and savings needs within their lifetimes, consumption smoothing.

1.6 Scope

This study will investigate the impact of immigration on the price level in Canada. The period under consideration stretches from 1961 to 2014. This provides sufficient time to study the long-term impact of immigration on prices. Furthermore this period captures the impact of the fourth immigration wave into Canada, which involved immigration mostly from continental Europe and took place in the 1960s. In measuring the level of prices this study will utilize the GDP deflator, which is a price index that relates GDP in nominal terms to real GDP, because of its breadth in reflecting the general level of prices. Additionally, economic growth and income will be considered as intervening variables due to their effect on price levels.

1.7 Key Concepts

In this study, immigration refers to the process of coming to live permanently in a country that is not one's own and economic growth is defined as an increase in the capacity of an economy to produce goods and services compared from one period to another. Economic growth will be measured in terms of GDP using the national expenditure approach which states that GDP is the total spending on all final goods and services during a year and is expressed as: $Y = C + I + G + (X - M)$, where Y is the total output, C is consumption, I is investment by firms, G is government spending and (X-M) is the net exports.

The balance of payments of a country are a set of accounts that show all economic transactions which take place between residents of one country and residents of all other countries. They show the imports and exports of a country with other countries.

Income, in this study, reflects the average income the Canadian population and is measure by gross national income (GNI) per capita.

Chapter 2: Literature Review

Most immigration theories use labour market dynamics to explain the reason for immigration. Such models include the neoclassical theory of immigration, which proposes that immigration is driven by the wage differentials that exist between geographic locations; and the dual labour market theory, which suggests that immigration is fuelled by a need for labour in the destination country. Other theories such as world system theory attribute an increase in immigration to globalisation. It states that trade with one country may create an incentive for migrants to move to a country with higher economic growth. However, this theory has been criticised on the basis that increased trade will create more demand for goods from developing countries thus increasing employment opportunities in the developing countries.

Additionally, several scholars have found that immigration has a positive economic impact on the economy: (Ridout, 2006); (Lincoln, 2010); (Peri, 2012); and (Hanson, 2012). Taking into account that economic growth and prices are related as posited by Keynesian economics, it is apparent that there exists a relationship between immigration and prices.

Numerous studies have been carried out on the impact immigration has on the economy. This section gives a breakdown of the literature done on immigration, concentrating on the relationship between immigration and prices of goods and services within an economy.

2.1 Introduction

Immigration is beneficial to an economy, especially for a country whose population is aging. Immigrants not only contribute to economic growth by providing labour necessary for increased productivity but also by increasing innovation. Kerr and Lincoln (2010) studied immigration and innovation within the American economy and found that immigrants contributed to economic growth by creating new technologies. This can be corroborated by the endogenous growth model, which suggests that innovation increases productivity in an economy. The increase in

incomes associated with economic growth can lead to an increase in the level of prices.

2.2 The Relationship Between Immigration and Prices Based on Past Literature

An increase in the price levels in an economy has repercussions on other sectors of the economy. Several studies have been conducted on immigration and prices within an economy. A study carried out on immigration and prices in Israel by Lach (2007)showed that there exists a negative relationship between the two factors. The author whose study was based on the influx of immigrants from the former Soviet Union into Israel observed that upon arrival immigrants have higher price elasticity due to their low incomes and lack of brand loyalties. Economists use price elasticity to show the responsiveness of quantity demanded to a change in price, *ceteris paribus*[1]. High price elasticity is indicative of high sensitivity to prices i.e. a small negative change in prices increases the quantity demanded. Since immigrants have high price elasticity then it is probable that a decrease in the level of prices will cause a significant increase in demand. This provides a plausible explanation for the lowering of prices by the retailers in the Israeli economy as provided by Lach (2007). Further, the study revealed that immigrants have long search periods that affect the prices of goods and services. Upon arrival immigrants experience search unemployment, and consequently they have more time to look around for best prices. This supposition is supported by the theory proposed by Stahl(1989), which asserts that when the number of consumers with low search costs increase, retailers respond by lowering prices.

Similarly, in a study of low- skilled immigration on the American economy, Cortes (2008) found that low- skilled immigration reduces the prices of goods and services that require low- skill levels for production. The author observed that an increase of low- skilled immigration pushed down wages, which, in turn, led to a decrease in the

[1]All factors held constant

prices of non-traded[2] goods. The observations showed that a 10% increase in low-skilled workers resulted in a 2% decrease in the prices of services mainly offered by immigrants such as gardening and housekeeping. In addition, Baghdadi and Jansen (2010) claimed that temporary immigration also has a negative effect on the level of prices. Utilising data on temporary and permanent immigration across American cities between 2000 and 2006, they found that temporary immigrants tend to push down the prices of non- tradable goods and services in the economy. They attributed this phenomenon to the low- skill requirement of non- traded goods and services alluding to the low costs associated with low- skilled labour. Further, Baghdadi and Jansen (2010) concluded that the effect of permanent immigrants on prices in the American economy was equivocal and that it was conditional on whether the non-traded sector requires more low- skilled workers than the traded sector.

2.3 Empirical Review

The authors who have investigated the relationship between immigration and prices have employed various methodologies in their study. Lach (2007)who investigated the impact of immigration from the former Soviet Union on prices in Israel used regression analysis to establish the size, sign and significance of immigration on the prices in Israel. In that study the monthly average price was the dependent variable and the explanatory variables were: the fixed effect on products sold in stores within a certain city and the number of immigrants and natives in the same city. The study used store- level prices for 915 consumer price index (CPI) products in Israel and immigration data in 1990. To find elasticity the author took logs of the dependent and independent variables and ultimately used ordinary least squares (OLS) method to estimate the regression. This method was aimed at analysing the influence of unexpected immigration on prices in Israel and thus used cross sectional data. However in some cases immigration occurs over a longer period and thus time has to be factored in the analysis of immigration and prices over longer time periods.

