**Effect of immigration on host countries: The curious case of Canada**

**Sanskar Sanjay Shah,**

**Sparsh Sihotiya,**

**Aryash Pateriya,**

**Roushan Prakash,**

**Mohammad Imad Khan,**

**Srajan Jain,**

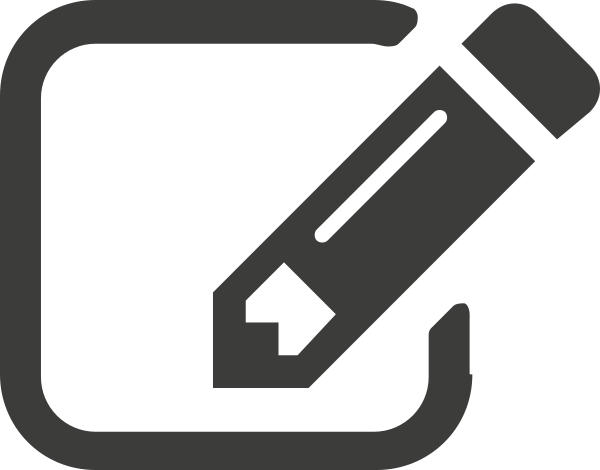
**Ansh Saxena,**

**Ishit ManojKumar Darania,**

**Abhinav Raj Singh**

**Ayush Gupta**

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[](https://colab.research.google.com/drive/10fWi-iG3haYFs0iEo0J7LSUd81LqkpEo#scrollTo=c20H8X1gsbsO) [The](https://www.tandfonline.com/action/authorSubmission?journalCode=recs20&show=instructions) codework behind the research

HSO201A Research Paper

Effect of immigration on host countries: The curious case of Canada

*HSO201A Research Work*

ABSTRACT

# This research work is focused on the dynamic causality relation between unemployment, wages, immigration, and the per capita GDP in the immigrant’s country, with an emphasis on Canada. According to the previous research done in the field, immigration significantly impacted the country's economy. However, there was no conclusion on the effect (either positive or negative) on the Labour Market due to immigration.

# This thesis uses a Vector Autoregressive Model (VAR) to study the effective impact on short and long-run nexus between these variables in Canada over 1970-2020.

# It provides a piece of clear evidence to the policymakers about the effect of the Canadian government's immigration policies.

# 

# Introduction

The question of the economic impact on immigration has been addressed widely in Economics. The result of Immigration on the Economy has been identified as necessary by using previous studies; however, there was no effect on the Labour Market because of immigration. Also, the economic impact of immigration varies by time and place, and it could be beneficial or harmful as well. However, questions can be raised about the link between Unemployment Rate and Immigration and studying the relationship between them, majorly in Canada.

Unemployment in Canada ranged from 7.1% in the 1970s to about 9.7% in the 1980s and 90s, which gradually started decreasing in the 2000s and it reached around 7.2% in 2012, and then further declined to less than 6% in Jan 2020 but subsequently rose to about 13% due to the pandemic. The divergence in unemployment levels over the years had many significant reasons such as the rise in the level of literacy rate and education among people, the population increase in these years, the nature of the labour market, and the economic growth and due to the government policies. The main reason behind the population growth was immigration - people from other countries started to settle in Canada.

As Canada's immigration history is concerned, its population increased from 0.65 million in 1800 to currently 37.7 million. The difference in the population shows a clear indication of the rich immigration history of Canada. It was a British colony until 1931, so the Irish Potato Famine (in the 1800s) brought the first wave of mass-migration to the country. The early 1800s saw a large population of migrants into Canada, with further migration from Scandinavia and Northern Europe.

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Also, after being awarded the Commonwealth status, the policies favoured immigration from other commonwealth nations. Eventually, many of the policies regarding immigration has been changed in Canada in order to raise economy and have a diverse set of immigrants.

Canada has been recognised as one of the countries that receives a significant number of immigrants every year. As per Bove &Elia in 2017 and Kang & Kim in 2018 , the country receives almost same immigrants as Australia. There are about 300,000 immigrants in Canada each year and many temporary immigrants every year. Unlike the US ( The United States), where family sponsored immigration is favored, the Canadian policies favour the incoming of skilled immigrants. This policy had an immense impact on the economy of the nation as well as it impacted the employment.

