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Unemployment and confidence in Canada: Evidence from national and regional level data

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Abstract

This study investigates the relationship between unemployment and confidence in Canada, using both panel data, which considers cross-sectional dependence and heterogeneity among the regions, and time series causality tests. A unidirectional causal relationship from confidence to unemployment, including total, male, female, long-term, and youth unemployment, is found. This indicates that confidence can predict unemployment. The results further highlight the importance of considering regional differences and cross-sectional dependence when performing the analysis. Moreover, improving confidence would help ameliorate the unemployment problem at the aggregate level and for specific groups, such as youth and females, and reduce the duration of unemployment.

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1. Introduction

The overall impact of a financial crisis on unemployment generally varies by country, and depends on country-specific factors, including the economic structure, labour market conditions, and policymakers' responses at different levels, among others. Nevertheless, the Great Recession, which began in 2007 as a result of the melt-down of the subprime mortgage market, has led to a severe economic contraction and lasting deterioration in labour market conditions around the globe. The U.S. unemployment rate rose from a pre-recession low of 4.4 per cent to 10.1 per cent in October 2009. This 5.7 percentage point increase is the largest post-war upswing in the U.S. unemployment rate. Pissarides (2013) observed a similar uptrend in other Organisation for Economic Co-operation and Development (OECD) and European countries. Some specific groups of people may have suffered from more severe unemployment problems. For example, according to the International Labour Organization (ILO) (2014) estimates, nearly 202 million people, of which 74.5 million youth—aged 15-24—were unemployed worldwide in 2013. Since the onset of the financial crisis in 2007, these number of unemployed people increased by approximately 31.8 million, including 4.6 million young people. Understanding the causes of unemployment is of great importance due to the fact that rising unemployment may lead to negative effects, such as negative long-term effects on future labour market prospects, and growing inequality in the long run (Matsumoto *et al*. 2012).

Keynes (1936) postulates the idea that market psychology, which he called 'animal spirits', can independently influence economic activity. Akerlof and Shiller (2010) extended the notion of animal spirits by linking it to the degree of an agent's confidence regarding unknown future events or psychological states of minds. Studies have shown that confidence or animal spirits could affect output fluctuation. Recently, Farmer (2012a, 2012b, 2013, 2015) and Pan (2018) showed that 'animal spirits', or confidence, can cause unemployment. However, empirical investigations linking unemployment and confidence remain scarce, especially from a regional perspective.

This study focuses on several aspects of the link between unemployment and confidence from both the national and regional levels. In particular, this study considers not only total unemployment, but also youth, female, and long-term unemployment. The results could enable us to compare how confidence affects unemployment in various groups of individuals. The analytical procedure consists of two parts. First, the relationship between the national unemployment and the confidence index is analysed using the Granger causality test suggested by Toda and Yamamoto (1995). Granger causality analysis finds a negative causality from the consumer confidence index to unemployment, which is particularly strong for youth unemployment. The second part is a regional panel analysis. Several cross-sectional dependency tests confirm the presence of cross-sectional dependence in the panel. The panel Granger causality test supports the results of the time series analysis, but is slightly different in that it suggests confidence has the greatest impact on long-term unemployment.

The rest of this paper is organised as follows. Section 2 reviews the related literature. Section 3 describes the econometric methods. Section 4 reports data sources. Section 5 reports the empirical evidence. Section 6 concludes the paper and provides future research line.

2. Theoretical motivation

From theoretical perspective, the role of confidence (or beliefs of agents) in explaining economic fluctuations has been examined in numerous studies. Acemoglu and Scott (1994) showed consumer confidence has strong predictive power for household spending, which rejects the permanent income hypothesis. Farmer and Guo (1994) used sunspots and animal spirits interchangeably, and show that sunspot shocks can generate persistent output dynamics. Benhabib and Farmer (1994) found that externalities and increasing returns to scale in production technology must be adequately high to imply that the labour demand curve is upward sloping, and the required degree of increasing returns to scale is around 60%. The central implication from their study is that agents' beliefs play a crucial role in aggregate fluctuations due to the indeterminacy of an equilibrium path. However, required degree of increasing returns to scale (60%) is considerably higher than what is suggested by most empirical studies (see Basu and Fernald, 1997). As a result, instead of being purely exogenous shifts in expectations, more recent literature (see e.g. Benhabib and Farmer, 1996, Perli, 1998, and Weder, 2000) has considered that animal spirits are an overreaction to technological innovations. This type of model has been generally found to be successful in matching the data as the required degree of increasing returns to scale is between 10%-20%.

