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Immigration Flows and Regional Labor Market Dynamics

Prepared by Dominique M. Gross[1]

Authorized for distribution by Mohsin S. Khan

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Abstract

The paper analyzes the ability of a regional labor market to absorb growing flows of immigrant workers with declining levels of skills during relatively high unemployment. The impact of the size of the flow and the skill characteristics of the immigrants are analyzed. It is found that immigration is positively related to unemployment in the short run but in the long run is negatively related. Also, a higher average skill level among immigrants makes them more effective in their job search in the short run. Finally, increasing the discrepancy between the skill distribution of immigrants and that of the existing workforce is desirable, as both types of labor appear to be complements in the short-run.

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Author's e-mail address: dgross@imf.org

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CONTENTS

SUMMARY

In recent years, growing immigration flows and persistently high unemployment have become common in many Western economies and concern about the ability of the labor markets to integrate the newcomers has risen. As a result, demands to curtail immigration levels have become more pressing in many countries. Canada is no exception, in particular, following the change in the federal immigration policy in the 1990s when the number of accepted applicants became independent of the state of the economy.

The ability of British Columbia, a high immigration region, to absorb growing flows of immigrant workers with declining levels of skills during relatively high unemployment is analyzed, as is the impact of the size of the flow and the skill characteristics of the immigrants. Immigration is found to be positively related to unemployment in the short run but negatively related in the long run. When skill characteristics are considered, the average level and the distribution of skills of immigrants relative to native workers matter. In particular, a higher average level of skills among immigrants reduces unemployment and real wage in the short run suggesting, that increased skill levels make immigrants more competitive on the labor market. Also increasing the discrepancy between the distribution of skills of immigrants and already employed native workers is beneficial for unemployment. Since immigrants' skill characteristics are directly related to the point system used to evaluate some categories of applicants, the results suggest that labor market outcomes can be modestly altered by immigration policy if it concentrates on the characteristics rather than on the number of immigrants.

I. INTRODUCTION

In recent years, growing immigration flows and persistently high unemployment have become common features of many Western economies (see Appleyard (1993)). As a consequence, concern about the ability of the labor markets to integrate these newcomers has risen and, in many countries, demands to curtail immigration levels have become more pressing. The arguments most often heard are along the following lines: Immigrants steal jobs from native workers; and immigrants are unskilled and therefore put pressure on the public purse because they do not find jobs. In both cases, they are held responsible for high unemployment.

Surprisingly, very few empirical studies analyze the impact of newly arrived immigrants on the destination labor market; even fewer are done at the aggregate level.[2] Moreover, existing aggregate studies put much emphasis on identifying the direction of causality between immigration flows and unemployment in the destination country. While unemployment reacts to new entrants, the level of immigration is also expected to be influenced by unemployment in the destination region through the so-called "pull-effect" (see Ghatak et al. (1996)). In those studies, the overall consensus is there is no significant causality from immigration to unemployment (see for examples, Marr and Syklos (1995, 1994) for Canada and Pope and Withers (1985) for Australia).

The main shortcoming of causality analyses is that they are pure statistical exercises as there is no structural representation of the labor market. A few Australian studies, among which Junankar and Pope (1990) and Withers and Pope, (1993), have modeled labor market aggregates simultaneously with immigration flows and they do not find an adverse effect of immigration on unemployment either. Nevertheless, time-series estimations present some challenges since potential endogeneity of immigration should be tested and it is now recognized that certain statistical properties of the data, such as non-stationarity, invalidate the results obtained by traditional estimation methods. Also, these studies are conducted at the country-level thereby implicitly assuming that immigrants settle randomly across the country. This clearly is not the case. Moreover, the level of immigration is very small compared to the country's overall labor market and any effect on aggregate unemployment is likely to be difficult to identify.

This paper is an investigation into the impact of immigrants on the dynamics of a *regional* labor market utilizing a model containing a set of aggregate *structural relationships* for immigration, unemployment, real wage and labor force participation. Advantage is taken of recent econometric developments for system estimations to investigate long-term as well as short-term effects of immigration flows and skill characteristics. The time-series properties of

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[2]Most of the literature concentrates on the assimilation question, i.e., the relative performance of native and immigrant workers in the destination country (see Borjas (1994) and Ghartak et al. (1996) for surveys).

the data such as non-stationarity are investigated prior to the estimations. Then, the simultaneous determination of some main labor market aggregate and immigration is recognized by implementing the two-step procedure developed in Johansen (1995) and Johansen and Juselius (1995). In the first-step, unemployment, real wage, labor force participation and immigration flows are considered to be simultaneously determined. The results can therefore be interpreted as the long-run response of the regional labor market to international immigration. The short-run dynamic response of unemployment, real wages and immigration flows is estimated in the second step, paying particular attention to the role of skill differentials between native and immigrant workers. The methodology can be viewed as an extension of the one used by Marr and Syklos (1994) in their study of Canada, in the sense that it allows for the modeling of short-run structural factors in addition to the long-run analysis.

By focusing on a region rather than a country, this study benefits from the presence of a high concentration of immigrants in a relatively small labor market. The region under consideration is British Columbia which is one of the three Canadian provinces with a major metropolitan area. It is also the region with highest density of immigrants.[3]

It is found that in the long-run, the immigration rate is negatively correlated with unemployment suggesting that immigrants create more jobs than they occupy. This adverse outcome is mitigated by the effect of immigrants' skills. The average level as well as the distribution of skills of immigrants relative to native workers matter. In particular, a higher average level of skills among immigrants reduces unemployment and real wage in the short-run suggesting that increased skill levels make immigrants more competitive on the labor market. Also increasing the discrepancy between the distribution of skills of immigrants and already employed native workers is beneficial for unemployment. Since immigrants' skill characteristics are directly related to the point system used to evaluate some categories of applicants, the results suggest that labor market outcomes can be modestly altered by immigration policy if it concentrates on the characteristics rather than the number of immigrants.

The paper is organized as follows. The next Section presents some facts about immigration and the labor market in British Columbia. Section 3 sketches briefly the theoretical argument and sets up the empirical specification. In Section 4, the estimation results are discussed. Final comments are given in Section 5.