In a general framework perspective, the non-natives create jobs as they the purchase of goods and use the services of the natives which are independent of their participation in the labour market. This benefits the native workers of the nation immediately. Also, the non-natives (i.e. Immigrants) promote primarily to the expenditure by the amount they are spending and secondarily through industrial and government expenditure on their behalf, and such expenditures help create employment. this thing helps in reducing the unemployment and increase higher wage for the natives of the nation.

The purpose and motive of our paper is to explore the complexities of unemployment and immigration in host countries using the immigration and unemployment statistics of Canada.

We aim to produce results that will enhance our understanding of the relationship and impact of immigration on Canada's labour market using the Vector Autoregressive Model or VAR, and we'll analyse the relationship between variables used in the study which ae Unemployment rate, Net Overseas Migration, Hourly Wage rate and per Capita GDP.

There are about 100 million people who reside in Canada, a country where they were not born. The last 100 years saw a massive influx of immigrants in Canada. In the mid-20th century, the major immigrants were from Europe, the US, and Great Britain. But after the policy changed in Canada in 1967 and the introduction of point system in the nation, the immigrants started to increase from the Asian nations primarily South and East Asia. Most of the immigrants (around two fifth of all immigrants) belong to five Asian nations, which are India, China, the Philippines, and the Korea. Although Canada admits around 300,000 immigrants, however this annual flow is not much higher than what it was in the mid-1960s and 70s.

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The coming part of the paper is organized as follows. The next segment presents the literature on the immigration, the unemployment rate, per capita GDP, economic growth, This is later followed by the methodology section. Then we have tried to explain the results we obtained after implementing the model, and drew some conclusions.

# Literature Review

This paper attempts to resolve the relationship between immigration in Canada and its unemployment rate empirically. The controversy over the relationship between immigration and unemployment rates has raged on in the public and academic realms. In reality, the relative intensity of supply and demand-side effects, as well as the policies that accommodate these flows, decide whether a given immigration flow adds or subtracts from the pool of unemployed workers. As a result, predicting the economic impact of immigration is difficult, and it eventually becomes a practical issue.

Several studies show that immigration has a negative and limited impact on employment, albeit statistically significant and consistent effect on wages (Nijkamp, Longhi, and Poot 2005; Kerr and Kerr 2011); others have found a positive impact on productivity and wages (Quispe-Agnoli, Hotchkiss, and Rios Avila 2015; Peri 2010, 2012) with only a few studies providing evidence of more significant adverse immigration effects (Altonji and Card 1991; Borjas 2003). Harris and Todaro (1970) are the founders of the analysis work on migration flows in a setting of underemployment and real wages. They predict that migrations probably have a negative influence on the general level of employment, since workers may be persuaded to migrate to certain regions because of the higher wages without considering that the unemployment in those areas is also high.

Regarding job displacement, most of the evidence suggests that immigration has adverse but mostly minor effects on employment (Nijkamp, Longhi, and Poot 2008). Hence the immigration-unemployment relationship is not clear-cut; rather the inconsistency between the theoretical literature and empirical findings has always put forth a conundrum. Similarly, depending on the degree of substitution (or complementarity) between migrant and native jobs, an influx of migrants may have both positive and negative effects on unemployment. One study looked at the effects of immigration on the labour market outcomes of less-skilled natives.

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They observed that there is no evidence that the immigrants crowded out the employment opportunities for the natives. The also observed that the immigration has a positive correlation with total factor productivity and a negative relationship with the high skill-bias of production technologies.

Borjas (2009) predicted a decrease of wages in short-run as an outcome of the arrival of immigrants, in line with the neoclassical theory of factor demand. However, if the international and host-country workers are complements in production, the addition of the new international workforce might increase resident productivity, which in turn, raises their wages and their opportunities of employment. Borjas (2001) claims that immigration greases the wheels of the labour market by bringing a community of people into the economy who are very sensitive to regional disparities in economic opportunities. Friedberg and Hunt (1995) the positive benefits of immigration for the host country by looking at possible complementarities between migrants and native factors, and by investigating the effects of immigration on growth. The paper also discusses theoretical considerations on the issue.

