

Seasonal Patterns of Migrations

Many time-series data demonstrates regular, periodic and predictable changes or fluctuations that re-occur every year, or sometimes every month. This happens frequently in business and economic data. For example, retail sales are inclined to during for the Christmas season and then slip after the holidays.

If seasonality is present, it must be incorporated into a time series model in order to detect the general direction of a time series' recent movement. Therefore, seasonal adjustment is applied to such series to produce data where the values of adjoining months are usually easier to compare.

Migration, including both interprovincial and international mobility, is a seasonal phenomenon. There are often large flows of people in the summer months and smaller numbers in the winter months. In order to reveal the underlying trends, seasonality must be removed from the migration data.

Inter-Provincial Migration

Although the four components of migration (immigration, emigration, interprovincial in and out) all peak in the third quarter, interprovincial movements show more seasonality than international mobility partly because of the degree of impacts resulting from administrative actions. Inter-provincial migration is more likely to be affected by social and economic factors, such as the desire for families with school age children to move when the children are between school years; the wish to avoid bad winter weather for longer moves

using ground transportation; and the avoidance of moves during peak tourism periods and so forth.

According to Statistics Canada, in the five year period from 2003 and 2007, over 40% of all moves in BC occurred between July and September, with slightly lower proportions of moves in August and September, which may possibly be caused by the popularity of August and September being vacation and tourism months. Relatively strong movements also take place in the second quarter with weaker migration in the last and first quarters.

Figure 1: Monthly Interprovincial In - Migration to B.C.

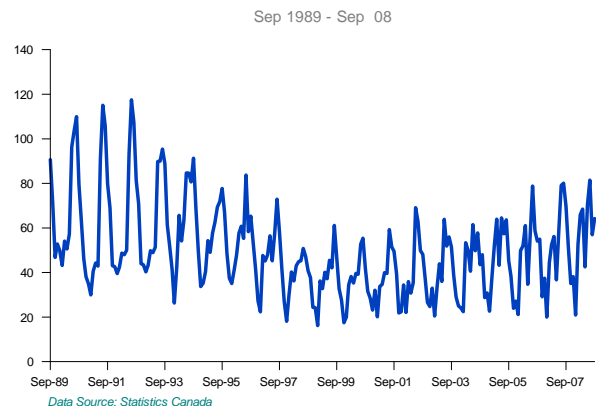
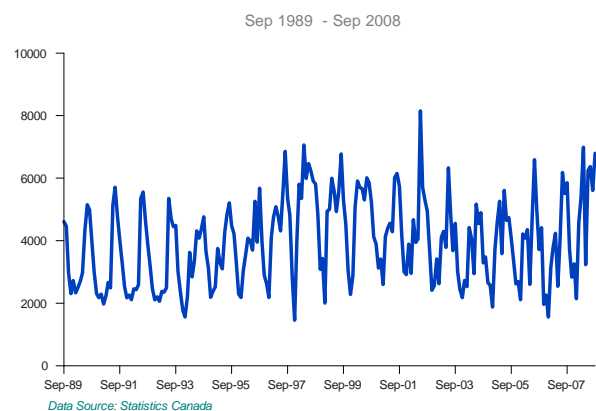


Figure 2: Monthly Interprovincial Out - Migration to B.C.



International migration – Immigration and Emigration

International migration is not as seasonal as interprovincial activities. Although the most common period for international moves still occurs in the third quarter of the year, movements in other quarters of the year are not much different from one another. In 2007, more than 31% of immigrants landed in B.C. in the third quarter, and first, second and last quarters each shared approximate 24% of the total landed immigrants.

Figure 3: Monthly Inter-provincial out (B.C.)
Sep 1989 - Sep 2008

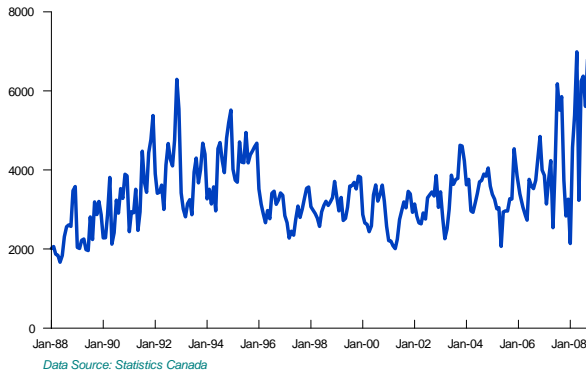
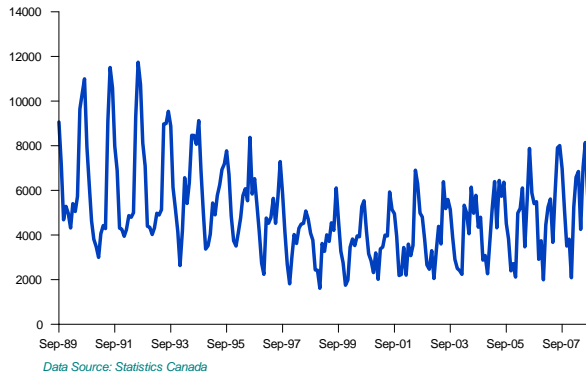


Figure 4: Monthly Emigration (B.C.)
Sep 1989 - Sep 2008



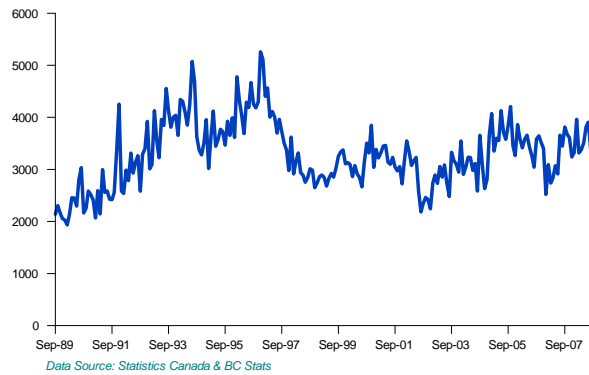
B.C.'s emigration yields a similar seasonal pattern, but with more activities happening in the third quarters, and fewer moves in the rest of the quarters. In the past five years from 2003

and 2007, over 38% emigrants left B.C. in the third quarter.

Seasonally adjusted migration data

Migration exhibits seasonal movements that recur every year in the same quarter. This dynamic makes it hard to interpret underlying trends. Comparing one month's performance to the same month of the previous year (say, September 2007 over September 2006) is one way to assess and analyze the data. However, it overlooks any changes happening in the intervening eleven months. For instance, were there more immigrants landed in July or was it just the usual summer run-up?

Figure 5: Monthly Immigration (B.C.)
Sep 1989 - Sep 2008



To understand what the data are really saying about migration trends, seasonal adjustment should be applied to the raw data, so it may provide a method of comparing one month to the previous month by removing the regular and predictable seasonal fluctuations.

Figure 5 shows seasonally adjusted immigration data from September 1989 to September 2007 using the X12 procedure¹. After

¹ The U.S. Census Bureau released X12ARIMA using regARIMA models (regression models with ARIMA errors) to allow the user to extend the series with forecasts and pre-adjust the series for outlier and calendar effects before seasonal adjustment takes place <http://www.census.gov/srd/www/x12a>.

removing seasonality in immigration data, the underlying trend and changes in immigration over time become clear. Immigration in B.C. started rising in the late 80's, and hit the highest point in the third quarter of 1996. After the peak, immigration fell sharply in 1998, and has been slowly climbing back. By levelling out the seasonal fluctuations in the immigration data, seasonal adjustment allows meaningful month-to-month or quarterly analysis.