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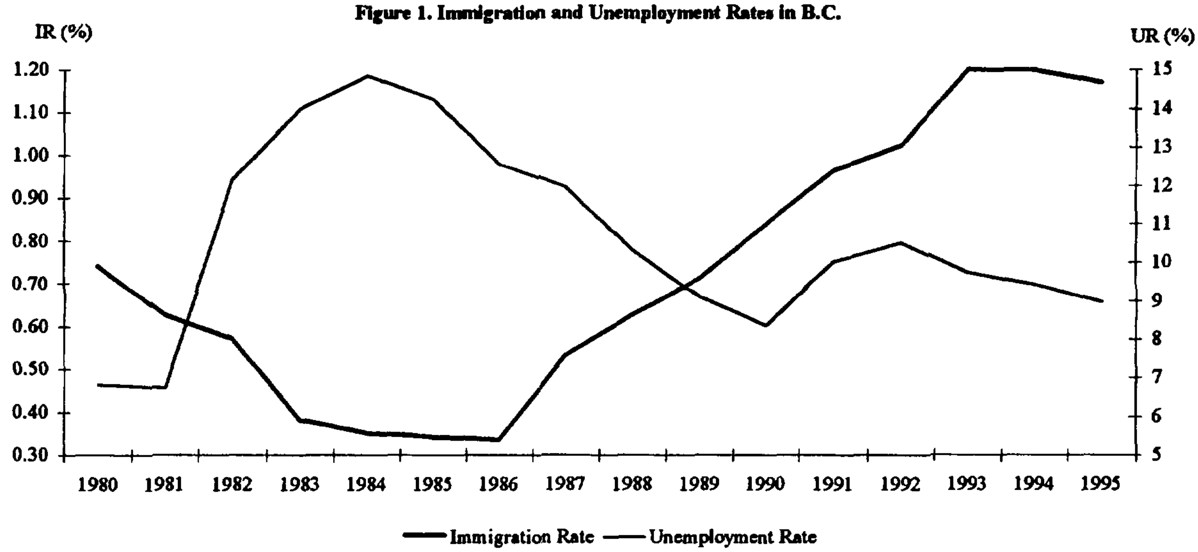
[3]In Canada in 1986, for example, more than 50% of immigrants lived in the 3 metropolitan areas, Montreal, Toronto, Vancouver, which represented less than 30% of the population. In 1986, immigrants represented 48% of the population of British Columbia. In the two other provinces, Quebec and Ontario, the shares were 45% and 38% respectively (Canada Yearbook (1994)).

II. IMMIGRATION AND THE LABOR MARKET

In British Columbia (also BC hereafter), the increasing public concern about the ability of the labor market to integrate new immigrants arises from two observations: First, in recent years, unemployment has been relatively high and immigration levels have risen, thereby not following the usual cyclical pattern. Second, the ability of immigrants to match the needs of the labor market appears to have deteriorated. This section reviews some of the evidence about these two statements between 1980 and 1995.

Throughout the 1980s, the pattern of immigration flows to BC reflects the federal policy which linked the number of accepted immigrants to the state of the business cycle (see Green and Green (1996), for details). As the unemployment rate more than doubled between 1980 and 1985, rising from 6.8% to 14.2%, the number of new immigrants dropped by 50% from 24,500 to 12,319 (see Figure 1).

Figure 1. Immigration and Unemployment Rates in B.C.



During the second part of the 1980s, unemployment receded slowly and the number of accepted newcomers increased steadily. By 1989, the flow of new immigrants was slightly above the 1980-level (25,442) and the unemployment rate was just below the two-digit level (9.1%).

In the 1990s, the federal immigration policy changed and for the first time in Canadian history, the number of accepted applicants became independent of the state of the economy. Hence, when the recession hit in the early 1990s, the flow of immigrants kept rising. In 1994, a yearly average of almost 42,000 new immigrants settled in BC and the unemployment rate was on average 9.6% (see Table 1, upper panel).

Table 1. Immigration to British Columbia and Canada

	Immigration flow to Canada		Immigration flow to B.C.		Share of B.C.'s immig. flow	B.C. Unemp. Rate	Share of B.C.'s population
	Sum over the period	% change	Sum over the period	% change	Average	Average	Average
81-85	511,463	-	81,080	-	15.7	12.4	11.6
86-90	819,477	+60%	109,246	+35%	13.3	11.6	11.8
91-95	1,145,739	+40%	208,236	+91%	18.3	9.6	12.4

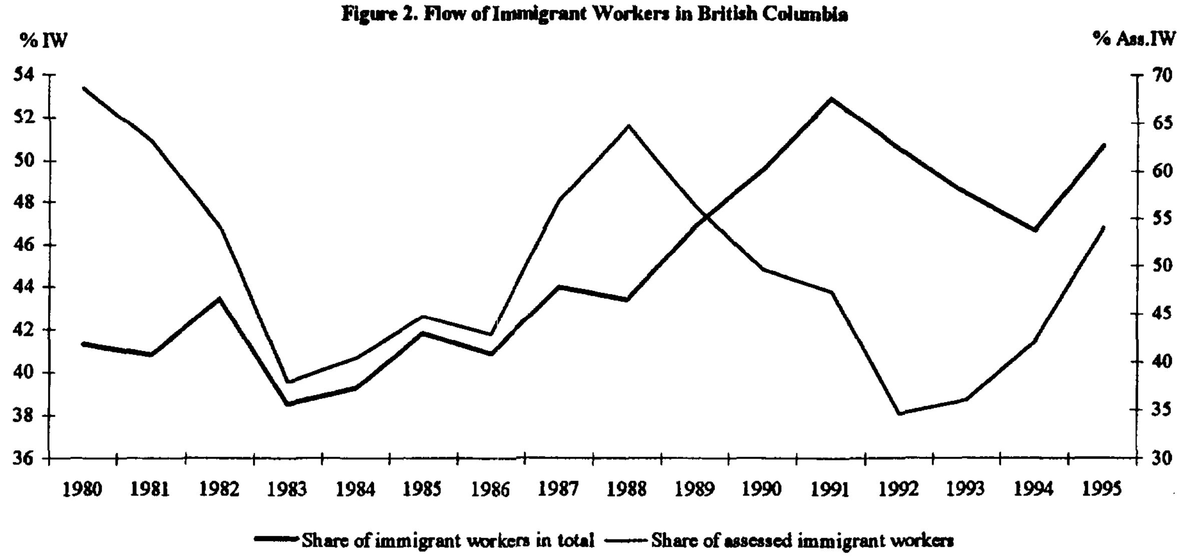
Immigration to British Columbia and the Labor Market

	Inflow of immigrant workers to B.C.[a/]		Share of immig. workers in total flow (%)	Immigration rate (%)[b/]	Ratio of B.C. to national unemp. rates
	Sum over period	% change	Average	Average	Average
81-85	33,182	-	40.8	0.45	1.17
86-90	49,864	+50%	43.4	0.61	1.25
91-95	103,213	+107%	49.6	1.11	0.92

[a/] Immigrants who have declared their intention to work, excluding entrepreneurs, self-employed and investors.
[b/] Yearly inflow of immigrant workers as a percentage of the B.C. labor force.

Moreover, further pressure was put on the BC labor market by a concurrent rise in the proportion of immigrants who declared their intention to work upon arrival (see Figure 2). In effect, in the early 1980s, approximately 41% of the newcomers declared their intention to work upon arrival (called "immigrant workers" hereafter). Ten years later, almost half of the immigrants to the region wanted to enter the labor market. As a result, immigrant workers were a driving factor in labor force growth and the ratio of new immigrants to the domestic labor force rose from 0.45% in the early 1980s to 1.11% in the early 1990s (see Table 1, lower panel).