[2] It is a good that cannot be sold far from the where it was produced. In contrast a tradable good is one that can be sold far from where it was produced.

The study carried out by Cortes (2008) on low- skilled immigration and price levels in USA used the consumer price index (CPI) and the change in low- skilled immigrant workers to determine the causal relationship between the two variables. The author perceived the likelihood of bias brought about by the choices of immigrants to settle in certain cities based on economic factors. To deal with this, the study used historical distribution data of immigrants to create an instrumental variable that factored in the tendency of immigrants to settle in a city with a large population of immigrants from their native countries. Cortes (2008)estimated the relationship between low- skilled immigration and prices by defining prices, given by the CPI, as the regressand and the share of low- skilled workers as the explanatory variable. The study assumed that the explanatory variable affects the explained variable through wages and thus accounted for this in the model.

On the other hand, Baghdadi and Jansen (2010), who studied the effects of temporary migration on the prices of non- tradable good and services, used a panel dataset of 14 American cities for the period between 2000 and 2006. Their study regressed the prices of non-tradable goods against low- skilled temporary immigrants, low- skilled permanent immigrants, population in the city, unemployment rate and per capita income to account for economic factors within the city and time and sector fixed effects to control for trend variation and sector specific characteristics. They recognized the possible existence of reverse causality between immigration and prices and therefore used an instrumental variable akin to the one used by Cortes (2008).

From above it is apparent that the studies conducted on immigration and prices used either panel data or cross sectional data. A time series analysis can also be conducted to observe the relationship between immigration and prices over time. Sims (1980)developed the vector autoregressive model, which is a hybrid of univariate time series models and simultaneous equation models. Vector Autoregression (VAR) rebuts a priori separation of endogenous and exogenous variables and instead it focuses on the impact one variable has on the other over time. VAR makes it possible for a researcher to capture more characteristics of the data by allowing the target variable to depend on its lagged values and the lagged values of other variables within the system that may have an impact on the target variable. This research will

utilise VAR to analyse time series data of immigration and prices over a period of 53 years to determine the relationship between the two.

2.4 Research Gap

Extensive research has been conducted on immigration and the economy. Most of these studies have focussed on the impact of immigration on the economy specifically, the labour market with few studies done on immigration and prices. Baghdadi and Jansen (2010) studied the effect of temporary low- skilled immigration on prices and included other variables that have an impact on the level of prices such as per capita income and unemployment rate. On the other hand, Cortes (2008) focused on the impact low-skilled immigration has on prices taking into consideration the settlement patterns of immigrants.

This research will investigate the causality between immigration and level of prices in Canada by incorporating other factors into the model such as income and economic growth, which may have an impact on the two variables. Furthermore, the study will focus on time series analysis using VAR to estimate the relationship between immigration and prices.

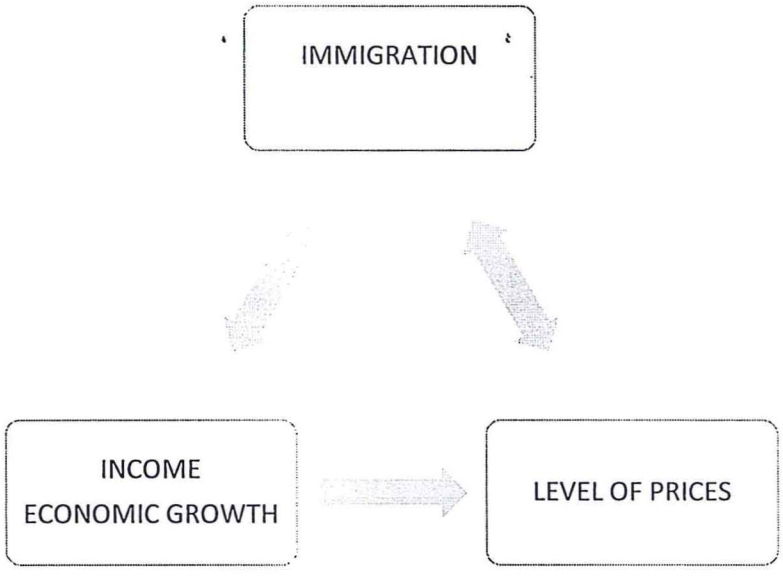
2.5 Conceptual Framework

According to Keynesian economics there are two types of inflation: demand- pull and cost- push. Demand-pull inflation arises when aggregate demand increases faster than supply in the economy while cost- push inflation is caused by an increase in the costs of production.

In the analysis of immigration and level of prices this study will take into consideration demand- pull inflation by including the factors that cause them i.e. aggregate demand. This study assumes that there exists a simultaneous relationship between immigration and prices since immigrants may consider price levels when making decisions on where to move and similarly increased immigration may have an impact on prices. In addition, there are other factors such as income and economic growth that affect both prices and immigration. These factors will be included in the

analysis as intervening variables: variables that possibly provide a causal link between the independent variables and the dependent variable. The inclusion of intervening variables in this study will improve the analysis and reduce the likelihood of omitted variable bias. Figure 1, below, shows the conceptual framework, which outlines the main variables to be studied and how they relate to one another.