(Borjas & Van Ours, 2010; Greenwood, Hunt, & Kohli, 1996; Grossman, 1982) state that if immigrants or residents are deemed substitutes, this means that the wage rates will fall due to the increase in competition in the labour market. This results in a rise in unemployment among residents, which might lead to decline in their work at these extremely low wages. Harris and Todaro (1970) also predict a possible negative effect of immigration on the employment opportunities available for the natives in the presence of a minimum wage, hence showing a negative impact on employment. Lozej(2019) predicts that unemployment increases immediately after the immigration shock, but falls subsequently. Friedberg and Hunt (1995) looked at potential complementarities between migrants and native influences, as well as the effects of immigration on development, to find positive benefits of immigration for the host country. The paper also addresses the issue's theoretical considerations.

On the other hand papers by Johnson (1980), Borjas (1987), Schmidt et al. (1994) and Greenwood and Hunt (1995)) state the effect of immigration on employment depends on whether the native people are and the coming immigrants are complements in production or whether they are substitutes of each other. If the immigrants act as substitutes of natives in production then the overall wages decrease but the total employment would increase. If the rate of participation of the labours is sensitive to wage rates then the changes would result in a decrease in the unemployment of the natives.

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However if the immigrants acts as complements to production (maybe because of some unique work skills that they possess which is not found in natives because of which they would be suitable for some particular jobs ) then their arrival increases the productivity and would result in increase in their wages and employment.

The results of papers by Dolado et al., 1994; Barro and Sala-i-Martin, 1995 show that the impact on economic growth as a result of migration depends on the skill composition of the immigrants. Higher the education level of migrants higher is the positive impact on the economic growth of the host country. Kemnitz (2001) also states that if the education level of immigrants is higher then, the human capital that they provide compensates for the reduction in the ratio of physical labour and capital and hence the overall effect in positive and beneficiary for the host country.

Long and Short-term Impact

Immigration has affected the incomes of low-skilled and young natives and previous migrants, who must fight for job opportunities. Second, there was a small surge of immigrants into unemployment (Winter-Ebmer and Zweimuller, 2000). In the long term, immigration has created new jobs and reduced the level of unemployment. So, the influx of immigrants has been useful in the long run (Gross, 2002). In general, it can be seen that the labor market was marginally impacted by immigration, with an uncertain outcome (Okkerse, 2008).

Available Literature

* Borjas (1999) The key worries about immigration derive from the expectation that immigrants would displace locals from their jobs, placing downward wage pressures on employment. In a closed market, these assumptions are based on a standard competitive supply and demand model. It focuses on two key aspects of immigration economic analysis, namely the factors that influence immigration decisions and the effect of immigrants on the host country.
* To explain the potential negative impact of immigration on locals, Harris and Todaro (1970) use a two-sector migration and unemployment model.
* Ortega (2000) gives a statistical explanation for the optimistic impact of immigrants on the incomes and jobs of natives.
* Berry and Soligo (1969) conclude that the influx of immigrants typically strengthens the economic condition of natives.

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* Barry Chiswick (2000), in his article "Jobs, unemployment, and unemployment compensation benefits of immigrants," analysed the job search activity of immigrants, taking into account the number of various variables.
* Harris and Todaro (1970) predict an overall negative impact on employment because of immigration using a two-sector model of migration and unemployement.
* Boubtane et al. (2013) employs the panel Granger causality approach to examine the relationship between immigration, unemployment, and economic growth of the host country.
* Breunig, Deutscher, and To (2017) examine the effect of immigration on the labour market outcomes of Australian workers using the national labour market approach by dividing immigrants into educational groups and experience groups.
* Steineck (1996) covers the economic impact of migration looking at the influence of the migration phenomenon on welfare (i.e., the aggregated effects and their distribution among natives).

Using Canada's immigration and unemployment statistics, the aim of this paper is to investigate the dynamics of unemployment and immigration in host countries.

# Hypothesis

The theoretical literature for the effects of immigration on the unemployment rate and per capita GDP cannot provide a conclusive result. Different models can also lead us to different ideas and conclusions, and the reality can be far from the results of the analysis. As stated by Borjas (1994), “the economic impacts of immigration will vary by time and by place, and can be either beneficial or harmful”. In a real scenario, whether a given immigration increases or decreases the number of unemployed workers depends on the relative strengths of side effects of supply and demand and on the policies of the country that govern and implement these flows. Thus, the economic outcome of immigration is quite challenging to determine a priori of complete research and analysis and ultimately becomes an empirical issue.