Figure 2. Flow of Immigrant Workers in British Columbia



The increase in the flow of new immigrants appears to be inconsistent with the observed rise in unemployment. In fact, despite its sluggishness, the BC labor market was performing well relative to the rest of the country in the 1990s as the unemployment rate was below the national average for the first time since 1980 (Table 1, lower panel). This suggests that immigration is endogenous at the regional level while it is not necessarily so at the national level with a policy based on quotas. In that case, the distribution of immigrants across the land is clearly not random.

This brief review validates the first public concern: Immigration to BC did rise during the past 10 years, with an even sharper increase in immigrant workers, despite persistently high unemployment rates.

The second reason for concern about immigration and the labor market is the deterioration of the skill level of newcomers. In the case of Canada, this deterioration is often attributed to changes in the selection process. The selection process is based on a class system by motives of immigration (i.e., business, family reunion, independent, retirement) and, depending on the class, candidates may be subjected to a point evaluation.[4] The goal of the point system is to assess the ability of candidates to fit the demands of the Canadian economy. It covers characteristics such as education, skills, work experience and language ability for examples. Throughout the 1980s, various changes in the definition of classes led to a significant decrease in the share of assessed immigrant workers (see Figure 2). From a maximum of 65.4% in 1980 the share fell to a minimum of 28.6% in 1992 with most of the decline taking place in the late 1980s and early 1990s. Thus, as the economy slowed down, a growing number of immigrants wanting to enter the labor market had not been evaluated for their ability to fit the demands of a rapidly changing economy. Hence, the second concern appears to be also supported by the facts.

Based on the statistical evidence which points toward an increase in immigration flows combined with a fall in immigrants' average skill during slow labor market adjustment, it is tempting to conclude that *larger* waves of *less skilled* immigrants are responsible for the continued high rate of unemployment. The remainder of this paper is a formal investigation into the validity of this argument.

III. THE BASIC THEORETICAL FRAMEWORK

The intent of this paper is not to develop a full theoretical model of the labor market in the presence of international immigration, but rather to uncover its dynamic evolution with the support of economic theory. This section therefore, merely outlines the main expected features of the aggregate relationships between unemployment, the real wage, the labor force and immigration.

Labor market models such as the ones developed in Layard et al. (1991), Pissarides (1991), for examples, provide a theoretical framework for the following set of equations,

$$\begin{aligned} u &= u[w,\ lf,\ m,\ z]\ , \\ w &= w[u,\ lf,\ m,\ x]\ , \\ lf &= f[w,\ u,\ m,\ y]\ , \\ m &= m[w,\ u,\ lf,\ k]\ , \end{aligned} \tag{1}$$

where u is total unemployment, w is the real wage, lf is the labor force and m is immigration. The letters z, x, y, k represent vectors of exogenous factors which affect each aggregate such as the business cycle or supply-side shocks. The variables included in these vectors are

[4] The "family reunion class" is totally exempted from assessment through the point system. Members of the so-called "independent class" are accepted solely on the basis of the number of points they receive. For other classes, an assessment by points as well as other criteria enter the decision to accept or reject the applicant (see Green and Green (1995) for details).

described in Section 4 below. The novelty with respect to the model developed in the literature is the introduction of immigration variable independently of the labor force.

The relationship between immigrants and unemployment is usually set up within the framework of the production process, and aims at determining whether immigrants are substitutes or complements to native workers. An often-neglected aspect of immigration is the job-creation effect of immigrants. Independently of their participation in the labor market, immigrants create jobs through their demand for goods and services thereby benefitting local workers immediately.[5] At constant wages, the effect on local unemployment depends, among other factors, on immigrants' spending on consumption goods relative to natives' and on the types of returns to scale in production. However, new immigrants, once they enter the labor market also have an adverse effect on the search efficiency of native workers. Depending on their relative ability to find jobs (for example, their skill likeness with residents), they may provide strong competition to native workers. The total impact of new immigrants on native unemployment will then be determined by the relative sizes of the demand- and the adverse search effects. A simple way to capture these effect is by defining unemployment with respect to turnover such that,

$$U_n^A = U_n^B + tE - (tE+dM)\left(\frac{tE+U_n^B}{tE+U_n^B+aM}\right), \qquad (2)$$

where U_n^B and U_n^A are native unemployment levels before and after the arrival of immigrants and tE is native turnover (see Simon (1989)). The term dM is the demand-induced job creation by immigrants where d [with $0<d<1$] is a function of immigrants' and native workers' relative consumption spending and of returns to scale in aggregate production; M is the number of new immigrants. The sum $(tE+dM)$ is therefore the number of new vacancies. The last term is the rate at which vacancies are filled by native job searchers. The externality immigrants impose on the search by native workers is measured by the factor a, with $0<a<1$, which represents the effectiveness of immigrants in competing with other workers for jobs.

Some insight into the expected magnitude of the two key parameters d and a can be gained from examples inspired by our data set. Consider a turnover rate of 6% and assume immigrants are as effective as native workers in job search (a=1). If immigrants' spending pattern is identical to natives' and assuming constant returns to scale in production (d=1), an immigration rate of 1% of the labor force will lower native workers' unemployment rate from 10% to 9.4%. If the relative consumption rate is 50% with constant returns to scale, there is still a small beneficial effect and native workers' unemployment rate drops to 9.9%. Clearly if immigrants are not as effective as native workers in job search (0<d<1), the decrease in native workers' unemployment will be even larger in both cases. Hence, a noticeable decrease in native workers' unemployment rate can be observed with reasonable parameter values.

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[5] For a development of the argument, see Simon (1989) and, Altonji and Card (1991).

Therefore, at the macroeconomic level, the supply effect of immigrants on unemployment will be altered by the job-creation effect.

In (1), the immigration rate enters the wage-setting equation through the usual supply effect of new entrants. In the domestic labor force equation two distinct effects are expected. First, the local labor force may respond to international migration by moving to another region. Filer (1992), using correlation coefficients, finds there was substitution between international and internal immigration, during the 1970s in the US metropolitan areas. In BC the opposite holds. The simple correlation between the immigration inflow from abroad and domestic net migration is positive, a result similar to that of Butcher and Card (1991) for the US in the 1980s. Second, international immigration may affect the participation decision of some categories of local residents who are in direct competition with immigrants for jobs. The evidence points toward contradictory and weak effects of immigration on the participation of native unskilled workers (see Borjas (1990) and Winegarden and Khor (1991)). In light of the results for the two labour force effects, we shall consider only the impact on the participation decision. In the time-series context, the labour force by skill categories cannot be identified, and we consider that, in BC, the group group most likely to be in direct competition with immigrants is young people.