Figure 1



Aggregate demand is composed of consumption by households, investment by firms, government expenditure and net exports. When an economy is expanding due to an increase in output, incomes are likely to increase consequently leading to an increase in aggregate demand. In a research conducted by Peri (2012) it was found that immigrants are instrumental in economic growth. The analysis which involved studying output per worker and employment in American states with large immigrant inflows showed that immigrants increased the level of output within the economy by encouraging investment and specialisation. Given that aggregate demand is a composite of investments and other factors, this increase in investment is likely to lead to an increase in aggregate demand and as a result, higher prices.

Additionally, increased consumption spending by households may have an effect on the level of prices. An increase in consumption spending by households could be

caused by low interest rates, a higher level of consumer confidence or a reduction in taxes. Various studies conducted on the impact immigrants have on fiscal policy have showed that skilled immigrants make a significant contribution via taxes. In a study conducted on advanced economies by Rowthorn (2008), it was shown that highly skilled immigrants pay more in taxes than they absorb. Therefore an influx of immigrants may cause taxes to reduce, *ceteris paribus*, thus increasing disposable income available to households. Consequently consumption will increase, perhaps, increasing the level of prices in the economy.

Immigrants may also increase the level of exports by reducing unit production costs and by providing useful links to their home country. Genc et al. (2012)argue that immigrants have better knowledge about their native country and other similar countries and as a result they enhance international trade. From the aggregate demand perspective, more exports increase aggregate demand, which may lead to demand- pull inflation.

A common argument against immigration is that it increases pressure on the fiscal deficit of an economy. Camarota (2004) proposed four areas where immigrants impose high costs for the government: education, penal institutions, health insurance and the immigration system i.e. border control. The study, which involved immigration into United States, showed that the federal government spent approximately $28 billion in providing primary and secondary education for children whose second language is English. Hanson (2012) concurs with this supposition claiming that education is the major drain on government funds. The increase in government spending is probable to increase the level of output in the economy and if it is significant, in comparison to aggregate supply, it may lead to an increase in the level of prices.

Moreover, the costs incurred by firms in producing goods and services have an impact on the level of prices. An increase in wages, oil prices or other costs related to the production process tends to push up the general price level. Comprehensive research has been carried out on the impact immigration has on wages. Borjas (2005) postulated that an increase in the number of high- skilled immigrant workers reduces the wages of the native born workers. Based on the demand- supply analysis of labour, a large supply of labour stimulated by immigration lowers the wages that

firms offer to their workers. The decrease in wages reduces production costs and can lead to lower price levels.

2.6 Additional Factors that Affect Prices

There are factors, other than aggregate demand and changes in the costs of production, which affect the level of prices within the economy. Monetarist economists believe that monetary aggregates are responsible for inflationary pressures in the economy. They believe that an increase in money supply will cause the prices of goods and services within the economy to increase. Schreur (2008) illustrated this relationship by arguing that an increase in money supply leads to increased spending by consumers, which results in higher prices.

Economic growth also has an effect on the price levels in the economy. An increase in the aggregate output in the economy, which can be measured by an increase in aggregate demand using the national expenditure approach has an impact on the level of prices. As stated earlier, Keynesian economics posits that an increase in aggregate demand causes demand- pull inflation thus showing the relationship between economic growth and prices.

The level of income affects prices in the economy by improving the standards of living. In microeconomics, one of the factors that drive the demand for goods and services is the income level. When the income level of households and firms goes up, demand from these households and firms, is likely to go up consequently leading to demand- pull inflation.

Additionally, as illustrated by the Phillips curve, the unemployment rate can affect the level of prices in an economy. Developed by William Phillips, a New Zealand economist in 1958, the Phillips curve predicts that a decrease in the unemployment rate results in an increase in price levels. However, this relationship holds only in the short- run as set forth by Milton Friedman.

2.7 Summary

From the review of literature it is evident that there exists a relationship between immigration and the price levels in an economy. Baghdadi and Jansen (2010) and Cortes (2008) focused on the impact low-skilled immigration has on prices and found the relationship to be negative for non-traded goods and services. Moreover, given the Keynesian theory on inflation, it clear that immigrants may affect the level of prices through aggregate demand and costs of production.

The Canadian immigration policy encourages high- skilled immigration with the aim of building human capital within the economy. From the point of view taken by Borjas (2005) this may depress wages of Canadian workers and as a result affect the level of prices in the Canadian economy. The link between immigration and prices is not a direct one. Rather, immigration is likely to make its impact on prices indirectly through aggregate demand. This research will contribute to the existing pool of knowledge by examining the relationship between immigration and prices with the inclusion of aggregate demand, which, in this case, is measured by economic growth. In addition economic growth and income will be included as intervening variables in the analysis. This will provide a means of better understanding the relationship between prices and immigration given that other factors may affect them. To achieve this, the study will use time series data and the VAR estimation model to provide insights into the constructiveness of Canada's immigration policy.

Chapter 3: Methodology

This section outlines the procedure that will be used in carrying out the study on immigration and price levels in Canada.

3.1 Research design

It is probable that immigration affects the level of prices within an economy. This is evidenced by the review of literature, which has shown that there exists an indirect relationship between immigration and the level of prices in an economy. The channels through which immigration affects prices are wages and the factors affecting aggregate demand: consumption, investment, government spending and exports.