For instance, most studies conducted in the US have shown either a neutral or a positive correlation between change in immigration and the unemployment rate, particularly the employment rates of the native populations. In contrast, many studies on the European continent have indicated the negative effects of immigration.

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However, as we have observed the trend of the data regarding net oversea migration and unemployment in Canada, it suggests that:-

1. Net migration negatively affects unemployment (migration decrease corresponds to increase in unemployment), as from 1990 to 1992 the net migration decreased and during that time there was a drastic increase in unemployment, similarly, even during the period of 2002-2007, there was a significant increase in migration during which period the unemployment decreased.
2. We even assume that another factor that decides the unemployment is the Per Capita Real GDP, and ideally, the Per Capita Real GDP must negatively impact the unemployment as GDP is eventually the indicator about the growth of the country.
3. Finally, according to us, Hourly Wage Rate is also an essential factor, and immigration must negatively impact the hourly wage rate as immigration might increase the need for jobs leading to a decrease in the wage rate.

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# Gathering the dataset

Canada, one of the highest immigrant-friendly countries, witnesses a high influx and outflux of population every year, which affects various factors related to the nation's living conditions. The three significant areas of impact are:

* Unemployment
* Minimum Wages
* Per capita GDP

**Unemployment Rate**

It is a measure of the fraction of the population left unemployed and does not have a fixed income. The amount of population unemployed acts as a liability for the country, and it is desired to eradicate unemployment as much as possible. Due to less population and high literacy rate, unemployment in Canada always remained in control till now, but it is threatened to get affected by the high inflation rate.

We gathered the data about the percentage of the Canadian population left unemployed after the end of one year along with the annual rate of change compared to the previous year from *the World Bank Report – Unemployment rate.*

The trend for the data is as follows:

Chart, line chart

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**Minimum Wages**

It is a measure of the minimum amount of average wage Canadians received in a particular year. It depends upon the number of industries set up across the nation and the competition among them, and the amount of manpower they utilize. Minimum wages in Canada always remained adequate due to the large land area and uniform distribution of wealth among individuals.

We found the monthly, *Hourly Minimum wage rate data* of Canada on the *Trading Economics website*. But as for our research, we needed yearly data from 1991 to 2018; we averaged the monthly data for every year to generate our final dataset.

Our data Provides the average hourly wage received by the Canadian population in Canadian Dollars every year.

The trend for the data is as follows:

Chart, line chart

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**Per capita GDP**

It is a measure of a country's economic output per person and is calculated by dividing a country's GDP by its population. Economists use it, along with GDP, to assess a country's stability based on its economic growth. Canada has a highly globalised economy and is one of the least corrupt countries in the world. It is amongst the top ten trading nations.

We gathered the data about the Yearly Per Capita GDP of Canada along with the annual growth rate compared to the previous year from *the World Bank Report – Per Capita GDP*.

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Chart, line chart

Description automatically generatedThe trend for the data is as follows:

**Data for Net Migration Rate**

We gathered the data about the net overseas migration rate in the form of the number of people migrated into Canada per 1000 population from the *population.un.org website*.

The trend for the data is as follows:

Chart, line chart

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**Finding Order of Integration**

Since we know that if we have unit roots in our time series, we can transform our non-stationary time-series into a covariance-stationary time series by taking a series of successive differences ‘d’. Generally, the differences are denoted by I(d), where ‘d’ is the order of integration. Those non-stationary time-series that can be transformed to a stationary time-series in this way are called “seriesintegrated of order k”.

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(<https://www.researchgate.net/publication/4722085_Determining_the_Order_of_Differencing_in_Autoregressive_Processes> )

Usually, the value of ‘d’ comes out to be either ‘0’ or ‘1’, having ‘2’ or more order of integration is quite rare. Given time-series is said to be integrated of order ’d’ if:

(1-L)d Xt  , where ‘L’ is a lag operator and (1-L) is the first difference,

is a stationary process.

We initially performed unit root test on our log data of all the variables to check if our data is stationary, and it turned out that all variables were non-stationary. So for calculating the order of integration we checked using unit root test if the first difference of our log data is stationary and it turned out that unemployment, daily wage rate and per capita GDP were I(1) as their first difference was stationary. And for Migration we further checked if it was I(2) by checking for the stationarity of its log data and it turned out to be I(2) according to unit root test.

