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Rapport de recherche

The Impact of the Sovereignist Movement on some Economic
Indicators for Quebec 1966-2010

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Sommaire – *L'impact du mouvement souverainiste sur des indicateurs économique du Québec 1961-2010*

Depuis la création du Parti québécois (PQ), à la fin des années 60, la question de l'indépendance du Québec est au cœur des débats politiques. Cette question touche une corde sensible chez plusieurs Québécois ce qui fait en sorte que les débats sont généralement teintés par des opinions et des anecdotes plutôt que par des faits tangibles. Les fédéralistes attribuent la faible performance économique du Québec par rapport à celle du reste du Canada, et plus particulièrement de l'Ontario, au PQ et à l'incertitude face à l'avenir du Québec qu'il générerait; argument que les souverainistes réfutent. La présente étude fait appel à la modélisation économétrique pour étudier l'impact de l'incertitude politique, représentée par la présence du PQ au pouvoir ou par un indice de support pour la souveraineté, sur le PIB, le taux d'emploi, l'investissement et les flux de migration interprovinciale. Les résultats obtenus grâce à des estimations par moindres carrés ordinaires et par la méthode de Prais-Winsten nous permettent de conclure que l'instabilité politique, modélisée des deux manières énumérées précédemment, n'a pas eu d'impact, ni négatif, ni positif, sur les niveaux de PIB per capita, d'emplois et d'investissements per capita. De plus, nous pouvons affirmer que l'élection d'un gouvernement péquiste et une hausse du support pour la souveraineté ont eu un impact négatif sur le solde migratoire interprovincial net du Québec. En effet, la présence du PQ au pouvoir ou une hausse du support pour la souveraineté est responsable du départ de milliers de Québécois au fil des ans.

Introduction

Since the creation of the Parti Québécois (PQ), in the late 1960s, political debates in Quebec have consistently involved the issue of the province's independence from Canada. Indeed, the question of Quebec's sovereignty is a sensitive one, and debates surrounding the issue often rely on opinions and anecdotes rather than hard facts. Federalists tend to attribute Quebec's supposed poor economic performance relatively to the Rest of Canada and especially Ontario to political instability allegedly generated by the PQ; while Sovereignists strongly refute this argument. Moreover, a large proportion of Quebecers are thought to have left the province in the 70s and 80s as a result of the political uncertainty surrounding the first referendum on Quebec's sovereignty. The impact of the Sovereignist movement would hence spread further than standard economic indicators and change the fabric of Quebec's society.

With this paper, we will examine whether political uncertainty has had a negative impact on the economy of the Province of Quebec over the 1961-2010 period. Our analysis will rely on the econometric modelling of a set of three economic indicators, namely gross domestic product (GDP), employment and investment. We will also look at the impact of political instability on Quebec's net interprovincial migration flows.

This study is divided in three main sections. A brief overview of the history of the Quebec Sovereignist movement and a review of the literature are provided in the first section. The data and econometric models are introduced in the second section and results and analysis are in the third section. A conclusion follows.

1. Analytical Framework

1.1 Historical Background

Even though several independence movements have helped shape Quebec's history since the conquest of New France, it was not until the 1960s that the issue of independence became a tangible idea for Quebecers (Noël, s.d.). The creation of the Sovereigntist movement in its contemporary form can be traced back to the Quiet Revolution, in the 1960s, and the ensuing formation of Sovereigntist political parties. The Alliance Laurentienne, founded in 1957, was one of the first groups advocating for the independence of the province through the creation of a new state. Then, followed many others amongst which are the Rassemblement pour l'indépendance nationale (RIN) and the Ralliement National (RN), the first political parties to run for office under a Sovereigntist banner in a provincial election, in 1966, and the Parti Québécois (PQ) born from a merger between the RN and René Lévesque's Mouvement Souveraineté-Association, in 1968 while the RIN dissolved itself. Sovereigntists garnered negative attention when the Front de libération du Québec (FLQ), an extremist faction, triggered the October Crisis, in 1970, by kidnapping and killing a Quebec government minister. The reaction of the population of Québec to this act led to the end of this kind of violence.

Seen as a moderate, former Liberal minister, René Lévesque was able to rally a large number of Quebecers in support of sovereignty. The PQ was elected with 41% of the vote for the first time in the November 1976 election (DGEQ, 2013). In its first mandate, from 1976 to 1981, the PQ adopted nationalist policies such as the Charter of the French Language, commonly called Bill 101, which instituted French as the official language of the province and the language of work. This facilitated access to management positions for native French speakers whereas those jobs were historically occupied by Montrealers, native-English-speaking Quebecers mainly concentrated in the Montreal area.

The first referendum on Quebec sovereignty was held in May 1980. The "Yes" was defeated by 60% of the vote (DGEQ, 2013). Following the opposition to the amending of the Canadian Constitution, the Charlottetown Accord and the Meech Lake Accord, Sovereigntists attracted more sympathizers. A second referendum on sovereignty was held in 1995. Independence was rejected once again, but with a much smaller margin, 51%, this time (DGEQ, 2013). Both referendums called for sovereignty-association, the independence of the Province of Quebec coupled with a partnership with the Canadian federal government. Debates over sovereignty surface every time a provincial election is held in Quebec; this is what is thought to be at the heart of the alleged political uncertainty in the province.

1.2 Literature Review

Most studies on the impact of the independence movement on Quebec's economy were written in the 90s, when support for the Sovereigntist movement was at its highest in polls. Since the defeat of the

“Yes” in the 1995 referendum, the question of Quebec’s independence has surfaced several times, but never to the point where it spurred debates as heated as before the second referendum. Existing studies express diverse opinions on the impacts of political instability caused by the eventuality of secession, but apart from Altug, Demers and Demers (2007) none rely on solid econometric evidence. This being said, two hypotheses prevail: political instability is harmful, especially because of the loss of jobs due to major companies leaving the province, a high risk premium on government borrowing, a decrease in investments and a high debt level; or there is no clear relation between political instability and Quebec’s economic performance.

Supporting the first hypothesis, McCallum and Green (1991) paint a bleak picture of Quebec’s economy since the birth of the Parti Québécois. In *Parting as Friends: The Economic Consequences for Quebec*, the authors argue that the Sovereignist movement is responsible for the migration from Montreal to Toronto of many corporations and head offices which caused an increase in the relative unemployment rate between the two cities. In addition, sovereignty would induce higher borrowing costs for the Quebec government as there would be a higher risk premium on provincial government bonds. All in all, McCallum and Green conclude, “a failure to resolve Canada’s constitutional crisis would be very bad for the Quebec economy and for the economic well-being of many Quebecers.” The econometric analysis leading to those results is not included in the paper.

Invited to comment on McCallum’s and Green’s study, Vaillancourt finds the evidence evoked to demonstrate the PQ’s negative influence on the province’s economic indicators for the 1976-1985 period to be “weak.” In fact, Vaillancourt notes that this period was marked by “a significant improvement in the socio-economic status of Francophones with respect to Anglophones.”

Similarly to McCallum and Green, Grady (1991) argues that political uncertainty is responsible for a decrease in Quebec’s level of investment per capita compared to Ontario’s. By seceding from Canada, Quebec’s net public debt would incur a substantial increase – in part because it would “receive” its share of the federal debt – which would make it a “high public debt country.” This would have a deterrent effect on lenders and would prompt a higher interest premium. Once again, there is no indication of quantitative work sustaining the author’s conclusions.

In “Political Risk and Irreversible Investment” (2007), Altug, Demers and Demers delve deeper to demonstrate the harmful effect of the Sovereignist movement on investment levels in Quebec. In their study of Quebec’s economy, the authors use a simulation model to examine the reaction of the investment-capital stock ratio in machinery and equipment for major sectors of the economy, namely the manufacturing industries, business sector and total industries, during the 1990s. Altug *et al.* compare data for two periods thought to represent political stability, from 1981 to 1989, and political risk, from 1990 to 1998, for both Quebec and Ontario. Levels of investment per worker in Quebec fell by 18% on average over the 1990-1998 interval relatively to the previous period, deemed as politically stable. The authors

find that “political risk affects the firm’s investment decisions regardless of the party in power.” In fact, as McCallum and Green (1991) and Grady (1991) hint at, expectations of higher interest rates or higher risk premia are “important channel[s] through which political risk must have made its effect [on Quebec’s economy].”

Stewart (2012) offers a more nuanced analysis by looking back at the events that shaped Quebec’s economy before the PQ first came to power. According to him, several “adverse trends,” such as the “historical shift from rail and sea transport toward trucking, and the general westward movement of Canadian industrial activity,” were already affecting Quebec’s economic performance since the 1940s. Moreover, the author claims that “political uncertainty” was as much a determinant factor of the size of the government’s debt risk premium as the debt load itself. Stewart notes that “investor nervousness” was triggered by the PQ’s win in the 1994 election. All in all, political instability would be responsible for no more than a 5% decrease in total investment.

Kollenz (2000) offers the closest analysis to what is sought with this paper. Relying on graphical evidence, the author attempts to establish “a correlation between political events, which could cause uncertainty, and socio-economic developments, which could stem from political instability.” In order to do so, Quebec’s economic indicators are compared to Ontario’s and Canada’s to identify trends and deviations from these trends. Kollenz uses four data categories, namely GDP, investment, consumption and employment, starting in 1961. Opinion polls commissioned by the Conseil du Patronat du Québec as well as newspapers articles provide the data for Quebecers’ and outsiders’ perception of the political climate in the province. No direct relation is found between the advent of the Sovereignist movement and Quebec’s economic performance. Rather, the author asserts that migration and language policies were major determinants of the province’s development. Kollenz’s findings can be summarized as follow:

- The widening gap between Quebec’s and Ontario’s GDP comes from capital accumulation, not from slower growth rates in Quebec.
- A causal relationship between lower level of investment in Quebec after the 1995 referendum and political instability seems likely. However, the effects of political instability “are not strong enough to be provable.”
- Quebec’s economic structure is more to blame than the PQ for higher unemployment rates.