Other authors like Lach (2007) and Cortes (2008) utilised panel regression estimation techniques to achieve the objective of determining the impact of immigration on prices across a cross- section of cities in Russia and United Stated respectively. On the other hand this study will use VAR to attain the same objective for Canada. Although studies that focus on immigration and prices have not conducted a VAR analysis other studies on other economic variables have done so. For example Blanchard and Perriotti (2002) studied the dynamic effects of shocks in government spending and taxes on economic activity in the United States. VAR analysis enabled them to study dynamic interactions between the variables.

This study will employ the VAR model by laying emphasis on the change in aggregate demand, which will be measured by the economic growth rate. Further, excluding from this study other variables that affect immigration and prices could lead to omitted- variable bias. For this reason economic growth and income measured by gross national income per capita (GNI per capita) will be included into the model as intervening variables.

According to Baghdadi and Jansen (2010) the effect of permanent immigrants on prices is ambiguous and depends on whether the non- traded sector requires more low- skilled workers than the traded sector. In view of Canada's immigration policy, which encourages skilled permanent immigration, the proposed study seeks to establish the causal relationship between immigration and prices in that country. To

achieve this objective this research will employ an explanatory research design, which is in line with the design used by both Lach (2007) and Cortes (2008).

3.2 Population and sampling

In measuring the change in price levels economists use CPI or the GDP deflator. The CPI, which measures the average change in price of a basket of goods, captures the impact changing prices have on households. In studying the impact of low- skilled immigrants on prices in US, Cortes (2008) applied CPI data. This is because in that study the main channel through which immigration affected prices was through wages, therefore CPI data was suitable for explaining the change in prices of goods and services purchased by households as a function of their earnings. On the contrary, this study concentrates on aggregate demand therefore the GDP deflator will be appropriate to measure the changes in prices of aggregate output in the economy.

The period of analysis will span the past 53 years, from 1961- 2014, with annual data being used. This will not only ensure that the sample size is adequate for time series analysis but will also capture the fourth immigration wave into Canada following the enactment of the Immigration Act in 1967, which assessed immigrants based on their education, skills, proficiency in English and French, age and employment prospects. Permanent immigration statistics will be used in this analysis and will focus on economic immigrants.

3.3 Data Collection

The nature of data used in this study will be quantitative data from secondary sources. Multiple- source secondary data from various databases will be used. Figures of Canada's GDP deflator, GNI per capita growth and economic growth rate for the past 53 years will be retrieved from The World Bank data bank. In addition immigration statistics will be sourced from Citizenship and Immigration Canada (CIC), the body in charge of admitting immigrants.

3.4 Data Analysis

This study will involve the use of VAR in determining the relationship between immigration and prices over time. This technique will provide a means of studying the dynamic interaction between immigration and prices by allowing prices to depend on its own lags and the lags of immigration as well as the lags of the intervening variables. In order to have a better understanding of these interactions a granger causality test is used to determine whether the lagged variables of the independent variable are significant in determining the dependent variable. Additionally, impulse response functions and variance decompositions will be used to determine the responsiveness of the dependent variables in the VAR system to shocks on the error term and the importance of random innovation in affecting the variables in the VAR respectively.

3.4.1 Preliminary analysis

Scholars within the field of econometrics disagree on whether stationarity of data is crucial for VAR analysis. Some scholars argue that differencing the data, to obtain stationarity, leads to a loss of information on the long- run relationship between variables and thus should be avoided. However, the Granger causality test of significance assumes stationarity of data therefore it is imperative that the structure of the data is examined to ensure that the data is stationary prior to estimating a VAR model.

To do this tests of stationarity will be conducted. This study uses the Augmented Dickey Fuller test (ADF) to test for stationarity and to obtain the order of integration due to the likelihood of serial correlation. The model used is:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + U_t$$

(0). This test will provide an understanding of the equilibrium relationship between the two variables by revealing whether they are bound by some long run relationship. Further, the result of the cointegration test will determine whether an unrestricted VAR will be used or a vector error correction model.

3.4.2 Analytical framework

VAR Model:

The VAR model to be estimated within this framework will be given as:

$$Y_{1t} = \alpha_{10} + \sum_{n=1}^{k} \alpha_{1n} Y_{1t-n} + \sum_{n=1}^{k} \beta_{1n} Y_{2t-n} + \sum_{n=1}^{k} \pi_{1n} x_{1t-n} + \sum_{n=1}^{k} \omega_{1n} x_{2t-n} + U_{1t}$$

$$Y_{2t} = \alpha_{20} + \sum_{n=1}^{k} \alpha_{2n} Y_{2t-n} + \sum_{n=1}^{k} \beta_{2n} Y_{1t-n} + \sum_{n=1}^{k} \pi_{1n} x_{1t-n} + \sum_{n=1}^{k} \omega_{1n} x_{2t-n} + U_{2t}$$

this study, the F- tests will be used to test the statistical significance of each variable on condition that the VAR variables are stationary. Given the VAR model defined in equation (2), the null hypotheses will be:

1. Lags of Y_{1t} do not explain Y_{1t}
2. Lags of Y_{2t} do not explain Y_{1t}
3. Lags of Y_{2t} do not explain Y_{2t}
4. Lags of Y_{1t} do not explain Y_{2t}

The Granger causality test will aid in explaining whether changes in immigration affect prices. It is also plausible that changes in prices could affect immigration or that there is a bi- directional relationship between the two variables.