Finally, even though it is not the purpose of this study to model the immigration decision fully, the endogeneity of the flows at the regional level cannot be ignored and the immigration rate is taken into account independently from the labor force.

In this more general equilibrium framework where the supply- and demand-side effects of immigrants as well as feedbacks from wage and the labor supply determine the final impact of immigration on the destination market, the empirical specification must be rich enough to account for simultaneity as well as to recognize the statistical properties of the time-series. The next Section develops a strategy for identifying the adjustment of this labor market in the short- and in the long-run.

IV. Empirical Implementation and Results

The estimation of (1) presents several challenges. First, the specification and estimation procedure are determined by the statistical properties of the various series. In particular, the presence of unit-root (i.e. the series are integrated of order one, I[1]) would require differencing the data and thus, contemplating the possibility of cointegration between the levels. Second, while Granger-causality tests at the country levels support the hypothesis of exogenous immigration, this conclusion cannot be easily extended to regional markets. The factual observations of Section 2 suggest that immigration responds to the state of the regional labor market. Hence, the simultaneous determination of all four variables, wages, labor force, unemployment and immigration must be considered.

Starting with the statistical properties, two tests have been performed on the main series: The Durbin-Watson statistic (DW) and the Augmented Dickey-Fuller (ADF) tests. The results for the unemployment rate (LUR), the immigration rate (LIRQ), the real product wage (LW) and the youth participation rate (LYPAR) are given in Table 2.[6]

Table 2. Single-Variable Augmented Dickey-Fuller Tests

	I(1)	I(2)	
	$\Delta x_t = c + \gamma x_{t-1} + \sum_{j=1}^{n} \beta_j \Delta x_{t-j} + \mu_t$		
	ADF(n)	ADF(n=4), c=0	D.W.
Unemployment rate (LUR)	-2.72*(n=8)	-3.14**	0.1983
Immigration rate (LIRQ)	-0.43 (n=4)	-3.70**	0.1636
Youth participation rate (LYPAR)	-1.64 (n=8)	-4.28$^{**a/}$	1.5178
Real product wage (LW)	-0.66 (n=4)	-4.02**	0.3454

H_0:γ=0 and there is a unit-root.
*,** H_0 is rejected at 10%, 5%. The critical values are -2.57 and -2.86 respectively for the specification with constant and -1.62 and -1.94, without constant (see, Davidson and MacKinnon (1993), Table 20.1, p. 708).
$^{a/}$ with constant.

The results of the ADF tests show that the hypothesis that all series except the unemployment rate are I[1] cannot be rejected at 10% significance. However, the values of the DW for unemployment is very small and not much different from that of the immigration rate. Since the ADF test lacks power in small samples[7], we choose to consider that all the series are likely to be non-stationary and a model in first differences is specified. Note, however, that if the series are cointegrated, a long-run relationship in levels between immigration, unemployment, real wage and labor force participation can still be identified.

In recent years, several methodologies have been developed to identify cointegration between variables and some of them deal with systems of equations (see Hargreaves (1994)). Our goal is to estimate efficiently the long-run relationship between the endogenous variables while also identifying the short-run structural parameters. We therefore adopt a two-step procedure. In the first step we use the methodology which identifies cointegration in systems

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[6] Detailed definitions of the variables are given in Appendix I. All the variables are in log.

[7] Unit-root tests which only have asymptotic properties are considered to be not very reliable in short samples (See Campbell and Perron (1991) and Davidson and MacKinnon (1993), chapter 20).

developed in Johansen (1995).[8] It allows us to define whether there exists a relationship between the unemployment rate, the real wage, the labour force participation rate and the immigration rate in the long-run when the variables are simultaneously determined. In the second step, we estimate the short-run dynamics for unemployment, real wage and immigration flows with a specification in difference where the parameters of the cointegrating vectors from the first step are fixed and enter as an error-correction mechanism (*ecm*).

First step: Identification of the long-run relationship

The procedure developed in Johansen (1995) for cointegration in systems is based on a p-dimensional VAR model in levels which is reparameterized as,

$$\Delta X_t = \Pi X_{t-k} + \Gamma_1 \Delta X_{t-1} + \ldots + \Gamma_{k-1} \Delta X_{t-k+1} + \mu + \epsilon_t , \qquad (3)$$

where μ is a vector of deterministic variable (constant and seasonal dummies) and k, is the number of lags. Model (3) is a VAR in differences with an additional term in levels (ΠX_{t-k}) which contains information about the long-run relationship between the variables. There is a matrix α and a matrix β such that $\Pi=\alpha\beta'$ and (3) becomes a system of equations in differences with an error-correction mechanism. Note that if matrix Π has full rank, the vector process X_t is stationary. If rank(Π)=r=0, equation (3) is a traditional differenced vector time-series. The maximal eigenvalue and the trace tests are the two tests based on the rank of matrix Π which identify the number of co-integrating vectors.

The difficulty with VAR specifications is the rapidly shrinking number of degrees of freedom. Moreover, the results of Johansen's procedure are valid only for well-behaved errors. Our strategy, therefore, is to design a parsimonious specification consistent with normality of the residuals and with our theoretical framework as represented by (1). Vector X contains the four variables which are endogenous in the long run: The unemployment rate (LUR), the real product wage (LW), the youth participation rate (LYR) and the quarterly immigration flow rate (LIRQ). The number of lags is set to k=4 and a vector with a constant and seasonal dummies is introduced. The observations are quarterly from 1980.1 until 1995.4.

The results of the two tests for identifying cointegrating vectors, in the upper panel in Table 3, confirm the results of non-stationarity in levels obtained with the single variable ADF-tests.

[8] See also Banerjee et al. (1993).

Table 3. Cointegration Tests

	Maximum eigenvalue[a]		Trace[b]	
	Critical value	LIRQ	Critical value	LIRQ
$r \leq 3$	6.69	0.080	6.69	0.080
$r \leq 2$	12.78	10.785	15.58	10.865
$r \leq 1$	18.96	21.184	28.44	32.049
$r=0$	24.92	34.971	45.25	67.020

Critical values from Osterwald-Lenum (1992). Results derived with PcGive (Hendry, 1989).
[a] $-T\log(1-\mu_i)$ where μ_i is the eigenvalue i. H_0: $r=r_0$ is tested against H_A: $r=r_0+1$.
[b] $-T\Sigma og(1-\mu_i)$ where μ_i is the eigenvalue i. H_0: $r \leq r_0$ is tested against H_A: $r>r_0$.