In parallel with the exodus of corporate head offices from Montreal to Toronto, political instability is also thought to be responsible for the out-migration of a great number of Quebecers, especially towards Ontario. Vachon and Vaillancourt (1998) find that interprovincial migration has decreased by one third in Canada over the 1971-1996 period. However, the national trend appears to have been obscured by

strong provincial trends such as the massive out-migration of Quebec-born migrants following the election of the PQ in 1976. Quebec lost approximately 8% of its population, compared to a basis scenario for which interprovincial flows are null, between 1961 and 1996, and is found to be one of the main losers of interprovincial migration flows. Ontario is a net gainer with its in-migration peaking in the years 1969 to 1971, largely because of Quebec's out-migration. The authors note that Ontario is the most popular destination for Quebec-born migrants. Age and education come out as the factors most likely to prompt Canadians to move from one province to another. Quebec's bilingual Anglophones are also found to form the most mobile group.

2. Data and Method

Our analysis of the impact of political uncertainty on Quebec's economic situation is twofold. Firstly, we seek to add to prior studies by establishing, through econometric analysis, if there exists a clear link between political instability and main economic indicators, namely GDP, employment and investment. Secondly, we seek to confirm (infirm) whether the massive out-migration episodes encountered during periods of apparent high support for sovereignty, as shown by poll results, were indeed caused by a fear of secession.

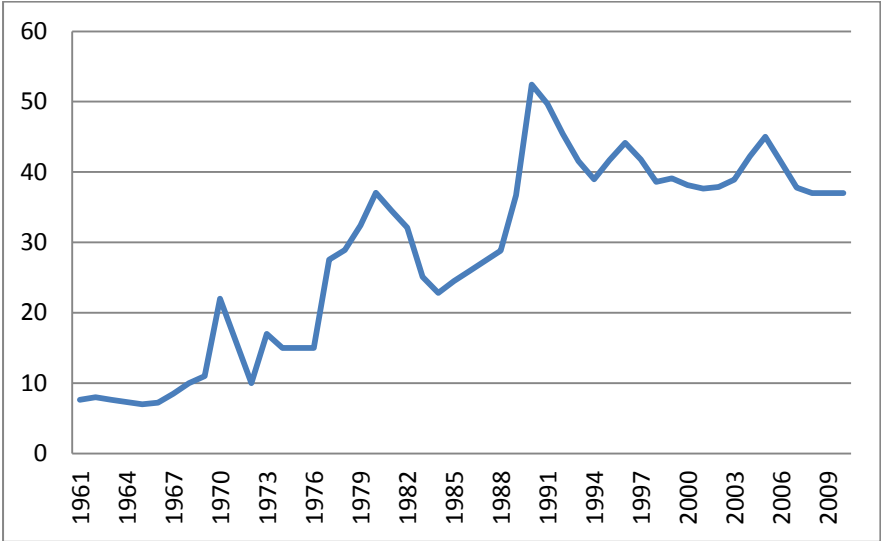
For the first part of the analysis, equations are built in levels to control for the economic environment, i.e. Quebec data is divided by Ontario data for all variables. In doing so, we measure the evolution of Quebec's economic aggregates compared to Ontario's, which partly removes the fluctuations stemming from outside shocks, either from the Canadian or international economies. Ontario is chosen as a point of comparison because it is the province closest to Quebec in terms of composition of economic activity, GDP, population and size. It can be argued that Ontario's economic indicators are also possibly negatively affected by the political instability caused by the Parti Québécois. In this sense, Ontario would not be an accurate comparison point. However, based on the literature cited above, Ontario would benefit from Quebec's misfortunes as firms, jobs and workers would move from the latter to the former. Consequently, the effect on Ontario's economy would be positive rather than negative, as is thought to be the case with Quebec, and the gap between the two provinces would widen even further. Variables are either expressed in percentages or per capita to remove the effect of the size of the population. The series come from Statistics Canada's CANSIM database and span 45 years, from 1966 to 2010. All series expressed in dollars are converted in real dollars of 1992 with the Canadian consumer price index (CPI) because provincial CPIs are not available for the whole period covered. Relevant provincial data was unavailable for prior years.

In the second part of this study, we look at the impact of political uncertainty on interprovincial migration flows to and from the Province of Quebec. The series span 50 years, from 1961 to 2010, and are built using CANSIM, Canadian censuses and Labour Force Surveys. Relevant series are expressed in dollars

of 1992. All data series used for modelling GDP, employment, investment and interprovincial migration are included in appendix Table A1 and sources are given in Table A2.

In both cases, political instability is modelled with two distinct proxies. $Dummy_{PQ_t}$ is a dichotomic variable equal to 1 for the years for which the Parti Québécois formed the government for more than six months and 0 otherwise. There are two periods for which $Dummy_{PQ_t}$ equals 1, from 1977 to 1985 and 1995 to 2002. $Dummy_{PQ_t}$ comprises of the years preceding and following the two referendums (1980 and 1995), which possibly reflect the episodes of buildup and aftermath of both referendums. The second proxy, $Index_{PQ_t}$, is an index reflecting Quebecers' support for sovereignty based on survey results compiled by Claire Durand and the Quebec Inter-University Centre for Social Statistics. The questions asked were not textually identical for all surveys but equally sought to measure the percentage of the population in favour of Quebec's secession from Canada. For the years for which more than one result is available, $Index_{PQ_t}$ is given by the simple average of those results. The index for the years with no data available is given by the average of the results for the preceding and following years. Since support for sovereignty was stagnant for the last years of the sample, we suppose that support for sovereignty in 2009 and 2010 was the same as in 2008. The evolution of the Parti Québécois sovereignty support index is presented in Figure 1 with the exact data available in appendix Table A1.

Figure 1 – Evolution of the support for sovereignty index (in %), 1961-2010

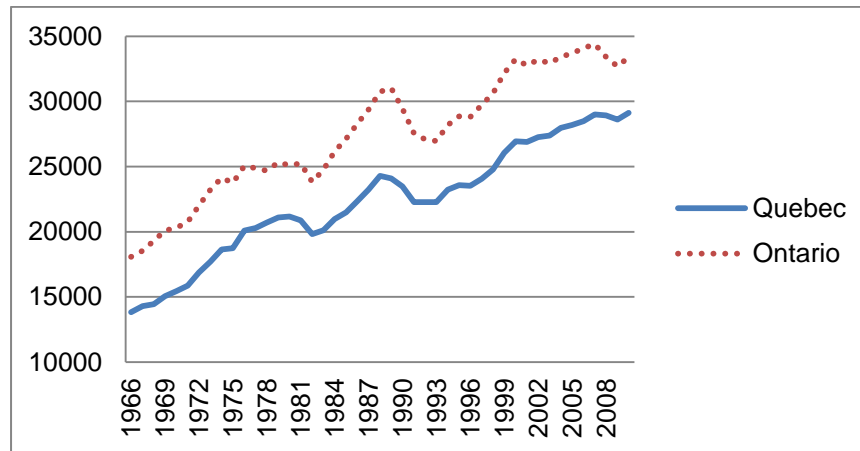


Source: Quebec Inter-University Centre for Social Statistics

2.1 Gross Domestic Product

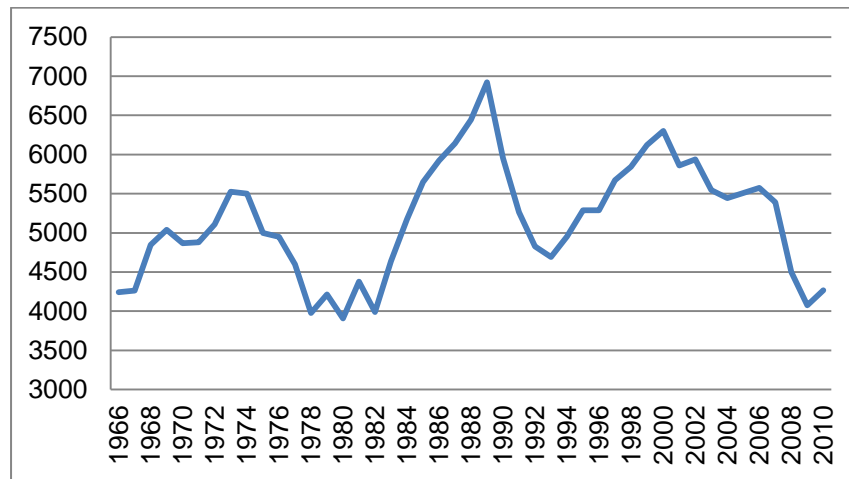
Even though GDP is not systematically mentioned in the literature as one of the economic indicators possibly suffering from political instability, it is reasonable to believe that, if the Sovereigntist movement has a negative impact on employment and investment, GDP is also likely to react negatively. Since 1966, Quebec's GDP per capita has followed an upward trend with some slumps in the early '80s and '90s (Figure 2). Ontario's GDP per capita stands above Quebec's for the whole period and seems to follow similar trends. By looking at the evolution of the difference between the two provinces (Figure 3), it is not clear whether Ontario has systematically fared better than Quebec, thus deepening the gap as suggested in the literature. In fact, the difference in GDP per capita between the provinces is about the same in 1966 and 2010. In addition, at 3,908\$, the difference is at its lowest in 1980, a referendum year. Massive investments had taken place in Quebec in the previous years, notably the James Bay Project and Montreal Olympics, which can partly explain the catching up by the Province of Quebec. At its widest, the gap is almost twice that, at 6,922\$, nine years later.