Considering the test for order of integration we had the following possibilities for our model:

* Since we know that When both variables are cointegrated of same order, we should use Engle Granger approach or Johansen approach. Thus, if all variables were I(1) then we would have directly done cointegration.
* If some variables were I(0) and some were I(1) we would have used the Autoregressive Distributed Lag (ARDL) approach to cointegration. In econometrics, the ARDL model is one of the most important models in which the dependent variable is represented by the lag value, and current values of independent variables.
* If some variables were I(0), some were I(1) and some were I(2) then we would have end up using VAR approach with Impulse Response and Variance Decomposition.

After implementing unit root test on the first difference of the data we found that “Unemployment rate”, “Hourly Wage Rate” and “Per capita real GDP” are integrated of order 1; but “Net Overseas Migration” is Integrated of order 2. So we will use the Vector Autoregressive model with Impulse Response and Variance decomposition.

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# Methodology

Our analysis uses Autoregressive models, a general macroeconomic model, to establish the dynamic interrelations amongst the variables under examination. These variables can be modelled as a function of one another as follows, for the sake of empirical application.

*UN t = f (UN t - k, NOM t - k, PGDG t - k, HW t - k)*

*NOM t = f (NOM t - k, UN t - k, PGDG t - k, HW t - k)*

*PGDP t = f (PGDP t - k, UN t - k, NOM t - k, HW t - k)*

*HW t = f (W t - k, UN t - k, NOM t - k, PGDP t - k)*

Where *UN* represents the total unemployment rate; *NOM* indicates net overseas migration; *PGDP* signifies per capita GDP; *HW* denotes the hourly wage rate; the time period and the lag length are being represented by subscripts *t (t = 1 . . . .T)* and *k (k = 1 . . . K)* respectively.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S. No. | Variable | Representation | | Description | Source | Order of Integration |
| 1 | Net Overseas migration |  | Denotes net migration across Canada per 1000 population | | United Nations - World Population Prospects | I(2) |
| 2 | Unemployment Rate |  | Denotes the percentage of Canadian population unemployed as per governments standards | | World Bank Report | I(1) |
| 3 | Hourly Wage Rate |  | Denotes the average hourly wage secured by a Canadian in US Dollars | | OCED.edu | I(1) |
| 4 | Real Per Capita GDP |  | Denotes the real per capita GDP contributed by Canada in percentage | | World Bank Report | I(1) |

To evaluate the stationarity properties of the variables, we are using the Augmented Dickey Fuller (1979) test, along with Phillips and Perron (1988). Furthermore, we are using the study applied by the Johansen (1988) and Stock and Watson (1988) test to analyse whether variables are co-integrated or not.

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In addition to it, we are using the Wald and Granger causality tests to examine the direction of causation among the variables. Finally, we are planning to do a diagnostic test for serial correlation and heteroscedasticity in the residuals.

**Data Cleaning**

The annual data for the period 1991 to 2018 for Canada were retrieved from World Bank Indicators, Organisation for Economic for Economic Cooperation and Development (OECD) and Statistics Canada. We had obtained the annual data for “Net Overseas Migration”, “Per capita real GDP” and “Unemployment rate”, but for “Hourly Wage Rate” we had got the monthly data so we averaged it to annually data. We manually cleaned the .csv files that we obtained from websites and even removed the nan values. We fed the logged data to the VAR model.

Data before taking log

Text

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*Data after taking log*

Note: These are just few samples of our data used actually our data is from 1991 till 2018

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**Unit root test**

To apply a particular methodology we first need to calculate whether our time series data is stationary or not , for that we have various tests for checking stationarity of given time series like Augmented Dickey-Fuller test and Phillips-Perron test. For the purpose of these research we are using augmented dicky fuller test (ADF) implemented unit root test using python version 3.9 .

Unit root is a characteristic of a time series that makes it non-stationary. Technically speaking, a unit root is said to exist in a time series of the value of alpha = 1 in the below equation.

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where, Yt is the value of the time series at time ‘t’ and Xe is an exogenous variable (a separate explanatory variable, which is also a time series).

It is from the test statistic and the p-value, you can make an inference as to whether a given series is stationary or not.

we performed unit root test on our data on time series of all four variables i.e; unemployment(UN), hourly wage rate(HW), per capita gdp(gdp) and net overseas migration per thousand (NOM) . This thing should be noted that we firstly cleaned our data and then then we performed the ADF test for stationarity check .