In understanding the impact of a one- time shock to innovations on current and lagged values of the dependent variables in the VAR model estimated in equation (2) an impulse response function will be used. This function will evaluate how an increase in immigration will change the price levels in Canada over time. For an impulse response function to be used the VAR model will be expressed as a vector moving average such that equation (2) becomes:

$$\begin{matrix} Y_{1t} \\ Y_{2t} \end{matrix} = \begin{matrix} \alpha_{10} \\ \alpha_{20} \end{matrix} + \begin{pmatrix} \alpha_{11} & \beta_{11} \\ \beta_{21} & \alpha_{21} \end{pmatrix} \begin{matrix} Y_{1t} \\ Y_{2t} \end{matrix} + \cdots . \begin{pmatrix} \alpha_{1k} & \beta_{1k} \\ \beta_{2k} & \alpha_{2k} \end{pmatrix} \begin{matrix} Y_{1t-k} \\ Y_{2t-k} \end{matrix} + \begin{matrix} U_t \\ U_t \end{matrix}$$

3.5 Summary

This study will utilize quantitative data from secondary sources to evaluate the impact increased immigration has on prices in Canada. The method of analysis used will be the VAR model, which places fewer restrictions on the model and is thus suitable for estimating multivariate time- series relationships. Prior to estimating the VAR model stationarity tests will be conducted to ensure that all the variables to be included in the analysis are stationary and to determine the order of integration of these variables in order to carry out cointegration. The appropriate lag length will be determined using the information criteria. Furthermore Granger causality test will be applied to the VAR model in order to determine the significance of the lagged values of the explanatory variable in determining the regressand variables. Ultimately an impulse response function will be used to determine the impact of random shocks to immigration and prices, while variance decomposition will give the relative proportion of shocks on the variables in the VAR.

Chapter 4: Empirical Results and Analysis

In order to determine the relationship between prices and immigration in Canada the data collected from the various sources was analysed. This section reviews the method used to achieve this goal and describes the analysis of the results.

4.1 Description of the Data

This empirical analysis focuses on the last 53 years, from 1961 to 2014. As mentioned in the methodology, this period of analysis captures the fourth wave of immigration into Canada and provides an adequate sample for time series analysis. The proposed data set was obtained with ease from the various databases, which all had data on the various variables for the period of analysis.

4.1.1 Price Data and Intervening Variables

The price data was retrieved from the World Bank data bank and was measured by the GDP deflator, which was expressed as a percentage. Further data on per capita income and economic growth, which were measured by GNI per capita growth and GDP growth respectively, were also extracted from the World Bank data bank.

4.1.2 Immigration Data

This study uses immigration data from Citizenship and Immigration Canada (CIC) to measure immigrant influence on prices in Canada. CIC classifies an immigrant as someone born outside Canada and seeks permanent residency in the country for both economic and social reasons. For this reason, the measure of immigrants utilised in this study will be the ratio of permanent residents to the total population.

4.2 Initial Analysis

Stationarity Tests:

Engle and Granger (1987) observed that the use of non- stationary data in analyzing phenomena could lead to spurious regression. For this reason, this study tested for a unit root in the variables using the ADF test. The results of the stationary tests are represented in table 1 and 2. From table 1, using a level of significance of 5% it is evident that immigration is stationary at level.

Table 1

Null Hypothesis: IMMIGRATION has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.101615	0.0021
Test critical values:	1% level	-3.560019	
	5% level	-2.91765	
	10% level	-2.596689	

*MacKinnon (1996) one-sided p-values.

Table 2

Null Hypothesis: D (PRICES) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.733463	0.0000
Test critical values:	1% level	-3.562669	
	5% level	-2.918778	
	10% level	-2.597285	

*MacKinnon (1996) one-sided p-values.

Using a significance level of 5%, the results in table 2 above show that prices are stationary at first differences and thus are integrated of order one. Having tested for stationarity the next step was to test for cointegration between prices and immigration. However, several scholars argue that for two variables to be cointegrated they should be integrated of the same order and as such a series

integrated of order 1 i.e. $I(1)$ and an $I(0)$, a stationary series cannot be cointegrated. Thus a cointegration test was not carried out in this study.

4.3 VAR Analysis

VAR Estimation:

The vector autoregression model enables one to examine dynamic interactions between a set of variables. In this study to investigate the interaction between prices and immigration in Canada equation (2) was estimated. The appropriate lag length as estimated by the information criteria is a lag of one as shown in table 3.

Table 3

	LogL	LR	FPE	AIC	SC	HQ
0	-97.8853	NA	0.238061	4.240217	4.471869	4.328106
1	-81.6097	29.22954*	0.144402*	3.739175*	4.125261*	3.885655*
2	-78.1632	5.908388	0.148072	3.761764	4.302284	3.966837
3	-77.9674	0.319700	0.173725	3.917037	4.611992	4.180702
4	-74.3721	5.576368	0.177881	3.933556	4.782945	4.255813

* Indicates lag order selected by the criterion and LR: sequential modified LR test statistic (each test at 5% level)

Given the lag of one the VAR estimation yielded the results represented in table 4. The values in the parentheses indicate the standard errors while those in the square brackets represent the t- statistics in table 4.