Figure 2 - Quebec and Ontario GDP per capita (in real dollars of 1992), 1966-2010



Sources: GDP: CANSIM 384-0035 (1966-1980), 384-0001 (1981-2010);
total population: 051-0026 (1966-1970), 051-0001 (1971-2010)

Figure 3 – Difference in GDP per capita between Ontario and Quebec (in real dollars of 1992), 1966-2010



Sources: GDP: CANSIM 384-0035 (1966-1980), 384-0001 (1981-2010);
total population: 051-0026 (1966-1970), 051-0001 (1971-2010)

To estimate the GDP equation, we use a classical production function in which output is explained by labour and capital inputs. We opt for a logarithmic form to be estimated by the method of Ordinary Least Squares (OLS). The following equation is estimated:

$$\ln(\text{GDPQC}_t/\text{GDPON}_t) = a + b \cdot \ln(\text{EmploymentQC}_t/\text{EmploymentON}_t) + c \cdot \ln(\text{CapitalQC}_t/\text{CapitalON}_t) + d \cdot \text{PQ}_t + e_t$$

Where:

$\text{GDPQC}_t/\text{GDPON}_t$: Quebec aggregated GDP per capita on Ontario aggregated GDP per capita;

$\text{EmploymentQC}_t/\text{EmploymentON}_t$: Quebec employment rate on Ontario employment rate;

$\text{CapitalQC}_t/\text{CapitalON}_t$: Quebec per capita capital stocks on Ontario per capita capital stocks;

PQ_t : either Dummy_PQ_t or Index_PQ_t .

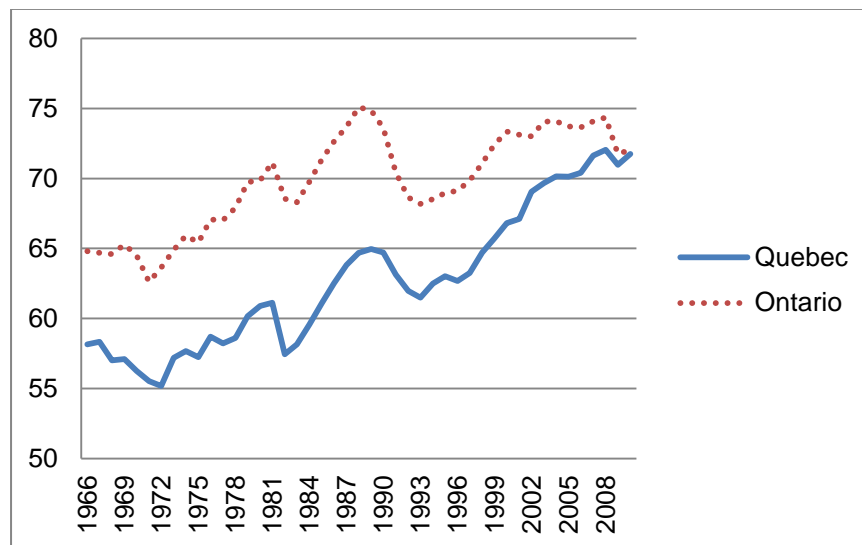
The employment rates (EmploymentQC_t and EmploymentON_t) are calculated by dividing the number of employed workers by the population aged between 15 and 64. Other variables (GDPQC_t , GDPON_t , CapitalQC_t and CapitalON_t) are obtained directly from national account series in CANSIM and are

converted in real dollars of 1992. Observations were recorded for each year, hence there are 45 observations.

2.2 Employment

We look at employment rather than unemployment to avoid leaving out discouraged jobless workers who have left the labour force. Our conclusions might thus differ from McCallum and Green (1991). The employment rate in Quebec has gradually increased from 58%, its 1966 level, to culminate at 72% in 2008 (Figure 3). In Ontario, employment seems to have followed a similar trend, but the drop occurring in the early '90s was deeper and the ensuing recovery slower. Graphical evidence shows that employment rates for the two provinces have converged over the 1966-2010 period. Appendix Figure A1 shows the evolution of the gap between the two provinces. Interestingly, the gap widens all the way to the mid-'80s. The massive job creation spurred by the James Bay Project in the '70s, amongst others, was not sufficient to overshadow the relative ongoing decline of employment figures in Quebec. On average, the employment rate was higher in Ontario than in Quebec, respectively at 70% and 63%.

Figure 3 – Employment rates in Quebec and Ontario (in %), 1966-2010



Sources: employment: CANSIM 384-0035 (1966-1975), 282-0002 (1976-2010); population 15-64: 051-0026 (1966-1970), 051-0001 (1971-2010)

To estimate the employment equation, we rely on the work of Lesueur (1992) according to which employment is a function of employment at the previous period and GDP. We estimate a logarithmic equation corresponding to:

$$\ln(\text{Employment}_{\text{QC}_t}/\text{Employment}_{\text{ON}_t}) = a + b*\ln(\text{Employment}_{\text{QC}_{t-1}}/\text{Employment}_{\text{ON}_{t-1}}) + c*\ln(\text{GDP}_{\text{QC}_t}/\text{GDP}_{\text{ON}_t}) + d*PQ_t + e_t$$

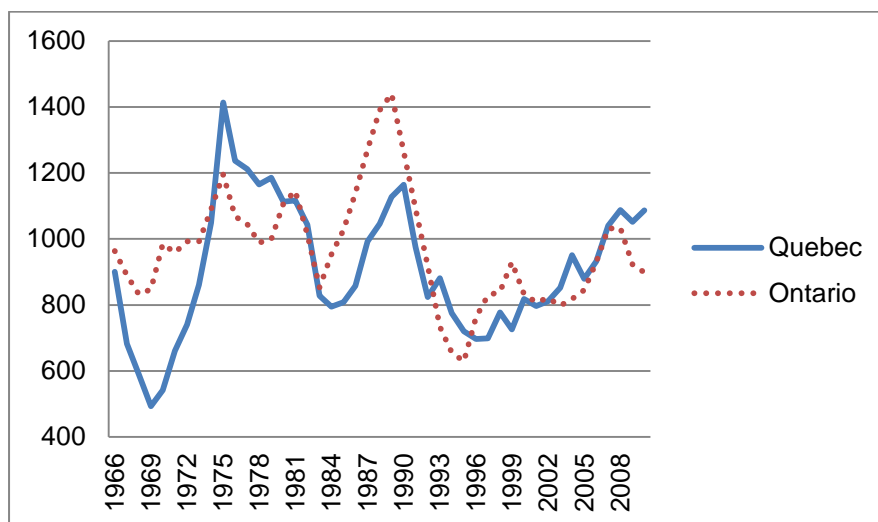
Variables are defined as for the GDP equation. There are 45 observations.

2.3 Investment

The measure of investment used here only takes into account private non-residential investments and leaves out public and residential investments, which, respectively, depend on government and household decisions rather than business choices. Private non-residential investments are thought to be more mobile and give a better indication of investors' confidence. It is important to note that Crown corporations' investments, such as Hydro-Québec's, are included in private non-residential investments and are hence accounted for in our data.

Figure 4 shows much more volatility than for previous economic indicators, with investment levels at times higher in Quebec (in particular from 1975 to 1980), at times higher in Ontario (especially 1983-1993). Average investment per capita levels are pretty close, with 911\$ in Quebec and 968\$ in Ontario. As mentioned previously, Quebec's investment peak occurs in 1975, the year following the launch of the James Bay Project. Contrarily to what is stated by McCallum and Green (1991) and Grady (1991), investment follows the same general trends in both provinces. There is no opposite movement in Quebec's and Ontario's investment levels due to the departure of firms from Montreal to Toronto or to a loss of investors' confidence imputed to political instability.

Figure 4 – Investment per capita in Quebec and Ontario (in real dollars of 1992), 1966-2010



Sources: investment: CANSIM 384-0015 (1966-1980), 384-0002 (1981-2010); total population: 051-0026 (1966-1970), 051-0001 (1971-2010)

The modelling of the investment is based on Cord (1962). The interest rate does not enter the equation because its coefficient is found to be not statistically significant when trying to explain empirically “highly” aggregated variables; furthermore the interest rate is set Canada wide in this case. Unlike Cord, the equation is estimated by relying on OLS rather than Two-Stage Least Squares. The following log-log regression is estimated:

$$\ln(\text{InvestmentQC}_t/\text{InvestmentON}_t) = a + b \cdot \ln(\text{BenefitsQC}_{t-1}/\text{BenefitsON}_{t-1}) + c \cdot \ln(\text{GDPQC}_{t-1}/\text{GDPON}_{t-1}) + d \cdot \text{PQ}_t + e_t$$

Where:

$\text{InvestmentQC}_t/\text{InvestmentON}_t$: Quebec private non-residential investment volume per capita on Ontario's;

$\text{BenefitsQC}_{t-1}/\text{BenefitsON}_{t-1}$: Quebec corporations' net benefits per capita at the previous period on that of Ontario;

$\text{GDPQC}_t/\text{GDPON}_t$ and PQ_t : as defined previously.

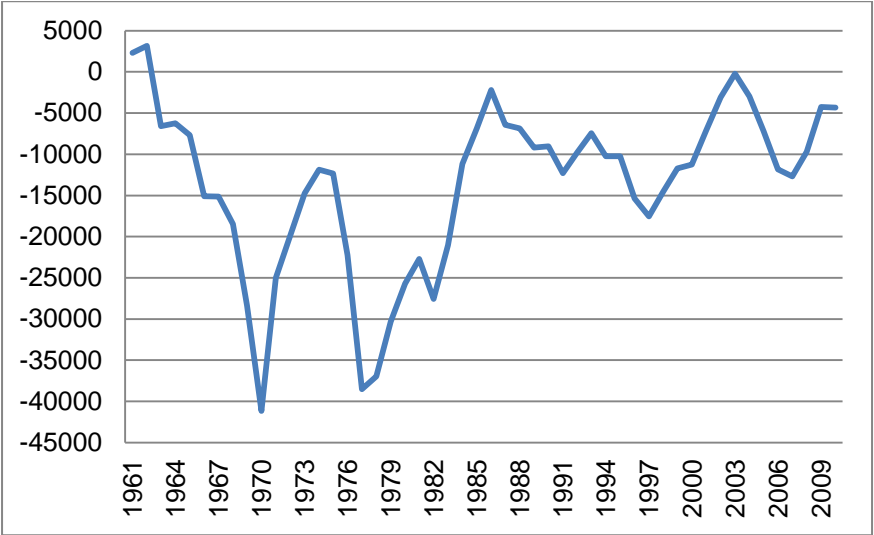
Investment and GDP data are extracted directly from CANSIM and are converted in real dollars of 1992 with the Canadian CPI. Net benefits (BenefitsQC_t and BenefitsON_t) are calculated by the author by subtracting direct corporate taxes from corporations' profits before taxes and converting the series in real

dollars of 1992. The data for direct corporate taxes both in Quebec and Ontario was not available for the last year of our sample. There are 44 observations for this series.