Cointegration Analysis

Eigenvalues

0.001335	0.164521	0.297467	0.441699

Standardized β' eigenvectors:

	LUR	LW	LIRQ	LYPR
LUR	1.00000	-2.05077	0.13066	4.20817
LW	0.26597	1.00000	0.25098	0.00965
LIRQ	0.31804	-0.01856	1.00000	12.18119
LYPR	0.10910	0.43195	0.04520	1.00000

Standardized α coefficients:

	LUR	LW	LIRQ	LYPR
LUR	-0.20401	-0.34456	0.00329	0.02072
LW	-0.01557	-0.07921	0.01445	-0.01473
LIRQ	0.29017	-1.26580	0.02202	0.07027
LYPR	-0.00403	-0.16741	-0.00813	-0.01004

Both the trace test and the eigenvalue test, predict there are two valid cointegration vectors. They are given by the first two rows of the standardized β' matrix in the middle panel in Table 3. Rewritten in the form of long-run relationships they are,

$$\begin{aligned} LUR - 2.051LW + .131LIRQ + 4.208LYPR &= 0, \\ LW + .266LUR + .251LIRQ + .010LYPR &= 0. \end{aligned} \tag{4}$$

We therefore conclude that unemployment, wage, youth participation and immigration rates are cointegrated. In both vectors, there is a negative relationship between unemployment and the flow of immigrants in the long run. Hence, in the long-run, *ceteris paribus*, the inflow of immigrants decreases aggregate unemployment and based on (2) there is net job creation. Note that the result is quite robust as it holds across the two vectors. Also the relationship between immigration and youth participation rate is negative suggesting that some of the supply-effect from immigrants is offset by a change in youth participation to labor market activities. The second step of the estimation procedure identifies the short-run parameters for model (1).

Second step: Short-run dynamic of unemployment and immigration

Since the variables are I[1] in levels and since there is a long-run relationship between unemployment, wage, youth participation and immigration in level, the short-run specification is in difference with an error-correction term such that

$$\begin{aligned} \Delta Y_t = c + \alpha_1 \Delta Y_{t-1} + \ldots + \alpha_3 \Delta Y_{t-3} + \\ \delta_1 \Delta Z_{t-1} + \ldots + \delta_3 \Delta Z_{t-3} - \lambda ecm_{t-4} + \epsilon_t , \end{aligned} \tag{5}$$

where Z is a vector of short-run exogenous variables and *ecm* is the error-correction term defined earlier as the cointegrating vector from the first-step procedure with parameters held fixed. In the case of multiple cointegration vectors there is no objective rule to choose one vector rather than the other except that the first vector is more strongly correlated with the stationary portion of the processes (see Johansen (1992)). Thus, the valid cointegration relationship that we consider is the one given by the first relationship in (4). The number of lags for the differences (3 lags) as well as for the *ecm* term (t-4) are dictated by the initial set-up of the VAR, where k=4 for levels.

In this second step, there are three endogenous variables (vector Y): The unemployment rate (LUR), the real wage (LW) and the immigration rate (LIRQ). Weak exogeneity tests for youth participation and immigration rate show that the youth participation rate can be considered weakly exogenous while the immigration rate is clearly endogenous.[9] Other exogenous variables (vector Z) are aggregate demand (AD), supply-side shocks (PWOOD), domestic structural shifts (OCCUP) and, the cost of capital (RINT). In the wage equation, unexpected inflation (UEINF) and productivity (PTY) are also used.[10]

Finally, the ability of immigrants to influence the regional labor market in the short-run depends on their characteristics relative to native workers. Hence, two variables controlling for the skill characteristics of immigrant workers are used. First, Section 2 provides evidence that the share of immigrants assessed through the point system dropped sharply in the 1990s. Furthermore, Green and Green (1995) show that such a shift has implications for the skill mix of immigrants such that a change in the distribution of classes changes the occupational distribution in the inflow. In particular, a move away from the "family class" where applicants are not assessed increases the average skill level in the flow. Thus, the share of immigrant workers who have been evaluated through the point system (PSH) is used to control for the average skill level of immigrants.

In addition, to the average immigrants' skill level, the distribution of their skills compared to that of native workers influences the efficiency of immigrants in their search for a job. We therefore use a matching index (MATCH) for the skill distribution between native and immigrant workers (see Appendix I for the description of the index). The index takes the value zero when the distribution of occupations within the immigration flow reflects exactly the distribution in regional employment.[11] An increasing value of M indicates that the discrepancy between the two distributions widens. Note that the short-run implications for unemployment of a growing gap between the two skill distributions are not clear. On the one hand, if immigrants are substitute for native workers, a better match improves their competitiveness in search for jobs. On the other hand, if they are complement, some mismatch is expected.

The final specification for the short-run structural equations is obtained by following the general to specific strategy and is estimated by two-stage least-squares. The results are given in Table 4.

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[9] See Johansen (1992) for testing weak exogeneity in systems. The F-value for the level term in the marginal equation is F(1,43)=.06 for the youth participation rate and F(1,43)=6.08 for the immigration rate. Therefore, the hypothesis of weak exogeneity cannot be rejected in the case of the youth labour force participation.

[10] Among the pull-factors for immigration in the short-run the pre-determined level of immigrants settled in the region could be used as a measure for network availability. However, no series recorded at the required frequency on the stock of immigrants is available.

[11] Vacancies could be viewed as more appropriate than employment to measure how newcomers "match" vacant jobs. However, there is no information on vacancies by occupation in Canada or any of the provinces. Also, in the absence of structural changes (and there is no evidence of such changes in our final results), the two measures are identical.

Table 4. Short-Run Dynamics: Quarterly Immigration Rate, 1980.1-1995.4

	ΔLUR_t (1)		ΔLW_t (2)	ΔLW_t (2)'		$\Delta LIRQ_t$ (3)
c[a]	-.513	c	-.009	.026	c	-.086
ΔLUR_{t-2}	-.348 (3.0)	ΔLW_{t-2}	-.466 (3.9)	-.474 (3.9)	$\Delta LIRQ_{t-1}$	-.367 (3.2)
ΔLW_{t-3}	.534 (3.4)	$\Delta LPTY_t$[b]	-.869 (16)	-.866 (16)	ΔLUR_{t-3}	-.884 (2.8)
$\Delta LYPR_{t-1}$	-.904 (2.8)	$\Delta LPTY_{t-2}$	-.309 (2.6)	-.305 (2.6)	$\Delta LPWOOD_{t-2}$	.786 (1.5)
$\Delta LYPR_{t-3}$	-1.359 (3.6)	$\Delta LUEINF_{t-3}$	-.014 (3.1)	-.014 (2.9)		
ΔAD_{t-2}	-.653 (3.8)	$\Delta LPWOOD_{t-2}$	.061 (1.8)	.053 (1.4)		
		$\Delta LPWOOD_{t-3}$	-.116 (3.0)	-.109 (2.8)		
Ecm_{t-4}	-.280 (7.3)	Ecm_{t-4}	-.003 (0.5)	-.006 (0.7)	Ecm_{t-4}	-.056 (0.5)
$\Delta LIRQ_{t-1}$	.058 (1.4)	$\Delta LIRQ_{t-1}$	.027 (3.2)	.028 (3.3)		
$\Delta LIRQ_{t-2}$	.079 (1.9)	$\Delta LPSH_{t-1}$	-.038 (3.3)	-.038 (3.3)		
$\Delta LPSH_{t-3}$	-.090 (1.8)	$\Delta LPSH_{t-2}$	.023 (2.2)	.025 (2.4)		
$\Delta LMATCH_t$	-.116 (1.7)	ΔLUR_{t-1}	-	.020 (0.9)		
		ΔLUR_{t-2}	-	.003 (0.1)		
		ΔLUR_{t-3}	-	.025 (1.2)		
n	57	n	57	57	n	57
Corr. actual and predicted	0.916	Corr. actual and predicted	0.985	0.985	Corr. actual and predicted	0.642
Norm.resid. $\chi^2(2)$	1.266	Norm.resid. $\chi^2(2)$	.490	-	Norm.resid. $\chi^2(2)$	7.369
4-lag serial corr. $\chi^2(16)$	18.59	4-lag serial corr. $\chi^2(16)$	19.35	-	4-lag serial corr. $\chi^2(16)$	17.75
Tests for parameter constancy: Within sample forecasts 1992.1-1995.4						
$Chi^2(48)/48=1.355$ Predictive Chow Test: $F(48,29)=.958$						