After we implemented ADF we got the following result :

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Now we can interpret firstly by ADF statistic. The ADF statistic, used in the test, is a negative number. The more negative it is, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence. In ADF we do hypothesis testing where the critical value is a point on the test distribution that is compared to the test statistic to determine whether to reject the null hypothesis, and finally by using p values of each variable since, value of p-value >0.05 we can conclude, time series of all our variables UN, NOM, GDP, HW is non stationary.

**Order of Integration Selection**

To choose between what methodology to apply we need to calculate the order of integration of our time series data. For calculating order of selection we used unit root test as explained above, for checking if our data is I(1) we checked for stationarity on our first differenced data using Unit Root Test, we found out that UN, HW and PGDP are integrated of order 1. And for checking if NOM is I(2) we performed unit root test on second differenced data and it turned out to be integrated of order 2.

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Considering the test for order of integration we had the following possibilities for our model:

* If all variables were I(1) then we would have directly done cointegration
* If some variables were I(0) and some were I(1) we would have used the Autoregressive Distributed Lag (ARDL) approach to cointegration.
* If some variables were I(0), some were I(1) and some were I(2) then we would have end up using VAR approach with Impulse Response and Variance Decomposition.

So as some of our variables were I(1) and some were I(2), we used the Vector Autoregressive model with Impulse Response and Variance decomposition

**Lag length selection**

We need to find a lag length which best describes fits our data so that we could find out how many lags should be there as regressors. As, if we take too big lag, it inflates the standard errors of estimated coefficients, whereas smaller lag could result in an estimation bias. For selecting an optimum lag length, we used Bayes information criterion (BIC) and Akaike information criterion (AIC) which are the estimators of the optimal lag length. And the lag order for which we get minimum criterion are called BIC estimate and AIC estimate. And for our data we found out that the optimum lag length for it is 4.

**VAR**

Autoregressive models consider effect of all variables on each other unlike in classical regression where just some predictor variables give some prediction, which is required in our case as most of our variables affect each other. A VAR model is an extension of a univariate autoregressive model, to a **k** time series regression, where the lagged values of *all* **k** series appear as regressors. Its equation is given as:

Here the βs and αs are estimated using OLS estimator and in order to use VAR models the data must be stationary as in order to get good fit regression and not undergo the problem of spurious regression. Stationarity basically means that the properties of time series data doesn't change over time. Some of the tests for stationarity is the Augmented Dickey-Fuller test and Phillips-Perron test.

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Basic VAR equations with multiple variables:

**Equations specific to our research**

*(1)*

*(2)*

*(3)*

*(4)*

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In which αj is the constant related to each equation, K denotes the lag period, while the βs are coefficients to be envisioned. So, finally we have 4 equations and each equation have 17 coefficients that would be calculated using OLS estimator.

**Impulse Response**

Impulse Response analysis is an important process in econometrics which uses the VAR model. Impulse Response describes the evolution of a models variable in response to a shock (Impulse) given to a single or more variables. In general the impulse response plots are showing the response of a variable when a shock of 1 standard deviation is given to another variable.

We performed Impulse Response on our data set and obtained the results shown below.The horizontal axis depicts the period of time and vertical shows the response. As we can observe there is a very erratic/random trend for each impulse-response pair. This is expected since the system that we worked on was Non-Stationary.

Had the system been stationary we would have expected that the effects of the Impulse should wear out after some time. This method is very useful for assessment of economic policies as it allows us to trace the transmission of a shock within an otherwise noisy system.

These are our results for the impulse response analysis of the resulting VAR model.

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**Variance Decomposition**

Variance decomposition of the forecast error gives the percentage of unexpected variation in each variable that is produces by shocks from other variables. This indicates the relative impact that a variable has on another. In econometrics and other applications of multivariate time series analysis, a variance decomposition or forecast error variance decomposition (FEVD) is used to aid in the interpretation of a vector autoregression (VAR) model once it has been fitted. The variance decomposition indicates the amount of information each variable contributes to the other variables in the autoregression. It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables.

These are our results for the variance decomposition analysis of the resulting VAR model.