2.4 Migration

As indicated in Vachon and Vaillancourt (1998), graphical evidence shows that Quebec has been a net loser in terms of interprovincial migration flows since 1963. The most important out-migration episodes occurred in 1970 and between the years 1976 and 1983. Interestingly, these years marked turning points for the Sovereigntist movement with the October Crisis, in 1970, and the adoption of nationalist policies such as Bill 101, in 1977, by a Parti Québécois government.

Figure 5 – Net interprovincial migration flows in Quebec, 1961-2010



Sources: CANSIM 051-0017

Net Interprovincial migration flows are modelled as a linear function with the relative employment rate, relative weekly average income and demographic characteristics (mother tongue and knowledge of official languages) as independent variables. The proportion of native French speakers is not included in the equation in order to avoid multicollinearity with the proportion of native English speakers and the proportion of Quebecers having neither French nor English as their mother tongue, also referred to as Allophones. We rely on employment figures rather than unemployment to be consistent with the previous part of the paper. The estimated equation is:

$$\text{Migration}_t = a + b \cdot (\text{Employment}_{\text{QC}_t} / \text{Employment}_{\text{ON}_t}) + c \cdot (\text{Earnings}_{\text{QC}_t} / \text{Earnings}_{\text{ON}_t}) + d \cdot \text{Anglo}_t + e \cdot \text{Allo}_t + g \cdot \text{Official_languages}_t + h \cdot \text{PQ}_t + i_t$$

Where:

Migration_t : Net migration flows to Quebec;

$\text{Earnings}_{\text{QC}_t} / \text{Earnings}_{\text{ON}_t}$: ratio of Quebec average weekly household income on that of Ontario;

Anglo_t : Percentage of Quebec's population having English as a mother tongue;

Allo_t : Percentage of Quebec's population having neither French nor English as a mother tongue;

$\text{Official_languages}_t$: Percentage of Quebec's population speaking both official languages;

$\text{Employment}_{\text{QC}_t} / \text{Employment}_{\text{ON}_t}$ and PQ_t : as defined previously.

Some manipulations are required to build the database for assessing the impact of the PQ on interprovincial migration. This series contains 50 observations with the data spanning 1961 to 2010. Net migration figures are obtained by subtracting the number of out-migrants from the number of in-migrants. This data is not available for the two first quarters of 1961. In supposing that migration figures are the same for the first and the second semester, we obtain a yearly figure by deducting the outflows from the inflows for the last two quarters and doubling that number. Employment data for 1961 to 1965 is found in the Labour Force Survey published yearly by Statistics Canada. We use figures for the month of July each year. Employment figures for 1966 to 2010 and average weekly household incomes for the whole sample come from CANSIM. The proportions of Anglophones and Allophones are available in Statistics Canada censuses every five years starting in 1971 and ending in 2006. Mother tongue figures are not available for 1961, but knowledge of official language is. Consequently, mother tongue figures are obtained by calculating the proportion of Quebecers speaking French only, English only and neither French nor English, and, for each linguistic group, multiplying the number of Quebecers speaking both official languages by the corresponding proportion and, respectively, adding it to the number of unilingual Francophones, unilingual Anglophones and Allophones speaking neither French nor English. For the years in between censuses, data is smoothed. Extrapolations complete the last four years of the sample. Official languages figures are smoothed following the same method. The series for average weekly earnings including overtime, all categories of employment combined, is built using three CANSIM series. Data is available for the years 1991-2010, 1983-2000 and 1961-1985. We construct a conversion factor by taking the ratio of the most recent data on the least recent for the years overlapping two series. Data series are integrated by multiplying least recent figures by this conversion factor.

3. Results and Analysis

Most Advanced Dickey-Fuller stationarity (ADF) tests conducted on our different variables indicate the presence of unit roots. However, these results need to be put into perspective as stationary processes and unit roots are thought to be very hard to distinguish in finite samples, especially in small samples like ours (Cochrane, 1991). Moreover, using ratios, like we do for the GDP, employment and investment regressions, should remove non-stationarity, if there is any, from these variables. Nevertheless, we also estimate the regressions in first differences to compare with results obtained when no corrections are made. Thereby, we estimate the three main regressions introduced in the previous section with variables expressed either in levels or in first differences, and using either one of our two proxies for political instability.

3.1 GDP

Usual tests reveal the presence of first-order autocorrelation according to the Schwarz's Bayesian information criterion (SBIC) as well as heteroskedasticity in equation 1. We also test for cointegration following the Engle-Granger two-step method which requires running additional ADF tests on equations' 1 and 2 residuals. Because non-stationarity is detected in all independent variables and residuals are also found to be non-stationary, we conclude to the absence of cointegration. We do not rely on a Johansen test because our sample is too small to return reliable results.

In addition, graphic analysis of the dependent variable shows a linear upward trend with a possible break for the years 1974 to 1984. A Chow test confirms a break in the trend for those years. We generate a dummy variable equal to 1 for the years between 1974 and 1984 and 0 for the rest to account for this break. $Dummybreak1_t$ is included as a regressor in equations 3 and 4, for which variables are in levels and PQ_t is given by $Dummy_PQ_t$ or $Index_PQ_t$. The equations are estimated using robust standard errors because of heteroskedasticity.

The two main equations are estimated twice: once using robust OLS estimators to correct for heteroskedasticity, when necessary, and once using Prais-Winsten estimators to eliminate autocorrelation. Results are found in Table 1. Estimated equations are as follow:

-Equation 1: Robust OLS in levels, $PQ_t = Dummy_PQ_t$;

-Equation 2: OLS in levels, $PQ_t = Index_PQ_t$;

-Equation 3: Robust OLS in levels, $PQ_t = Dummy_PQ_t$, with $Dummybreak1_t$;

-Equation 4: Robust OLS in levels, $PQ_t = Index_PQ_t$, with $Dummybreak1_t$;

-Equation 5: Robust Prais-Winsten estimators (PWE) in levels, $PQ_t = \text{Dummy_}PQ_t$;

-Equation 6: PWE in levels, $PQ_t = \text{Index_}PQ_t$.

As discussed in the introduction for this section, tests to detect unit roots may not be reliable because of the size of the sample. In this sense, equations in first differences are not the preferred options (results available in appendix Table A3). In both cases, all variables are found to be not statistically significantly different from 0 at a confidence level of 5%. R^2 values are low, at 0.08 and 0.12, and denote a poor fit of the regressions.

Equations 3 and 4 include a dummy variable to account for an apparent break in $\ln GDP_t$ for the years 1974 to 1984. It should be noted that these years correspond to the first election of a Parti Québécois government, in 1976, and the first referendum, in 1980. Moreover, the 1974-1984 period sees the ratio of employment between Quebec and Ontario fall and reach its lowest level for the whole sample at 84%, in 1982. Meanwhile, support for sovereignty steadily increases up to the 1980 referendum and falls thereafter. Including Dummybreak1_t as a regressor removes ten observations out of the 45 observation sample. Because it takes away what can be considered as crucial years for the independence movement, Dummybreak1_t could be responsible for diverting some of the PQ variables impact. Out of the six equations, equations 3 and 4 return the best fit with R^2 values of 0.86 and 0.87. All coefficients are found to be statistically significant except for $\text{Dummy_}PQ_t$, in equation 3. $\ln \text{Employment}_t$ and $\ln \text{Capital}_t$ have expected positive signs. Interestingly, equation 4 is the only instance for which a political instability proxy, $\text{Index_}PQ_t$, is statistically significant at a 5% level. However, it does not have the expected sign.

Equations 1 and 2 estimated with OLS estimators exhibit a good fit for our model with R^2 values of 0.73 and 0.72. In both cases, $\ln \text{Employment}_t$ and $\ln \text{Capital}_t$ coefficients are statistically significant and take expected positive signs. In equation 1, a 1% increase in the employment ratio, i.e. an improvement in the Quebec-to-Ontario figures, would lead to a 0.30% increase in the GDP ratio. Similarly, a 1% increase in the capital ratio would lead to a 0.40% increase in the GDP ratio. In equation 2, figures are similar with an elasticity of 0.24% for the employment ratio and 0.45% for the capital ratio. With p-values above 19%, $\text{Dummy_}PQ_t$ and $\text{Index_}PQ_t$ are not found to be statistically significantly different from zero. Results are similar when using Prais-Winsten estimators to correct for first-order autocorrelation, except for $\ln \text{Employment}_t$ which is found to be not significant in both equations 5 and 6. Therefore, we cannot conclude that political instability has an impact on Quebec's GDP.

Table 1 – Explanatory factors for the Quebec-Ontario GDP ratio, 1966-2010, different methodologies

Independent variable	Equation 1 (Robust OLS level)	Equation 2 (OLS level)	Equation 3 (Robust OLS level)	Equation 4 (Robust OLS level)	Equation 5 (PWE level)	Equation 6 (PWE level)
InEmployment _t	0.298* (0.005)	0.235* (0.009)	0.494* (0.000)	0.498* (0.000)	0.169 (0.301)	0.152 (0.321)
InCapital _t	0.395* (0.000)	0.451* (0.000)	0.378* (0.000)	0.262* (0.000)	0.492* (0.015)	0.462* (0.020)
Dummy_PQ _t	0.011 (0.191)		-0.001 (0.802)		-0.004 (0.582)	
Index_PQ _t		-0.000 (0.920)		0.001* (0.028)		0.001 (0.163)
Dummybreak1 _t			0.040* (0.000)	0.044* (0.000)		
R ²	0.73	0.72	0.86	0.87	0.24	0.25

Notes: N=45;

P-values are in parenthesis below the estimated coefficients;

*Significant coefficients at a 5% confidence level.