Table 4

Vector Autoregression Estimates		
	IMMIGRATION	D (PRICES)
IMMIGRATION (-1)	-0.032856 (-0.12839)* [-0.25590]**	0.371896 (-1.34609)* [0.27628]
D (PRICES(-1))	0.049363 (-0.01341)* [3.68152]**	-0.068973 (-0.14057)* [-0.49065]**
C	-0.074339 (-0.08805)* [-0.84430]**	-1.049279 (-0.9231)* [-1.13669]**
ECONOMICGROWTH	0.097304 (-0.06486)* [1.50020]**	0.25321 (-0.68)* [0.37237]**
INCOME	-0.104809 (-0.06663)* [-1.57310]**	0.103617 (-0.6985)* [0.14834]**
R-squared	0.296309	0.147848
Adj. R-squared	0.235119	0.073748
Sum sq. resids	1.75477	192.876

* Standard errors in () & **-statistics in []

Economic growth and income were included in the analysis as endogenous variables thus accounting for the intervening variables that affect immigration and prices. Based on critical value of 1.96, at 5%, it is evident that only the one period lags of prices are significant in the immigrant equation. However interpreting the coefficients from a VAR output does not provide meaningful inferences.

Granger Causality/ Block Exogeneity Test:

Other tools have been developed for providing a means of understanding the interaction between variables within a VAR system. The granger causality test is used to test for block significance of the variables by showing whether the lagged variables of one variable are useful in explaining variations in the other. In this study

to test for significance of the variables, the granger causality test generated the following result:

Table 5

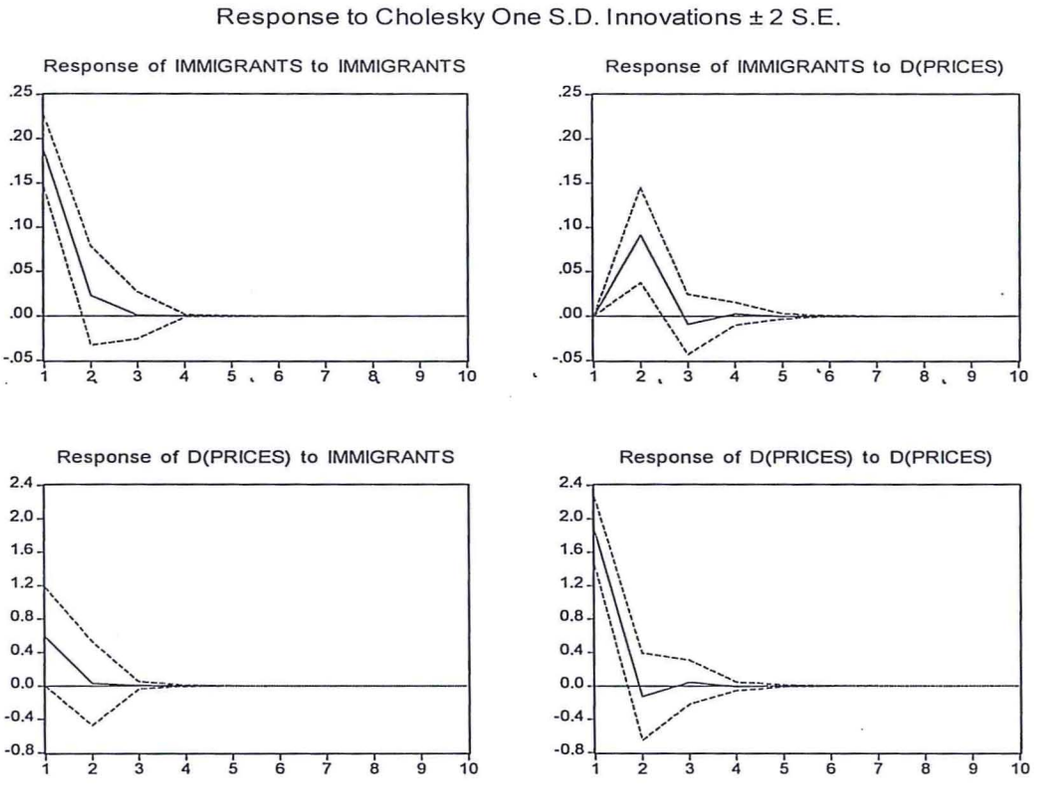
Dependent variable: IMMIGRATION			
Excluded	Chi-square	df	Prob.
D (PRICES)	13.55362	1	0.0002
All	13.55362	1	0.0002
Dependent variable: D (PRICES)			
Excluded	Chi-square	df	Prob.
IMMIGRATION	0.07633	1	0.7823
All	0.07633	1	0.7823

Using a 5% significance level, table 5 shows that the lags of prices are significant in the immigration equation, a result that corresponds to that of the VAR coefficients. This suggests that the lags of price are significant in determining the level immigration. Conversely, immigration appears not to granger cause prices thus showing that the lags of immigration are insignificant in the price equation.

Impulse Response Functions:

To determine the nature of the relationship between prices and immigration impulse response functions (IRFs) were generated. These functions are vital in determining the impact of shocks to either immigration or prices on immigration and prices. They provide information on the effect of shocks on one variable to the other variable. In this research the multiple graphs obtained from the impulse response functions are shown in figure 2.

Figure 2



Examination of the IRF graphs reveals that a shock to immigration has a positive effect on immigration in the first four years and levels off thereafter, a result that is similar for shocks on prices to prices. On the contrary, a shock to immigration has a positive effect on the prices of goods and services in Canada in the first year, which subsequently stabilizes at zero. This shows that a sudden increase in immigration causes an increase in prices, which stabilize after one year. A shock to prices has an increasing positive effect on immigration in the first year, which is followed by a decreasing positive effect in the second year and a negative impact in the third year after which the effect is zero. These results show that there is a relationship between prices and immigration in Canada.

Variance Decomposition:

In addition, variance decomposition is carried out to determine the proportion of movement in the dependent variables that is due to their own shocks versus the

shocks on the independent variable. This provides information about the importance of shocks to the variables in the VAR system. Table 6 shows variance decomposition of immigration. This result indicates that in the first year 100% of changes in immigration are due to its own shocks while in the second year 19% are due to shocks in prices.