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Table

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**Correlation Matrix (Results)**

A correlation matrix is a table showing correlation coefficients between variables. Each cell in the table shows the correlation between two variables. It is usually a square matrix in which all diagonal elements are 1 , It typically gives each cell a value between -1 and 1. A value of 1 between any cell i,j of correlation matrix essentially means , the variable corresponding to ith row and variable jth row increase or decrease simultaneously. Hence , they are strongly correlated . positive value of cell signify variables are positively correlated which essentially, means if one variable increase other variable also increase and vice versa for negative cell value . and larger value in cell corresponds to , strong positive and negative correlation.

After we implemented the VAR model for advance understanding of our results we computed var model for our variables i.e; unemployment(UN), hourly wage rate(HW), per capita gdp(gdp) and net overseas migration per thousand (NOM) . And, as explained in data processing section (x.x) all our data is logged data (we implemented var model using logged data eg :instead of using UN ans variable we use log(UN)).

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Hence, our correlation matrix also gives relation between logged variables but since logarithm is increasing function the relation between logged data and actual data would be same (for eg : if correlation between UN and NOM is positive then correlation between log\_UN and log\_NOM would also be positive ).

# The Correlation Matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | NOM | HW | UN | GDP |
| NOM | 1.000000 | 0.116917 | -0.809114 | 0.724953 |
| HW | 0.116917 | 1.000000 | -0.385461 | 0.639119 |
| UN | -0.809114 | -0.385461 | 1.000000 | -0.911902 |
| GDP | 0.724953 | 0.639119 | -0.911902 | 1.000000 |

# The Outcome of our Research

Effect of immigration(NOM) on unemployment(UN):

1. As observed from the correlation matrix, the correlation value of net overseas migration and unemployment rate is -0.809114. Here negative sign means that if the value of net overseas migration increases, then there will be a decrease in unemployment. Since the value is quite significant, NOM and unemployment are somewhat strongly related to each other.

2. The Unemployment Rate is supposed to decrease in Canada for upcoming years (positive effect for policymakers).

3.     Possible reason – More skilled migrants come to Canada in search of work from Asia, Africa and South America in search of opportunity as compared to just liabilities.

4.     Thus, from a policy-making point of view, the outcome of our research suggests that Canadian policymakers should make policies that the number of skilled immigrants increases in the country so that unemployment will decrease.

HSO201A Research Work Group 12

Effect of Immigration on host countries: The curious case of Canada, 01 May, 2021

Effect of immigration(NOM) on hourly wage rate(HW):

1. The impacts of immigration on the hourly wage crucially depends on the amount of skills the migrants have, the skills possessed by the existing workforce, and the characteristics of the host country economy(in our case Canada). There is also a possibility of difference between the short and long term relationships as the economy of the host country and labour may affect each other differently.

2. As we have seen in the correlation matrix, the correlation value of net overseas migration and the hourly wage rate is 0.116917. Here positive sign means that if the value of net overseas migration increases then there will be an increase in the hourly wage rate. Since the value is quite small, NOM and hourly wage rate are not strongly related to each other.

3. As per our analysis, the minimum wage rate will keep on increasing for upcoming years in Canada as net overseas migration increases.

4. This is concrete evidence in support of immigration as despite the ever-increasing population in Canada, HW increases which mean skilled immigrants get a good income in the country which makes Canada a good choice to settle if you think you can contribute to the country’s skilled workforce.

Effect of immigration(NOM) on per capita GDP (PGDP):

1. Effect of immigration(NOM) on per capita GDP (PGDP) is one of the critical factors that determine whether immigration is actually beneficial for the development of the host country. If the growth rate of per capita GDP increases with the increase in migrants, the well being of society and the standard of living of the citizens of the host country will increase. At the conceptual level, the impact of net overseas migration on per-capita GDP can be analysed by observing the share of individuals who are employed in the total population and the productivity of labour.

2. As we have observed in the correlation matrix, the correlation value of net overseas migration and per capita GDP is 0.724953. Here positive sign means that if the value of net overseas migration increases, then there will be an increase in per capita GDP. Since the value is also quite large, thus NOM and per capita GDP is also quite strongly related to each other.

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3. The Per Capita GDP is supposed to go down a bit and will then start to increase again.

4. The decrease in GDP predicted according to the dataset for recent years is explained by the recession in the global market due to coronavirus impact. Once the world will begin to get normal again, the GDP will increase.