3.2 Employment

Usual tests invalidate the presence of autocorrelation and heteroskedasticity. We test for cointegration by running ADF tests on the residuals of the regression. Residuals are stationary whether Dummy_PQ_t or Index_PQ_t is used. Therefore, there would be cointegration in the two main equations were InEmployment_t and InGDP_t truly non-stationary. In this event, we would not be able to tell in which direction the causal relation between support for sovereignty and employment goes. All equations are estimated without using robust standard errors as no heteroskedasticity is found.

When graphing the logarithm of the employment ratio, the curve appears “v shaped”, with its lowest point occurring in 1982. A Chow test confirms a break in the trend for this year. However, we can hardly justify including a dummy-break variable, especially as it would affect almost half of the sample. In the same vein, we choose not to include a trend variable as a regressor to remove an apparent linear trend in the data after 1982.

All results are given in Table 2. The following equations are estimated:

-Equation 1: OLS in levels, PQ_t= Dummy_PQ_t;

-Equation 2: OLS in levels, $PQ_t = \text{Index_}PQ_t$;

-Equation 3: OLS in first differences, $PQ_t = \text{Dummy_}PQ_t$;

-Equation 4: OLS in first differences, $PQ_t = \text{Index_}PQ_t$.

Equations 1 and 2 exhibit a very good fit with similar R^2 values of 0.94. Only $\ln\text{Employment}_{t-1}$ is statistically significant at a 5% confidence level. A 1% increase in the first lag of the employment ratio produces either a 0.98% or 1.01% increase in the employment ratio whether $\text{Dummy_}PQ_t$ or $\text{Index_}PQ_t$ respectively stand for political instability. According to this model, the only determinant of the employment ratio at the current period is the employment ratio at the previous period. Equations in first differences, equations 3 and 4, have extremely low R^2 and all coefficients are found to be not statistically significantly different from 0.

As discussed previously, this model is one of few empirical models that relate employment and economic output. A Ramsey Regression Equation Specification Error Test (RESET) confirms that equations 1 and 2 are properly specified, i.e. there are no omitted variables. Our results demonstrate that political instability does not have a direct impact on employment. This is in line with graphical evidence that shows the employment ratio to be fairly stable, around 0.9, for the most part of the sample (appendix Figure A2).

Table 2 – Explanatory factors for the Quebec-Ontario employment ratio, 1966-2009, different methodologies

Independent variable	Equation 1 (OLS level)	Equation 2 (OLS level)	Equation 3 (OLS 1 st diff)	Equation 4 (OLS 1 st diff)
$\ln\text{Employment}_{t-1}$	0.977* (0.000)	1.010* (0.000)	-0.080 (0.623)	-0.075 (0.646)
$\ln\text{GDP}_t$	0.092 (0.122)	-0.006 (0.932)	0.093 (0.501)	0.094 (0.505)
$\text{Dummy_}PQ_t$	-0.005 (0.238)		-0.002 (0.786)	
$\text{Index_}PQ_t$		0.007 (0.126)		-0.000 (0.961)
R^2	0.94	0.94	0.88	0.90

Notes: N=45;

P-values are in parenthesis below the estimated coefficients;

*Significant coefficients at a 5% confidence level.

3.3 Investment

Investment data also exhibits first-order autocorrelation as suggested by the SBIC. Heteroskedasticity is found in equation 2, which makes it the only regression to be estimated with robust standard errors. ADF tests reveal the presence of unit roots in residuals for equations 1 and 2, which means that there is no cointegration, notwithstanding whether there truly is non-stationarity in $\ln \text{Investment}_t$ and $\ln \text{GDP}_{t-1}$. In equations 3 and 4, Prais-Winsten estimators are used to eliminate autocorrelation. Equations with variables in first differences are also estimated (results given in appendix Table A4). It is worth mentioning that, in this case, $\ln \text{Benefits}_{t-1}$ is not in first differences because it is stationary. Estimated regressions are found in table 3. Equations are as follow:

-Equation 1: OLS in levels, $\text{PQ}_t = \text{Dummy_PQ}_t$;

-Equation 2: Robust OLS in levels, $\text{PQ}_t = \text{Index_PQ}_t$;

-Equation 3: PWE in levels, $\text{PQ}_t = \text{Dummy_PQ}_t$;

-Equation 4: Robust PWE in levels, $\text{PQ}_t = \text{Index_PQ}_t$.

In both equations 1 and 2, $\ln \text{GDP}_{t-1}$ is the only variable that is found to be significantly statistically different from 0. The GDP ratio elasticity is 3.7%, should Dummy_PQ_t or Index_PQ_t be used as the political instability indicator. A Ramsey RESET test shows these equations to be properly specified. Equations exhibit a good fit with R^2 values of 0.49. Equations using Prais-Winsten estimators have lower R^2 values, at 0.25. Results are similar except for $\ln \text{Benefits}_{t-1}$ which is found to be significant in equation 4. However, it does not have the expected positive sign. As for previous indicators, we do not rely on equations in first differences to draw conclusions.

Even though investment was identified in the literature as the variable most likely to be affected by political instability, we cannot confirm this assertion based on our results. In all the equations, Dummy_PQ_t and Index_PQ_t are both not statistically significant with p-values above 70%. As noted by Stewart (2012), major changes were already underway in Quebec's economic fabric when the PQ first came to power and those transformations appear to have been supported successively by Federalist and Sovereigntist governments.

Table 3 – Explanatory factors for the Quebec-Ontario investment ratio, 1966-2010, different methodologies

Independent variable	Equation 1 (OLS level)	Equation 2 (Robust OLS level)	Equation 3 (PWE level)	Equation 4 (Robust PWE level)
lnBenefits_{t-1}	-0.031 (0.900)	-0.070 (0.732)	-0.314 (0.081)	-0.316* (0.043)
lnGDP_{t-1}	3.700* (0.000)	3.690* (0.000)	3.082* (0.004)	3.070* (0.006)
Dummy_PQ_t	-0.019 (0.721)		-0.002 (0.971)	
Index_PQ_t		-0.001 (0.805)		0.000 (0.960)
R²	0.49	0.49	0.25	0.25

Notes: N=44;

P-values are in parenthesis below the estimated coefficients;

*Significant coefficients at a 5% confidence level.

3.4 Migration

Our study of interprovincial migration relies on a linear model estimated with employment and income variables expressed in levels and demographic variables, namely $Franco_t$, $Anglo_t$, $Allo_t$ and $Official_languages_t$, expressed in percentages. We take the proportion of native French speakers as our reference point in order to avoid multicollinearity with $Anglo_t$ and $Allo_t$. We use $Franco_t$ as the basis, rather than $Anglo_t$, because it is wider; it encompasses over three quarters of the Quebec population. In fact, the proportion of Francophones roughly stays around 77% for the whole sample. The greatest variations happen in the proportion of Anglophones and Allophones. As mentioned previously, the number of English native speakers shrinks while Allophones become more numerous and fill the gap (Figure 6).

A Ramsey RESET test confirms the proper specification of the model when estimated with OLS at a 5% confidence level when $Dummy_PQ_t$ is included, but not when $Index_PQ_t$ is. We also estimate regressions omitting $Official_languages_t$ as one of the demographic characteristic independent variables. ADF tests reveal the presence of unit roots in all series. We choose not to estimate regressions in first differences because the interpretation would not be relevant. Following the two-step Engle-Granger method, we find cointegration in equations 1 and 2, i.e. it is not clear whether the independent variable causes the dependent variable or vice versa. Because non-stationarity seems plausible in variables such as $Anglo_t$, $Allo_t$ and $Official_languages_t$, we accept the possibility of cointegration. Moreover, we denote first-order

autocorrelation in $Migration_t$. In this light, we estimate our equations both with robust-OLS estimators and autocorrelation-robust Prais-Winsten estimators. The following regressions are estimated:

-Equation 1: Robust OLS in levels, $PQ_t = Dummy_PQ_t$;

-Equation 2: Robust OLS in levels, $PQ_t = Index_PQ_t$;

-Equation 3: Robust OLS in levels, $PQ_t = Dummy_PQ_t$, without $Official_languages_t$;

-Equation 4: Robust OLS in levels, $PQ_t = Index_PQ_t$, without $Official_languages_t$;

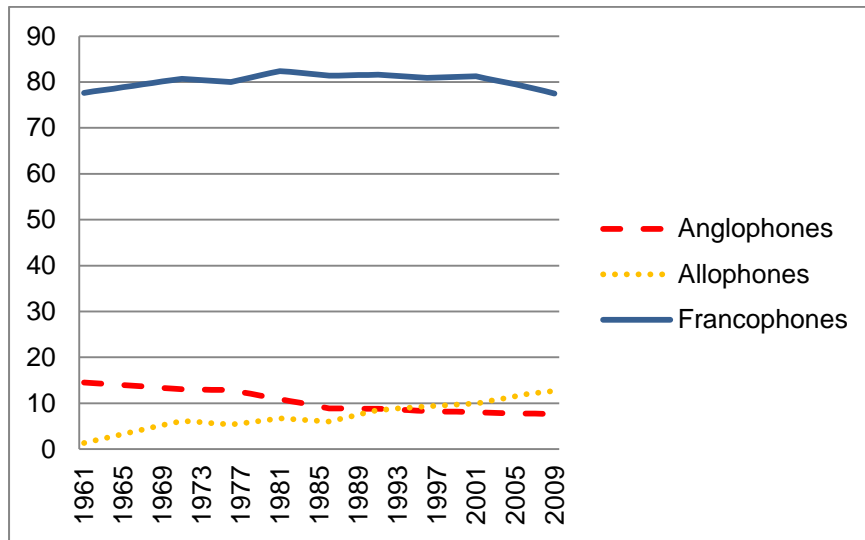
-Equation 5: Robust PWE in levels, $PQ_t = Dummy_PQ_t$;

-Equation 6: Robust PWE in levels, $PQ_t = Index_PQ_t$.