Table 6

Variance Decomposition of IMMIGRANTION:

Period	S.E.	IMMIGRATION	D (PRICES)
1	0.195313	100	0
2	0.219119	80.66628	19.33372
3	0.219339	80.50508	19.49492
4	0.219354	80.49425	19.50575
5	0.219355	80.49396	19.50604
6	0.219355	80.49394	19.50606
7	0.219355	80.49394	19.50606
8	0.219355	80.49394	19.50606
9	0.219355	80.49394	19.50606
10	0.219355	80.49394	19.50606

On the other hand, changes in prices in the first year are attributed in part by immigration: 9% of changes in prices are due to shocks to immigration as shown in table 7. This suggests that immigration has a small effect on prices in Canada.

Table 7

Variance Decomposition of D (PRICES):

Period	S.E.	IMMIGRANTION	D (PRICES)
1	2.047671	9.143744	90.85626
2	2.05231	9.123723	90.87628
3	2.052817	9.120348	90.87965
4	2.052828	9.12025	90.87975
5	2.052829	9.120246	90.87975
6	2.052829	9.120246	90.87975
7	2.052829	9.120246	90.87975
8	2.052829	9.120246	90.87975
9	2.052829	9.120246	90.87975
10	2.052829	9.120246	90.87975

In summary, it is obvious that there exists a relationship between prices and immigration in Canada. From the Granger causality tests, the lags of prices are

shown to be significant in determining immigration to Canada, a result that leads to the belief that immigrants consider the price level before immigrating to Canada. A further analysis of the impulse response functions shows that a one- time shock to prices has a positive effect on immigration within the first three years after which it dies off. Moreover, variance decomposition shows that 19% of shocks to immigration can be attributed to shocks in prices. On the other hand, immigration is found to be insignificant in determining prices in Canada, with 9% of shocks to prices being explained by immigration. Also the impulse response functions show that shocks to immigration have positive impact on prices within the first year. These results show that there exists a relationship between immigration and prices; that is, prices determine immigration into Canada.

Chapter 5: Discussions of the Results

Following the recent establishment of the express entry system, immigration into Canada is likely to increase in the next few years. This study aimed at examining the impact of immigration on the overall price level in the Canadian economy. To do this a VAR model was estimated, which showed that there exists a positive relationship between immigration and prices. However, given that other variables such as money supply and unemployment have an impact on price levels as postulated by theory, this study was unable to incorporate this element into the research due to the unavailability of reliable figures on both variables. Instead, income and economic growth were included as intervening variables.

From the VAR analysis conducted on the impact of immigration on price levels in Canada, it apparent that the one- period lags of prices are significant in the immigration equation. Furthermore, the block exogeneity test reveals that prices are significant in the immigration equation. These findings suggest that immigrants take into consideration the price level prior to making decisions on whether or not to apply for permanent residency. This finding is in line with the arguments stated by Borjas (1999), who stated that immigrants are attracted to places with better welfare programs and lower costs of living. In addition, variance decomposition shows that approximately 19% of the change in immigration can be ascribed to changes in prices thus suggesting that immigrants incorporate information on prices in their migration decisions and as such they prefer to move to countries where they expect the cost of living to be lower.

In contrast the granger causality test also revealed that the lagged values of immigration do not play a critical role in determining the price level in Canada. This, perhaps, is because there are other factors that have a stronger influence on prices, especially in the short run, than immigration does. Such factors as postulated by theory include the amount of money supply present in the economy, the unemployment rate, the level of income, economic growth and the costs of production.

In other respects, evaluation of the graphs of the impulse response functions indicates that a shock to immigration has a positive impact on prices in the first year after which the effect levels off. This shows that an increase in immigration causes

prices to go up in the first year, an outcome that conflicts with the studies done by other authors on the subject such as (Lach, 2007); (Cortes, 2008); and (Jansen, 2010). The reason for this divergence in results could possibly be caused by the difference in the approach taken by these authors from that taken in this study. These authors laid emphasis on low- skilled immigrants as opposed to high- skilled immigrants. Over the past several years the largest proportion of immigrants to Canada have been economic immigrants who possess high skills. Economic immigrants are likely to cause an increase in aggregate demand through various channels as posited by thus providing support for the positive relationship between immigration and prices. Moreover, variance decomposition of both prices show that a 9% change in prices can be attributed to immigration thus giving more backing of the influence that immigration has on prices.

The results in this study are contrary to those found in (Lach, 2007); (Cortes, 2008); and (Jansen, 2010), who showed that there is a negative relationship between immigration and prices. Cortes (2008) and Baghdadi (2010), showed that low-skilled immigration benefits the native population by reducing the price of non-traded goods, thus showing that the relationship between prices and immigration is negative. Similarly, Lach (2007) explained the negative effect of immigration and prices by showing that immigrants spend a long time period searching for best prices an activity that induces store owners to reduce their prices in order to attract these new customers. Conversely this study has showed that economic immigrants, who posses high skills have a positive impact on prices within the first year possibly due to the impact these immigrants have on aggregate output.

Chapter 6: Conclusions and Recommendations

Several authors have examined the relationship between immigration and other economic forces such as wages and output. Few authors dealt with the relationship between immigration and prices not including (Lach, 2007); (Cortes, 2008); and (Jansen, 2010). The study of the relationship between immigration and prices is significant as it aids in policy decisions on immigration. This research contributes to the existing pool of literature by studying the relationship between immigration and prices in Canada with an emphasis on economic immigration. However, this study failed to include money supply and unemployment, which would have provided more insights into the relationship between immigration and prices. This limitation is due to the lack of reliable data on both unemployment and money supply in Canada.