The critical values for $\chi^2(2)$ and $\chi^2(16)$ are 5.99 and 26.3 at 5% respectively and 9.21 and 32.0 at 1%.
a Average of the constant and three seasonals.
[b] The dependent variable is real wage over productivity per employed (pty). By introducing contemporary pty on the right hand side, the real wage is the dependent variable and the constraint of unitary elasticity of real wage with respect to productivity is relaxed in the short-run.

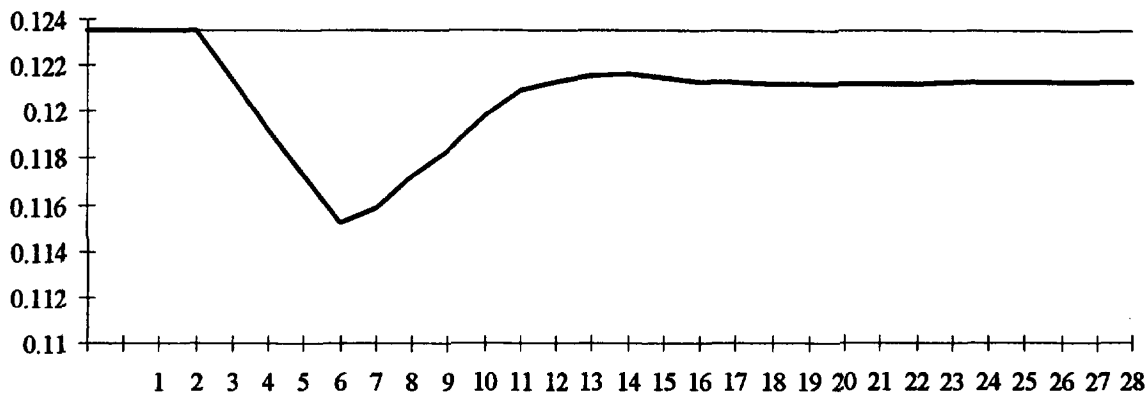
Before considering the actual impact of immigration a few general comments about the dynamic structure of the equations are necessary. All three equations have normally distributed residuals at 2.5% significance as indicated by the values of the χ^2 tests in the middle panel of Table 4. The error-correction term is significant only in the unemployment equation. This implies that, following exogenous shocks, the unemployment rate adjusts toward an equilibrium value given by the co-integrating vector. Hence, exogenous shocks have only temporary effects. The absence of a significant error-correction mechanism in the wage equation implies that all shocks have permanent effects. Moreover, an excess supply of labor does not exert any pressure on the real wage as the results in Column 2' show and this constraint is explicitly imposed in the final specification (Column 2). The non-significance of both the error-correction mechanism and the market-clearing mechanism point toward an extreme sluggishness in the adjustment of the real wage which is a deciding factor for unemployment dynamics.

As seen in Section 2, concerns about the impact of immigrants on the labor market in BC are partly the consequence of changes in immigration policy in the 1990s. To get some insight whether the new policy has had an impact on labor market aggregates, we tested the stability of the parameters after the switch in policy by computing within sample forecasts for the period 1992.1-1995.4. The results of the tests, at the bottom of Table 4, indicate there is no significant shift in the parameters following the change in policy. Hence, the switch to an immigration policy independent of the business cycle did not affect significantly the short-run adjustment mechanisms of the labor market to immigration flows.

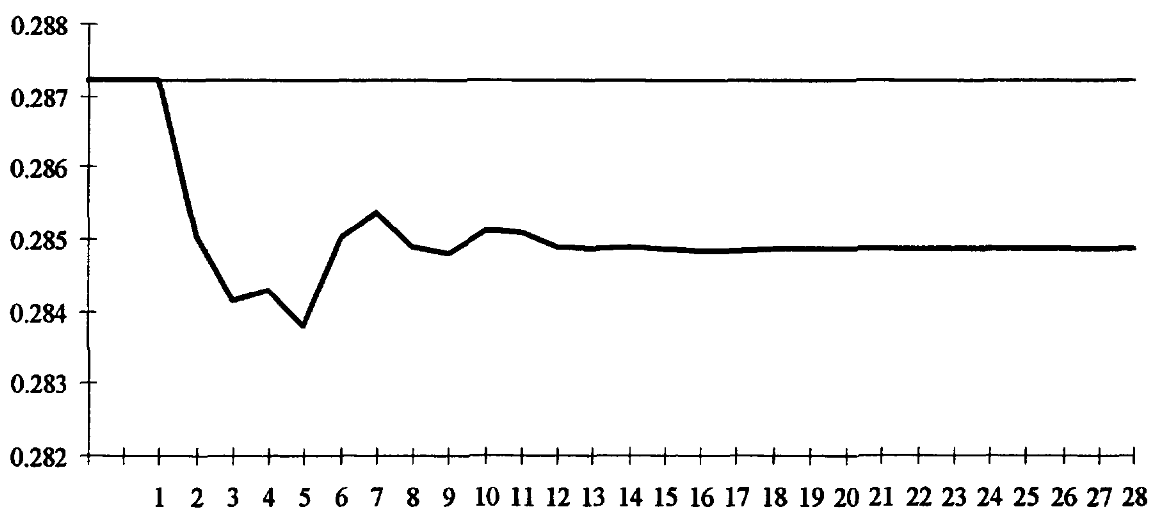
Turning to the parameters of the unemployment equation, in the short-run, variations in the immigration rate are positively related with unemployment rate variations (Column 1). The effects last for two consecutive quarters with a weak initial impact. Since our dependent variable is total unemployment this result in itself does not indicate whether immigrants displace native workers or search longer for a job on average. However, the immigration flow rate enters the wage equation with a positive sign. Hence, newly arrived immigrant workers are likely to be complement with native workers in which case the positive effect on unemployment is attributable to a longer search period by immigrants. Finally, since immigration is endogenous to the unemployment rate, it also responds to the new state of the labor market thereby lifting some of the pressure on unemployment in the medium term.