Interestingly, relative average weekly income, $Earnings_t$, is not statistically significant in all of the regressions. We expected the prospect of higher revenues to have an attractive effect, but it does not appear to be the case. $Employment_t$ is significant in all four equations and takes the expected positive sign. As noted by Cousineau and Vaillancourt (2001), “workers move from the low-wage and low-employment region to the high-wage and high-employment region.” Consequently, it is reasonable to believe that Quebecers move westward seeking job opportunities.

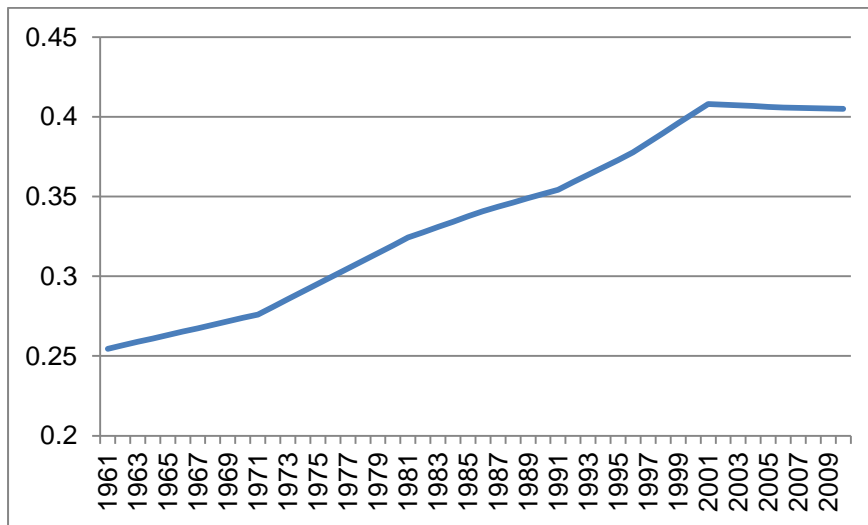
When looking at the demographic characteristics of the Quebec population, we notice that $Anglo_t$ and $Allo_t$ coefficients are significant at a 5% confidence level in all the equations except for equation 5 where $Anglo_t$ is significant at 10%. As expected they have a negative sign, meaning that a higher percentage of native English speakers or Allophones within Quebec’s population increases migration outflows. $Official_languages_t$ is not significant in any case. We thought that a higher proportion of bilingual people in Quebec might be related to larger interprovincial migration outflows than inflows. However, this might also be indicative of greater bilingualism amongst the Quebec Francophone population. In fact, the proportion of Quebecers speaking both official languages has steadily gone up from 25%, in 1961, to 41%, in 2010 (Figure 7) at the same time as the proportion of Anglophones has shrunk by half, from 14% to 7% (Figure 6).

Figure 6 – Breakdown of Quebec’s population by mother tongue (%), 1961-2010



Sources: Census of Canada (1961-2006)

Figure 7 – Proportion of Quebec’s population speaking both official languages (%), 1961-2010



Sources: Census of Canada (1961-2006)

Moving on to the measure of the impact of political instability, we find $Dummy_PQ_t$ and $Index_PQ_t$ to be statistically significant at a 5% level in all regressions except for equation 6 where $Index_PQ_t$ is significant

at a 10% confidence level. In equation 1, the presence of a Parti Québécois government in power means a decrease in net interprovincial migration flows by 8,471 people per year. In equation 3, a PQ government is responsible for an annual outflow of 5,778 migrants. When measuring political instability with the support for sovereignty index, we note that a 1% increase in the support for sovereignty is responsible for the departure of 342 Quebecers per year, in equation 2. If Official_languages_t is not one of the explicative variables, equation 4, this number goes up to 346 out-migrants per year. We find similar figures when using Prais-Winsten estimators. In equation 5, a PQ government is responsible for the yearly departure of 6,895 Quebecers and, in equation 6, a 1% increase in the support for sovereignty induces annual outflows of 453 people. Thereby, econometric modelling of the factors influencing net interprovincial migration flows reveals that political instability has had an impact on Quebec's population in the past 50 years.

Table 4 – Explanatory factors for net migration flows in the Province of Quebec, 1961-2010, Francophones as the reference group, different methodologies

Independent variable	Equation 1 (Robust OLS level)	Equation 2 (Robust OLS level)	Equation 3 (Robust OLS level)	Equation 4 (Robust OLS level)	Equation 5 (Robust PWE level)	Equation 6 (Robust PWE level)
Employment_t	204,699* (0.001)	265,164* (0.000)	246,813* (0.000)	261,557* (0.000)	291,606* (0.002)	220,970* (0.001)
Earnings_t	-19,547 (0.564)	-32,839 (0.322)	-30,360 (0.337)	-31,940 (0.307)	-10,585 (0.832)	-9.561 (0.849)
Anglo_t	-416,794* (0.035)	-848,106* (0.000)	-718,123* (0.000)	-806,889* (0.000)	-476,376 (0.072)	-812,673* (0.004)
Allo_t	-796,637* (0.000)	-661,822* (0.000)	-712,781* (0.000)	-674,177* (0.000)	-734,734* 0.001	-512,364* (0.011)
Official_languages_t	212,203 (0.060)	-28,489 (0.758)			152,200 (0.406)	-23,000 (0.889)
Dummy_PQ_t	-8,471* (0.000)		-5,778* (0.001)		-6,895* (0.024)	
Index_PQ_t		-342* (0.023)		-346* (0.021)		-453 (0.092)
R²	0.78	0.74	0.76	0.74	0.56	0.50

Notes: N=50;

P-values are in parenthesis below the estimated coefficients;

*Significant coefficients at a 5% confidence level.

Conclusion

All in all, we cannot conclude that either a Parti Québécois government or high support for sovereignty have had a negative impact on the Province of Quebec's economy in the 1966-2010 period, as was suggested in the literature. Such arguments are thus supported by anecdotes rather than econometric evidence. Indeed, thorough econometric modelling of the province's main economic indicators has shown no significant causal relation between political instability and GDP, employment or investment. However, we were able to demonstrate that political instability has had a negative impact on net interprovincial migration flows and would be responsible for the departure of several thousands of Quebecers.

In addition, graphical analysis does not support the popular statement according to which Ontario's economy systematically fares better than Quebec's. If this might be the case in terms of GDP per capita, Quebec's employment figures have caught up with Ontario's and no clear picture can be taken for investment per capita levels. In this sense, Quebec's economic performance was not as bad as many authors have painted it to be. Nevertheless, a study of interest rates and government borrowing costs might reveal a different picture. These two indicators might better capture investors' nervousness in regards to Quebec's political situation.

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APPENDIX 1

Table A1 – Relevant data series for the modelling of GDP, employment, investment and interprovincial migration equations, 1961-2010

Year	GDPQC*	GDPON*	EmploymentQC	EmploymentON	CapitalQC*	CapitalON*	BenefitsQC*	BenefitsON*	InvestmentQC*	InvestmentON*
1961	.	.	0.560932	0.630326	.	.	.	.	.	.
1962	.	.	0.570318	0.634475	.	.	.	.	.	.
1963	.	.	0.575926	0.640546	.	.	.	.	.	.
1964	.	.	0.574228	0.651563	.	.	.	.	.	.
1965	.	.	0.575169	0.642753	.	.	.	.	.	.
1966	0.01384	0.018083	0.581535	0.648111	0.032638	0.040078	0.000987	0.001285	0.000901	0.000963
1967	0.014291	0.018552	0.58341	0.646883	0.033397	0.040991	0.000899	0.001339	0.000682	0.00089
1968	0.014455	0.019301	0.570121	0.645937	0.033371	0.040854	0.000901	0.001384	0.00059	0.000833
1969	0.015052	0.02009	0.571145	0.652946	0.034456	0.042085	0.00092	0.001316	0.000493	0.000847
1970	0.015451	0.02032	0.562665	0.644997	0.035938	0.04406	0.000816	0.001111	0.000542	0.000985
1971	0.015882	0.020761	0.555209	0.626128	0.037527	0.045147	0.000885	0.001243	0.000661	0.000959
1972	0.01689	0.021997	0.551957	0.636444	0.039255	0.046566	0.001041	0.001544	0.00074	0.000992
1973	0.017715	0.02324	0.571952	0.64887	0.041254	0.048766	0.001249	0.001991	0.00086	0.000992
1974	0.018641	0.024142	0.576821	0.65917	0.045971	0.053353	0.001488	0.002288	0.001048	0.001089
1975	0.018748	0.023748	0.572431	0.654169	0.049348	0.055223	0.001261	0.00177	0.001413	0.001195
1976	0.020098	0.025048	0.587127	0.670681	0.050236	0.055663	0.00122	0.001785	0.001237	0.001068
1977	0.02029	0.024889	0.58223	0.670084	0.051417	0.056277	0.001164	0.001664	0.001212	0.001044
1978	0.020698	0.024675	0.58626	0.67907	0.052711	0.057124	0.00133	0.00187	0.001166	0.000988
1979	0.021099	0.025311	0.601668	0.697447	0.054392	0.058865	0.001607	0.002297	0.001185	0.000998
1980	0.021184	0.025092	0.608908	0.698513	0.056192	0.06046	0.001577	0.002145	0.001113	0.001107
1981	0.020873	0.025251	0.611231	0.711435	0.05729	0.061259	0.000972	0.00173	0.001117	0.001146
1982	0.019831	0.023818	0.57443	0.685529	0.056859	0.060575	0.000559	0.00098	0.001043	0.001013
1983	0.020127	0.024764	0.581504	0.682953	0.056483	0.059925	0.00094	0.001606	0.000827	0.000853