The results of the study show that economic immigrants have a positive effect on the level of prices. A proportion of changes in prices, 9%, can be attributed to changes in immigration. This is because economic immigrants cause the aggregate output within the economy to increase by increasing consumption, investments and government spending. Furthermore, economic immigrants benefit the economy by increasing net exports through their knowledge of their native economies, which can lead to the strengthening of economic and trade ties. In addition, immigrants in Canada have been found to incorporate price information when making their migration decisions. The findings of this study have shown that 19% of changes in immigration are due to changes in prices.

Generally, this study has shown that sudden increase in immigration fuelled by economic immigrants is likely to lead to an increase in prices within the first year. The increase in the Canadian immigration target from 265,000 immigrants a year to 285, 000 is likely to cause the overall price level in Canada to go up in the first year as advanced in this study. Furthermore, it has shown that Canadian immigrants incorporate price information in making their migrating decision. However, because of the emphasis on economic immigration in Canada, this study has been limited to economic immigrants. Social immigrants, those who immigrate for social reasons such as seeking refuge or to be with a family member, are also likely to have an impact on the prices in Canada, especially with the current increase in refugees from Africa and the Middle East who with time may find their way into Canada. An

empirical analysis of this issue should be examined not only for Canada but also for Europe, which is currently undergoing a migrant crisis in order to have an absolute outlook of the relationship between immigration and prices.

Bibliography

Borjas, G. J. (1999). Immigration and Welfare Magnets . *Journal of Labor Economics, 17* (4), 607- 637.

Borjas, G. J. (2005). The labour- market impact of high- skill immigration. *The American Economic Review, 95* (2), 56-60.

Camarota, S. A. (2004). *The High Cost of Cheap Labor: Illegal Immigration and the Federal Budget.* Center for Immigration Studies, Washington, D.C.

Card, D. (2005). Is the new immigration really so bad? *The Economic Journal, 115* (507), F300- F323.

Certified General Accountants Association of Canada. (2005). *Growing Up: The Social and Economic Implications of an Aging Population.*

Cortes, P. (2008). The Effect of Low- Skilled Immigrants on US Prices: Evidence from CPI Data. *Journal of Political Economy, 116* (3).

Gary S. Becker, E. L. (1999). Population and Economic Growth. *American Economic Review, 89* (2), 145-149.

Gerry Johnson, K. S. (2008). *Exploring Corporate Strategy* (Vol. Eighth). Harlow, Essex, England: Prentice Hall.

Government of Canada. (2014, November 14). *Facts and Figures 2013- Immigration Overview: Permanent Residents*. Retrieved May 7, 2015 from Citizenship and Immigration Canada: http://www.cic.gc.ca/english/resources/statistics/facts2013/permanent/07.asp #figure5

Granger, R. F. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testin. *Econometrica, 55* (2), 251- 276.

Hanson, G. H. (2012). Immigration and Economic Growth. *Cato Journal, 32* (1).

Jansen, L. B. (2010). The Effects of Temporary Immigration on Prices of Non Traded Goods and Services . *Journal of Economic Integration , 25* (4), 754-782.

Lach, S. (2007). Immigration and Prices. *Journal of Political Economy, 115* (4), 548-587.

Lincoln, W. R. (2010). The Supply Side of Innovation: H□1B Visa Reforms and U.S. Ethnic Invention. *Journal of labour economics, 28* (3), 473-508.

Moore, E. G. (2003). Changing Income Inequality and Immigration in Canada: 1980-1995. *Canadian Public Policy, 29* (1), 33-52.

Murat Genc, M. G. (2012). *The impact of immigration on international trade:a meta analysis.* Migrations Impact Assessment: New horizons.

Needleman, E. J. (1966). Immigration, Excess Aggregate Demand and the Balance of Payments. *Economica, New series, 33* (130), 129-147.

Oxford Advanced Learner's Dictionary of current english. (2010). *Oxford Advanced Learner's Dictionary of current english* (Vol. 8). New York: Oxford university press.

Peri, G. (2012). The Effect Of Immigration On Productivity: Evidence From U.S. States. *The Review of Economics and Statistics, 94* (1), 348-358.

Perotti, O. J. (2002). An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output. *Quarterly Journal of Economics , 107*, 1329- 1368.

Ridout, H. (2006). *Productivity Commission Annual Report.* Australian Government, Productivity Commission. Melbourne: Media and publications Productivity Commission.

Rowthorn, R. (2008). The fiscal impact of immigration on the advanced economies. *Oxford Review of Economic Policy, 24* (3), 560-580.

Phillip Hardwick, B. K. (1999). *Introduction to Modern Economics.* Longman pub group.

Schreur, G. (2008). Why They Just Can't Print More: Money Supply and Prices. *Social Education, 72* (2), 80- 83.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica, 48* (1), 1-48.

Stahl, D. O. (1989). Oligopolistic Pricing with Sequential Consumer Search. *The American Economic Review, 79* (4), 700-712.

The Economist. (2015, January 10). *No country for old men*. Retrieved May 9, 2015 from Canada's Immigration Policy: http://www.economist.com/news/americas/21638191

Yabuuch, S. (2008). Immigration and Unemployment of Skilled and Unskilled Labor . *Journal of Economic Integration, 23* (2), 331-345.