Concerning the role of immigrants' skill, both measures affect the dynamics of the regional labor market. The average skill level of immigrants matters for adjustments in both unemployment and the real wage. More screening through the point system improves the unemployment rate. Thus, the adverse "quantity effect" from the flow rate can be partly offset by the "quality effect". Higher average skill also puts downward pressure on the wage in the short-run. Hence, the direct effect of immigrant characteristics on unemployment is reinforced by the indirect effect through the wage-setting mechanism. The combined effects on unemployment and the real wage confirm that higher average skills make immigrants more effective in their job search in the short-run.

Figure 3. Dynamic Adjustment Following a 20% Increase in the Share of Screened Applicants



Adjustment of the Unemployment rate



Adjustment of the Real Wage

Since the distribution of skills is directly controllable through the point system, it is possible to get some insight into the potential effect of changes in skill characteristics on unemployment. We have run simulations assuming a 20% increase in the share of assessed immigrants. This change corresponds to the average yearly increase between 1992 and 1995. The results of the dynamic adjustment in real wage and unemployment are pictured in Figure 3. As expected, an increase in average skill level lowers unemployment and real wage in the short-run and both effects persist in the long-run. However, if the share of assessed workers were to be increased by 20% (for example, from 35% to 42%), the unemployment rate would drop from 9.6% to 9.4%, in the long run. Hence, while speeding immigrants' access to the job market in the short-run, the screening process has only a negligible effect on unemployment in the long-run. Since we assume symmetric positive and negative effects, the 12% annual average decline in the share of assessed immigrant workers between 1988 and 1992 cannot be held responsible for much of the high unemployment rate that persisted at the time.

Finally, a perfect match of skills between newly arrived immigrants and native workers is not desirable since lower unemployment can be achieved with a less perfect match. This result suggests that in the very short- run, immigrants are more likely to be complement to than substitute with local workers, and this conclusion is consistent with the result found in the wage equation. When combining the skill-related results it is clear that higher average skills combined with imperfect matching with the local labor force's skills ease immigrants' transition into employment in the short-run. Hence, the screening process does play a role, albeit a small one, in the dynamics of regional unemployment.

Throughout the analysis, the immigration rate (LIRQ) is measured by the quarterly flow of immigrant workers as a proportion of the regional labor force. The use of quarterly observations implies that immigrants are distinct from native workers' for up to the number of lags in the specification (one year in this case). Clearly, the use of this measure imposes restrictions on the speed of adjustment of newcomers to the local labor market demands. Hence, the robustness of the hypothesis has been tested by allowing immigrants to remain distinct for up to 4 years after their arrival. The measure is the cumulative flow of immigrant workers during the past 12 months relative to the regional labor force (LIRY). The complete results of the first-step for the long-run parameters, are given in Appendix II. Again there are at least two valid cointegrating vector in the long-run and the first one is,

$$LUR - 2.218LW + .091LIRY + 3.279LYPR = 0, \tag{6}$$

where the immigration flow and the unemployment rates are negatively correlated and immigration and youth participation are negatively correlated again. For easier comparison, the dynamic specification in the second step of the estimation is constrained to be identical to that in Table 4. Hence, changes in parameters provide some insight into the transition between the short-run and long-run relationships between unemployment and immigration. The results for the second step procedure are given in Table 5.[12]

Table 5. Short-Run Dynamics: Yearly Immigration Rate, 1980.1-1995.4

	ΔLUR_t (1)		ΔLW_t (2)		$\Delta LIRY_t$ (3)
c	-.263	c	-.001	c	-.086
ΔLUR_{t-2}	-.315 (2.7)	ΔLW_{t-2}	-.355 (2.8)	$\Delta LIRY_{t-1}$	-.479 (4.3)
ΔLW_{t-3}	.478 (3.1)	$\Delta LPTY_t^{a/}$	-.866 (14)	ΔLUR_{t-3}	-.263 (2.3)
$\Delta LYPR_{t-1}$	-.825 (2.5)	$\Delta LPTY_{t-2}$	-.221 (1.7)	$\Delta LPWOOD_{t-2}$	.170 (0.9)
$\Delta LYPR_{t-3}$	-1.045 (2.9)	$\Delta LUEINF_{t-3}$	-.005 (1.2)		
ΔAD_{t-2}	-.682 (3.9)	$\Delta LPWOOD_{t-2}$	.069 (1.7)		
		$\Delta LPWOOD_{t-3}$	-.055 (1.3)		
$Ecmy_{t-4}$	-.273 (6.6)	$Ecmy_{t-4}$	-.013 (1.6)	$Ecmy_{t-4}$	-.009 (0.2)
$\Delta LIRY_{t-1}$	.050 (0.6)	$\Delta LIRY_{t-1}$	.051 (2.1)		
$\Delta LIRY_{t-2}$	.018 (0.4)	$\Delta LPSHY_{t-1}$	-.036 (1.0)		
$\Delta LPSHY_{t-3}$	-.097 (0.8)	$\Delta LPSHY_{t-2}$	.059 (1.7)		
$\Delta LMATCH_t$	-.088 (1.3)				
n	57	n	57	n	57
Corr. actual and predicted	0.913	Corr. actual and predicted	0.981	Corr. actual and predicted	0.653
Norm.resid. $\chi^2(2)$	2.089	Norm.resid. $\chi^2(2)$	.176	Norm.resid. $\chi^2(2)$	2.026
4-lag serial corr. $\chi^2(16)$	18.64	4-lag serial corr. $\chi^2(16)$	15.54	4-lag serial corr. $\chi^2(16)$	13.50

All immigrant-related variables lose their significance in the unemployment equation, suggesting that, after one year, immigrants who have expressed their intention to work are well integrated in the basic functioning of the labor market. This argument is supported by the larger pressure of flow rate variations on the real wage.

[12] Note that the measure for point assessment (PSHY) is modified according to the new definition of immigration flow.

To summarize, the overall empirical results show that immigrants are competitive on the labor market in the medium- and long-term while in the short-run they may face more difficulties than native workers in finding jobs. This is particularly true for those who have not been assessed by the point system.

V. Conclusion

This paper addresses the growing concern about the effect of large flows of unskilled immigrants into Western economies by offering some insights into the adjustment process of a regional labor market. Using data for British Columbia, the Canadian region with the highest density of immigrants, we show that growing immigration rates increase unemployment in the short-run only. In the long run, unemployment is permanently lowered suggesting immigrants create more jobs than they occupy. Also, the screening of immigrants matters for regional unemployment and wage-setting as a higher screening rate, by raising their average skill level, makes immigrants more competitive in the search for jobs.