5. Once again we conclude that most of the migrants in Canada are packed with economy supporting skills, and for a nation like Canada, which have a low population density. Supporting migration initially is favourable.

# Trends and inferences

*Unemployment Rate*

![Chart, line chart

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get a good overlap of our predictions on testing data with actual datasets for this factor. It is found that unemployment rate highly influeces the GDP of the country and its dependence on net immigration is appreciable enough. The correlation clearly indicates that immigration in Canada have so far caused a decline in unemployment rate.

The original trend

![Chart, line chart

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The model-run trend

There are many possible reasons for this. Since Canada shares its border only with the US in the south, and US has a strict policy on maintaing control of its borders, hence most of the inflow of migrants into Canada isn’t illegal.

HSO201A Research Work Group 12

Effect of Immigration on host countries: The curious case of Canada, 01 May, 2021

Those who migrate are the people from Asias and Africas who come to Canada in search of work and better living conditions and offer skilled workforce in return. Since Canada is still sparsely populated, it can bear the insurge of migrants for many more years, thereby offering awesome ooportunities for skilled individuals, who eventually contribute to eradicate unemployment.

* 1. *Hourly Wage Rate*

![Chart, line chart

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closely examining the correlation matrix, it can be understood that HW’s dependence on Net overseas migration is not very much. This factor is majorly influenced by increasing GDP which is indeed, pratically true because a high GDP of Canada allows better living conditions for its residents allowing its citizens to receive a good earning in return of their work. This indeed actually creates a dependence cycle as both factors influence each other and a decrease in unemployment helps to maintain a good balance between them.

The original trend

![Chart, line chart

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*The model-run trend*

*Per Capita GDP*

This is the actual display of a country’s wealth and living conditions and has a huge dependence on all 3 factors – Unemployment rate (negative), Hourly wage rate (positive) and Net overseas migration. The increase of GDP with NOM is an indication of Canada’s ability to handle insurge of workforce from various countries for many more years to come.

HSO201A Research Work Group 12

Effect of Immigration on host countries: The curious case of Canada, 01 May, 2021

![Chart, line chart

Description automatically 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The original trend

![Chart, line chart

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The model-run trend

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# The exhaustive set of entire result

After implementing var model, as metioned in methodology section, finally we have 4 equations and each equation have 16 coefficients that would be calculated using OLS estimator. Results of all four equations are below:-

1. Here Lj.X\_log corresponds to jth lag coefficent of given variable ‘X’ in a given equation. For example, in figure 1, we have results of GDP equation. So L1.UN\_log corresponds to the coefficient of 1st lag of unemployment of GDP equation.
2. Std.error corresponds to standard error in the coefficients which we obtained from the model.
3. Table

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   Description automatically generatedthe t-statistic measures how many standard errors the coefficient is away from zero. Generally, any t-value greater than +2 or less than – 2 is acceptable. The higher the t-value, the greater the confidence we have in the coefficient as a predictor.

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# Conclusion

# This study attempted to study a dynamic causal relationship among immigration, Unemployment, per capita GDP, and wage levels in the Canadian market. We used Vector Autoregressive Model (VAR) to examine the dynamic interaction between short-run and long-run relationships among the Unemployment, GDP, and wages. During the duration of our study, there were high variations exhibited by Unemployment and immigration. This variation is associated with the new labor accord and economic liberalization orientation that started under economic reforms during the 1980s.

# Moreover, the wage levels and the per capita GDP were also highly variant in the same period. However, according to our prediction, Unemployment will decrease in the upcoming years, while Per Capita GDP and Hourly Wage Rate will increase as Net Overseas Migration increases. Also, our hypothesis was correct in predicting the relationship amongst Unemployment, Immigration, and Per Capita GDP, but we got a reverse relationship between Immigration and Hourly wage rate. The results suggest that Canadian policymakers should pursue current immigration policies and that decreasing admissions below the current level of immigrants is not desirable.

# In the future, we should work over the impact of emigration with different skill levels and how each of the skills affects our model. Also, we could do a sectoral analysis to find which sectors are severely affected by emigration. Our study saw almost no negative impacts/effects of immigration on the economy; instead, there was a positive impact on the Economic Sector; however, it is still unclear if the same conditions would be at economic downturns or recession.

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