1984	0.020977	0.02615	0.595779	0.697681	0.057761	0.060351	0.001146	0.00197	0.000794	0.000953
1985	0.021481	0.02713	0.611003	0.713685	0.058614	0.061734	0.001223	0.002029	0.000808	0.001028
1986	0.022362	0.028283	0.625183	0.726407	0.059054	0.062168	0.001137	0.00195	0.000858	0.001139
1987	0.023237	0.02938	0.638205	0.736852	0.059072	0.06274	0.001486	0.002301	0.000992	0.001271
1988	0.024293	0.030737	0.646914	0.750814	0.059735	0.063731	0.001834	0.002583	0.001046	0.00139
1989	0.024083	0.031005	0.649743	0.748565	0.059767	0.063956	0.001469	0.002152	0.001128	0.00144
1990	0.023487	0.029443	0.647126	0.736037	0.060012	0.063382	0.00085	0.001267	0.001165	0.001264
1991	0.022288	0.027552	0.631261	0.704309	0.056253	0.05952	0.00048	0.000787	0.000975	0.001091
1992	0.022273	0.027099	0.619724	0.686364	0.056421	0.059287	0.000404	0.000821	0.000824	0.000919
1993	0.022268	0.026961	0.615001	0.681919	0.056359	0.059113	0.000571	0.001077	0.000881	0.000734
1994	0.023238	0.02819	0.624874	0.685331	0.058651	0.061269	0.001191	0.001839	0.000775	0.000656
1995	0.023574	0.028862	0.630148	0.689661	0.05953	0.061899	0.001363	0.002089	0.00072	0.000629
1996	0.023523	0.028813	0.626901	0.691296	0.06073	0.062906	0.001216	0.001949	0.000697	0.000763
1997	0.024072	0.029745	0.632478	0.698501	0.062391	0.064483	0.001182	0.001895	0.000698	0.000828
1998	0.024769	0.030615	0.647019	0.71082	0.0644	0.066598	0.001331	0.002009	0.000777	0.00084
1999	0.026051	0.032174	0.657144	0.723987	0.065016	0.067234	0.001759	0.002421	0.000726	0.00093
2000	0.026937	0.033238	0.668044	0.733431	0.065719	0.068294	0.001605	0.002427	0.000818	0.000832
2001	0.026904	0.032764	0.671077	0.731068	0.066252	0.06828	0.001709	0.002356	0.000797	0.000808
2002	0.027267	0.033205	0.690487	0.730012	0.066408	0.067284	0.001724	0.003114	0.000811	0.000821
2003	0.027389	0.032933	0.696634	0.740609	0.064094	0.065479	0.001298	0.002745	0.000852	0.000798
2004	0.027984	0.033429	0.701514	0.740708	0.064402	0.065656	0.001565	0.002679	0.000951	0.000818
2005	0.028186	0.033694	0.701277	0.737193	0.064759	0.065702	0.001474	0.002614	0.000879	0.000845
2006	0.028497	0.034073	0.703951	0.736363	0.06527	0.066522	0.001616	0.00259	0.000933	0.000931
2007	0.02901	0.034403	0.716226	0.740759	0.065603	0.067492	0.001539	0.002607	0.00104	0.001031
2008	0.028929	0.033427	0.720408	0.743506	0.067861	0.070081	0.001501	0.002454	0.001087	0.001033
2009	0.028602	0.032677	0.709712	0.717511	0.069889	0.070889	0.001091	0.001948	0.001051	0.000923
2010	0.029126	0.033394	0.717407	0.720484	0.068829	0.069227	.	.	0.001086	0.000898

*per capita in million dollars of 1992

Table A1 (Continued) - Relevant data series for the modelling of GDP, employment, investment and interprovincial migration equations, 1961-2010

Year	Migration	EarningsQC*	EarningsON*	Franco	Anglo	Allo	Official_languages	Dummy_PQ	Index_PQ*	Dummybreak1	Dummybreak2
1961	2320	384.1159	406.7846	0.77644	0.145189	0.013561	0.254578	0	7.67	0	0
1962	3159	392.9121	414.1181	0.779529	0.143757	0.018385	0.256722	0	8	0	0
1963	-6577	400.3725	421.2975	0.782619	0.142324	0.023209	0.258866	0	7.67	0	0
1964	-6219	408.9148	428.7931	0.785708	0.140892	0.028033	0.261011	0	7.33	0	0
1965	-7674	420.7235	441.8388	0.788797	0.13946	0.032857	0.263155	0	7	0	0
1966	-15109	432.5246	447.165	0.791886	0.138028	0.037681	0.265299	0	7.23	0	0
1967	-15128	446.5741	460.8167	0.794975	0.136595	0.042505	0.267444	0	8.5	0	0
1968	-18480	457.2436	474.0589	0.798065	0.135163	0.047329	0.269588	0	10	0	0
1969	-28368	466.594	486.2	0.801154	0.133731	0.052153	0.271732	0	11	0	0
1970	-41156	480.0468	508.5342	0.804243	0.132298	0.056977	0.273877	0	22	0	0
1971	-25005	503.5019	537.6925	0.807332	0.130866	0.061802	0.276021	0	16	0	0
1972	-19891	519.7148	555.5752	0.80592	0.130379	0.060157	0.280843	0	10	0	0
1973	-14730	521.3802	551.9402	0.804508	0.129891	0.058513	0.285665	0	17	0	0
1974	-11852	527.8426	546.0401	0.803096	0.129403	0.056869	0.290487	0	15	1	0
1975	-12340	548.2881	555.7941	0.801683	0.128916	0.055225	0.295308	0	15	1	0
1976	-22231	569.2137	577.0402	0.800271	0.128428	0.053581	0.30013	0	15	1	0
1977	-38498	581.0703	583.7364	0.805027	0.124564	0.056232	0.304952	1	27.56	1	0
1978	-36955	572.4004	566.8382	0.809783	0.1207	0.058884	0.309774	1	28.92	1	0
1979	-30306	566.8675	561.541	0.814539	0.116836	0.061536	0.314596	1	32.43	1	0
1980	-25684	571.4395	556.3305	0.819295	0.112972	0.064188	0.319418	1	37.06	1	0
1981	-22707	566.7499	552.8915	0.824051	0.109108	0.06684	0.32424	1	34.5	1	0
1982	-27556	561.4264	547.3808	0.822026	0.105045	0.065527	0.327567	1	32.11	1	0
1983	-21028	579.5171	566.7624	0.82	0.100981	0.064213	0.330894	1	25.12	1	1
1984	-11175	576.3431	570.8028	0.817975	0.096918	0.062899	0.334221	1	22.85	1	1
1985	-6876	569.4749	574.7317	0.815949	0.092855	0.061586	0.337548	1	24.5	0	1
1986	-2211	559.8119	577.0602	0.813924	0.088792	0.060272	0.340875	0	25.94	0	1
1987	-6448	559.0464	579.0822	0.814307	0.088629	0.065251	0.343563	0	27.39	0	1

1988	-6878	562.845	585.8585	0.81469	0.088466	0.070229	0.34625	0	28.83	0	1
1989	-9209	556.8978	590.2409	0.815073	0.088303	0.075207	0.348938	0	36.7	0	1
1990	-9029	561.208	587.2266	0.815456	0.088139	0.080186	0.351626	0	52.42	0	1
1991	-12300	553.7563	584.599	0.815839	0.087976	0.085164	0.354314	0	49.69	0	1
1992	-9785	566.03	598.6	0.81449	0.087029	0.086799	0.358982	0	45.43	0	1
1993	-7426	562.5049	601.277	0.813142	0.086082	0.088434	0.363649	0	41.57	0	1
1994	-10252	564.1765	615.6078	0.811793	0.085135	0.090069	0.368317	0	38.98	0	1
1995	-10248	556.0557	608.4069	0.810445	0.084188	0.091704	0.372985	1	41.72	0	1
1996	-15358	552.899	613.1256	0.809097	0.08324	0.093339	0.377652	1	44.17	0	1
1997	-17559	552.3141	616.6357	0.809753	0.08265	0.094583	0.383735	1	41.8	0	1
1998	-14512	554.4843	619.2634	0.810409	0.082059	0.095827	0.389817	1	38.6	0	1
1999	-11712	548.181	618.6244	0.811065	0.081468	0.097072	0.3959	1	39.11	0	1
2000	-11233	542.9515	616.7577	0.811721	0.080877	0.098316	0.401982	1	38.14	0	1
2001	-7089	535.1117	597.5	0.812377	0.080286	0.09956	0.408065	1	37.67	0	1
2002	-3095	536.5546	597.2521	0.80799	0.079709	0.103486	0.407622	1	37.88	0	1
2003	-221	536.4432	595.4456	0.803603	0.079133	0.107412	0.407179	0	38.91	0	1
2004	-2972	540.1605	600.947	0.799217	0.078556	0.111338	0.406736	0	42.24	0	1
2005	-7156	546.1351	609.7329	0.79483	0.07798	0.115264	0.406294	0	45.03	0	1
2006	-11828	545.1116	607.0978	0.79	0.077403	0.119189	0.405851	0	41.42	0	1
2007	-12675	556.315	617.1289	0.785333	0.077302	0.121892	0.405638	0	37.77	0	1
2008	-9707	553.704	617.187	0.780222	0.077201	0.124595	0.405425	0	37	0	1
2009	-4247	558.3554	623.4581	0.775111	0.077101	0.127297	0.405213	0	37	0	1
2010	-4348	564.982	636.0562	0.77	0.077	0.13	0.405	0	37	0	1