One view of immigration policy would conclude that an improvement of the labor market can be achieved by cutting the immigration flow rates and increasing the average skill level of immigrant workers. However, the long-term analysis shows that immigration and unemployment rates are negatively correlated. Hence, decreasing admissions is not favorable in the long-run. Moreover, such a policy may not even deliver the expected improvement since immigration is endogenous at the regional level. Better labor market conditions would attract to the province of British Columbia a larger proportion of total immigration. Intensifying the screening process appears to be a more promising avenue since it increases immigrants' effectiveness in job search in the short-run. It cannot, however, be expected to be a powerful tool to combat high unemployment in the long-run. Thus, high unemployment in British Columbia is unlikely to have arisen from *larger* flows of *less skilled* immigrants. The structure of the labor market and in particular the lack of responsiveness of the real wage to disequilibrium in the labor market is more likely to be the reason for persistently high unemployment.

APPENDIX I: DATA AND SOURCES

AD : Detrended Canadian real GDP. Estimated residuals from the regression,

$$\underset{}{Log(RGDP)} = \underset{(816)}{11.113} + \underset{(21.2)}{0.0127 Time} - \underset{(-8.5)}{0.470*10^{-4} Time^2}$$

estimated over the period 1970.1-1995.4. (D10373*).

IRQ : Ratio of the quarterly inflow of immigrants aged 15+ who have declared their intention to work minus the following categories: Entrepreneur, investor and self-employed over the relevant labor force in BC. (Ministry of Citizenship and Immigration; D769175, D769182).

IRY : Ratio of the cumulative inflow of immigrants over the current and past 3 quarters.

MATCH : Ratio of share of immigrants and employed in occupations such that:

$$MATCH = \frac{1}{2}\sum \left|\frac{I_i}{I} - \frac{N_i}{N}\right|$$

where I_i/I and N_i/N are the shares of occupation I in total immigration inflow and regional employment respectively. The occupations are, the same as for *OCCUP*, based on declarations by applicants. It is assumed that those who did not declare any occupation but intended to work follow the same distribution of occupations as those who did.

OCCUP : Turbulence index calculated as,

$$\frac{1}{2}\sum_i |(\Delta N_i/N)|$$

where N_i is employment in sub-category 'I' and N is total employment. The index captures the fraction of jobs that have changed sectors or occupations (see Layard et al., 1991, chapter 6, p. 298-300 for a description). The correlation coefficients between domestic aggregate demand and the indexes are 0.111 for sectors and 0.039 for occupations which suggest that the measure is independent of business cycle variations.
Two indexes have been computed. One for nine broadly-defined types of occupations: Managerial and administrative, clerical, sales, service, primary, processing, construction, transport and material handling and other crafts. The other for nine industries: Agriculture, other primary industries, manufacturing, construction, transport and power, trade, finance/insurance and real estate, community business and personal service, public administration. (D770355, D771561, D771562, D771563, D771564, D771565, D771566, D771567, D771568; D771581, D771582, D771583, D771584, D771585, D771586 , D771587, D771588, D771589).

W : Ratio of real hourly wage and production per employed (PTY). Real hourly wage is weekly earnings in industrial aggregate, divided by the weekly hours worked in manufacturing in BC (the only series on hours available). (D704316, L87280, D706892, L87996, P710000) deflated by the BC CPI. Production per employed is real BC GDP per employed aged 15+. The BC RGDP is expanded to generate a quarterly series with a seasonal pattern based on the national RGDP. (D45169, D769176, D769183).

RINT : Ex-ante real yield on government bonds. Yield for 5-10 year federal bonds minus expected 12-month inflation measured by the IPPI in Canada. (B14011, D693420).

PWOOD : IPPI for wood products divided by total IPPI, both for Canada. (D694055, D693420).

UR : Number of unemployed people in British Columbia aged 15+ as a proportion of the labor force aged 15+. (D769184, D769177, D769175, D769182).

UEINF : Sluggishness in price adjustment is measured by the second difference in prices such that best predictor for next period inflation is this period's inflation. Hence, unexpected inflation is actual 12-month inflation in BC minus one-period lagged 12-month inflation such that $\Delta p = \Delta p_{-1} + \epsilon$ (see Dimsdale et al.(1989), p.286; P710000).

YPR : Labor force participation rate for youth aged 15 to 24. (D769216, D769217, D769223, D769224).

[*] The numbers refer to the CANSIM Database from Statistics Canada.

APPENDIX II

TESTS FOR I.I.D. RESIDUALS OF THE SYSTEM

LUR, LW, LIR, LYPR are endogenous.				
	Quarterly immigration rate		Annual immigration rate	
	$\chi^2(2)^a$	$\chi^2(16)^b$	$\chi^2(2)^a$	$\chi^2(16)^b$
LUR	0.286	22.453	0.834	14.950
LW	1.678	18.145	1.659	15.679
LIR	1.480	9.444	7.402	16.619
LYPR	2.029	18.418	1.516	13.539

[a] Jarque-Bera (1980) test for normality. $\chi^2 = [(T-m)/6]*[SK^2+(1/4)EK^2]$ where m is the number of regressors, SK is skewness and EK is excess kurtosis.
$SK=E(x-\mu)^3/\sigma^3=0$ for a normal distribution. $EK=[E(x-\mu)^4/\sigma^4]-3=0$ for a normal distribution.
[b] Box-Pierce (1970) test for serial correlation. $\chi^2 = T\Sigma r_j^2$ for j=1,2,..., 16.
The critical values at 5% are 5.99 and 26.30 for 2 and 16 degrees of freedom respectively.
The critical values at 1% are 9.21 and 31.99.

ANNUAL IMMIGRATION RATE

Cointegration tests:

	Maximum eigenvalue		Trace	
	Critical value	LIRY	Critical value	LIRY
$r \leq 3$	6.69	0.001	6.69	0.001
$r \leq 2$	12.78	13.916	15.58	13.917
$r \leq 1$	18.96	28.518	28.44	42.435
$r=0$	24.92	45.624	45.25	88.059

Eigenvalues

0.000025	0.216623	0.393656	0.550860

Standardized β' eigenvectors:

	LUR	LW	LIRY	LYPR
LUR	1.00000	-2.21762	0.09090	3.27911
LW	0.07510	1.00000	0.15900	-0.51391
LIRY	0.71038	-0.02441	1.00000	10.43239
LYPR	0.10102	0.51364	0.04892	1.00000

Standardized α coefficients:

	LUR	LW	LIRY	LYPR
LUR	-0.37823	-0.27843	-0.00642	0.00255
LW	-0.05264	-0.09206	0.01048	-0.00235
LIRY	0.06670	-0.98183	0.01374	0.00294
LYPR	-0.01879	-0.14729	-0.02359	-0.00093

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