*in dollars of 1992

APPENDIX 2

Table A2 – Sources for data series

Data	Sources
Gross domestic product	CANSIM 384-0035 (1966-1980), 384-0001 (1981-2010)
Consumer price index	CANSIM 326-0021 (1961-2010)
Employment	CANSIM 384-0035 (1966-1975), 282-0002 (1976-2010), Labour Force Survey (1961-1965)
Population 15-64	CANSIM 051-0026 (1966-1970), 051-0001 (1971-2010)
Total population	CANSIM 051-0026 (1966-1970), 051-0001 (1971-2010)
Fixed capital stocks	CANSIM 031-0004 (1966-2010)
Non-residential private investment	CANSIM 384-0015 (1966-1980), 384-0002 (1981-2010)
Corporations' profits before taxes	CANSIM 384-0014 (1966-1980), 384-0001 (1981-2010)
Direct corporate taxes	CANSIM 384-0022 (1966-1980), 384-0004 (1981-2009)
Interprovincial migration flows	CANSIM 051-0017 (1961-2010)
Average weekly income	CANSIM 281-0021 (1961-1985), 281-0006 (1983-2000), 281-0027 (1991-2010)
Mother tongue	Census of Canada (1961-2006)
Knowledge of official languages	Census of Canada (1961-2006)

APPENDIX 3

Table A3 – Explanatory factors for the Quebec-Ontario GDP ratio, 1966-2010, different methodologies

Independent variable	Equation 1 (Robust OLS level)	Equation 2 (OLS level)	Equation 3 (OLS level)	Equation 4 (OLS level)	Equation 5 (PWE level)	Equation 6 (PWE level)	Equation 7 (OLS 1 st diff)	Equation 8 (OLS 1 st diff)
InEmployment_t	0.298* (0.005)	0.235* (0.009)	0.494* (0.000)	0.498* (0.000)	0.169 (0.301)	0.152 (0.321)	0.089 (0.619)	0.087 (0.620)
InCapital_t	0.395* (0.000)	0.451* (0.000)	0.378* (0.000)	0.262* (0.000)	0.492* (0.015)	0.462* (0.020)	0.391 (0.090)	0.378 (0.086)
Dummy_PQ_t	0.011 (0.191)		-0.001 (0.802)		-0.004 (0.582)		-0.003 (0.606)	
Index_PQ_t		-0.000 (0.920)		0.001* (0.028)		0.001 (0.163)		0.001 (0.164)
Dummybreak1_t			0.040* (0.000)	0.044* (0.000)				
R²	0.73	0.72	0.86	0.87	0.24	0.25	0.08	0.12

Notes: N=45;

* Significant coefficients at a 5% confidence level;

P-values are in parenthesis below the estimated coefficients;

Equations are specified as:

- Equation 1: Robust OLS in levels, $PQ_t = \text{Dummy_PQ}_t$;
- Equation 2: OLS in levels, $PQ_t = \text{Index_PQ}_t$;
- Equation 3: OLS in levels, $PQ_t = \text{Dummy_PQ}_t$, with Dummybreak1_t ;
- Equation 4: OLS in levels, $PQ_t = \text{Index_PQ}_t$, with Dummybreak1_t ;

- Equation 5: Robust PWE in levels, $PQ_t = \text{Dummy_}PQ_t$;
- Equation 6: PWE in levels, $PQ_t = \text{Index_}PQ_t$;
- Equation 7: OLS in first differences, $PQ_t = \text{Dummy_}PQ_t$;
- Equation 8: OLS in first differences, $PQ_t = \text{Index_}PQ_t$.

APPENDIX 4

Table A4 – Explanatory factors for the Quebec-Ontario investment ratio, 1966-2010, different methodologies

Independent variable	Equation 1 (OLS level)	Equation 2 (Robust OLS level)	Equation 3 (PWE level)	Equation 4 (Robust PWE level)	Equation 5 (OLS 1 st diff)	Equation 6 (OLS 1 st diff)
lnBenefits_{t-1}	-0.031 (0.900)	-0.070 (0.732)	-0.314 (0.081)	-0.316* (0.043)	-0.116 (0.483)	-0.133 (0.431)
lnGDP_{t-1}	3.700* (0.000)	3.690* (0.000)	3.082* (0.004)	3.070* (0.006)	2.975* (0.031)	2.901* (0.036)
Dummy_PQ_t	-0.019 (0.721)		-0.002 (0.971)		-0.028 (0.628)	
Index_PQ_t		-0.001 (0.805)		0.000 *0.960)		0.000 (0.951)
R²	0.49	0.49	0.25	0.25	0.12	0.11

Notes: N=44;

*Significant coefficients at a 5% confidence level;

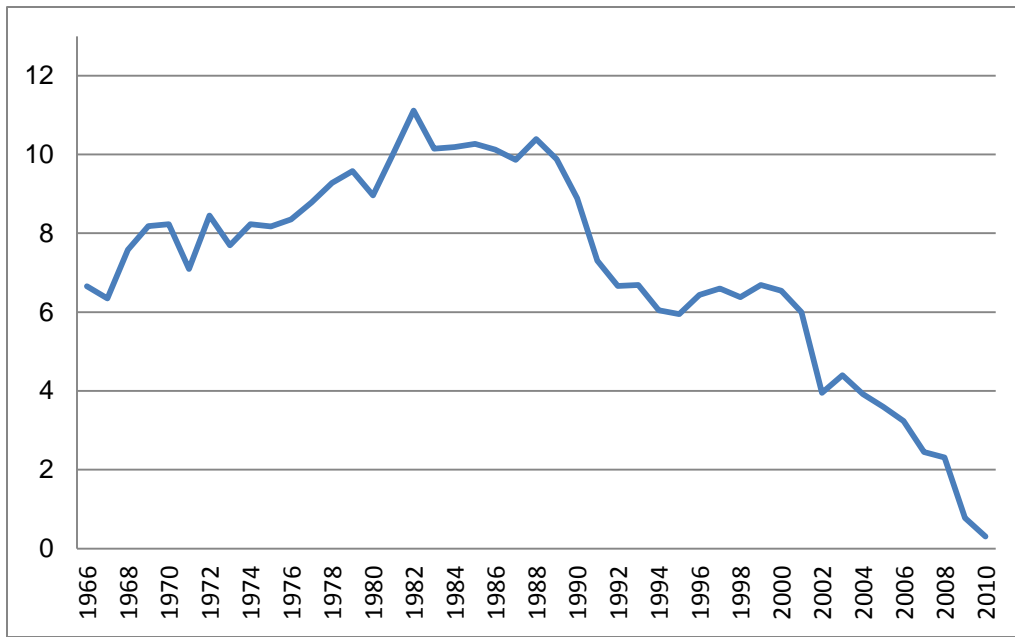
P-values are in parenthesis below the estimated coefficients;

Equations are specified as:

- Equation 1: OLS in levels, $PQ_t = \text{Dummy_PQ}_t$;
- Equation 2: Robust OLS in levels, $PQ_t = \text{Index_PQ}_t$;
- Equation 3: Prais-Winsten estimators (PWE) in levels, $PQ_t = \text{Dummy_PQ}_t$;
- Equation 4: Robust PWE in levels, $PQ_t = \text{Index_PQ}_t$;
- Equation 5: OLS in first differences, $PQ_t = \text{Dummy_PQ}_t$;
- Equation 6: OLS in first differences, $PQ_t = \text{Index_PQ}_t$.

APPENDIX 5

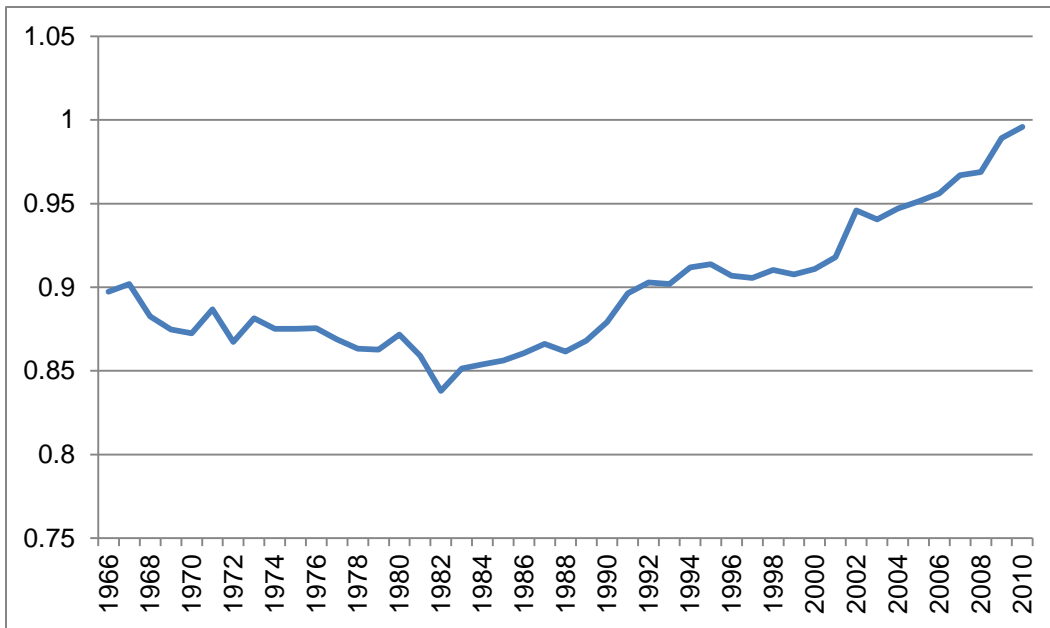
Figure A1 - Difference in employment rates between Ontario and Quebec (%), 1966-2010



Sources: employment: CANSIM 384-0035 (1966-1975), 282-0002 (1976-2010);
population 15-64: 051-0026 (1966-1970), 051-0001 (1971-2010)

APPENDIX 6

Figure A2 – Quebec-Ontario ratio of employment, 1966-2010



Sources: employment: CANSIM 384-0035 (1966-1975), 282-0002 (1976-2010);
total population: 051-0026 (1966-1970), 051-0001 (1971-2010)