There are many empirical studies aimed at finding whether consumer confidence causes economic activity (see Akerlof and Shiller, 2010). Matsusaka and Sbordone (1995) is one of the examples, and they showed that consumer confidence Granger caused the U.S. gross national product (GNP). The variance decomposition further showed consumer confidence would explain 13% to 26% of the variance of GNP. Using the University of Michigan Index of Consumer Sentiment, Howrey (2001) found that the consumer confidence index is a statistically significant predictor of the future rate of growth of personal consumption expenditures and real gross domestic product (GDP). Based on Japanese data, Utaka (2003) observed consumer confidence only has a short-term effect, and no long-term effect on GNP. On the other hand, sentiment also plays key roles in financial markets. Baker and Wurgler (2006) showed when investor sentiment is high, stocks are more attractive to optimists and speculators, but less attractive for arbitrageurs. This makes the future returns of certain types of stocks, such as young stocks, small stocks, unprofitable stocks, non-dividend paying stocks, become lower. Jansen and Nahuis (2003) found a positive relationship between consumer confidence and stock market returns in nine out of 11 European countries, but there was no significant causality between consumer confidence and stock returns.

Until recently, Farmer (2012a, 2012b, 2013) introduced the idea that beliefs of stock market participants play a key role in finding a unique equilibrium out of a continuum of equilibriums, arising from search and matching costs in labour markets. Farmer (2012a) showed that the unemployment rate can be explained as a steady-state equilibrium, where assuming that market participants' beliefs are self-fulfilling resolves the indeterminacy of the equilibrium. The belief function is described as

$$E_t\left[\frac{P_{k,t+1}}{P_{t+1}}\right] = X_t \tag{1}$$

where $P_{k,t+1}$ is the value of the stock market and X_t is a process that represents beliefs about the future value of the stock market. The belief is determined by the function

$$X_t = \frac{P_{k,t}}{P_t} exp(s_t^b) \tag{2}$$

where s_t^b are belief shocks with $s_t^b \sim D(0, \sigma_s^2)$. The employment in his model is driven by

$$L_t = \frac{1}{s_t^p}\left[\frac{P_{k,t}}{\vartheta P_t} exp(s_t^b)\right]^{1/b} \tag{3}$$

where s_t^p denotes the shocks of productivity. Based on the this model, Farmer (2013, 2015) provides empirical evidence that the confidence, proxy by the ratio of stock prices to a wage series, could have caused unemployment and recession in the U.S. since WWII. Fritsche and Pierdzioch (2016) also find this relationship in Germany.

Although the Farmer (2012a, 2012b) theoretical model postulates an strong link between employment and confidence, relevant empirical studies remain scarce. Farmer (2013, 2015) provided empirical evidence for this, but he mainly focused on national instead of regional or micro-level unemployment. In addition, there are groups of individuals, such as youth and females, that may suffer from a more severe unemployment problem. Youth unemployment is characterised by a substantial rise as well as a slow recovery (Verick 2009; Bell and Blanchflower 2011). Moreover, there are studies on gender gaps in unemployment rates (Ham et al. 1999; Azmat et al. 2006), and noticed that the gender gap in unemployment rates is small in some countries, while the gap is very large in others. The main contribution of this study lies in investigating to what extent a fluctuation of confidence affects youth, long-term, male, female, and overall unemployment at both national and regional levels.

3. Data and preliminary analysis

The national and regional unemployment rates are all collected from Statistics Canada, the Government of Canada agency commissioned with producing statistics, which offers various types of unemployment measures. To measure national confidence, I use the consumer confidence index from the OECD's main economic indicator database. Regional confidence level data, Business Barometer Index, is collected from the Canadian Federation of Independent Business (CFIB) for ten different regions, namely Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia. The regional dataset reflects the observations from the fourth quarter of 2000 to the second quarter of 2017. The national dataset reflects monthly observations from January 1980 to June 2017. Table 1 provides the detailed definitions and sources of all variables.

Table 1. List of variables

Variable	Definition	Source
Total unemployment rate	The number of the unemployed as a percentage of the total labour force	Statistics Canada
Youth unemployment rate	The number of unemployed ages 15-24 expressed as a percentage of the youth labour force	Statistics Canada
Long-term unemployment rate	The proportion of long-term unemployed (unemployed for 12 months or more) among all unemployed	Statistics Canada
Female unemployment rate	The percentage of female labour force that is currently unemployed	Statistics Canada
Male unemployment rate	The percentage of male labour force that is currently unemployed	Statistics Canada
Consumer confidence index	households' plans for major purchases and their economic situation, both currently and their expectations for the immediate future.	OECD
Business barometer index	Enterprises' assessment of business performance, including production, orders and stocks, as well as its current position and expectations for the immediate future.	CFIB

Figure 1 provides the evolution of national consumer confidence levels with the total unemployment rate. Unemployment is shown in the right axis, while the confidence index is presented in the left axis. It is evident from the figure that the declining confidence index tends to be followed by an increase in the rate of unemployment. Notice that such negative correlation between the two time series is particularly obvious during recession periods, such as the 2007-2009 global financial crisis.

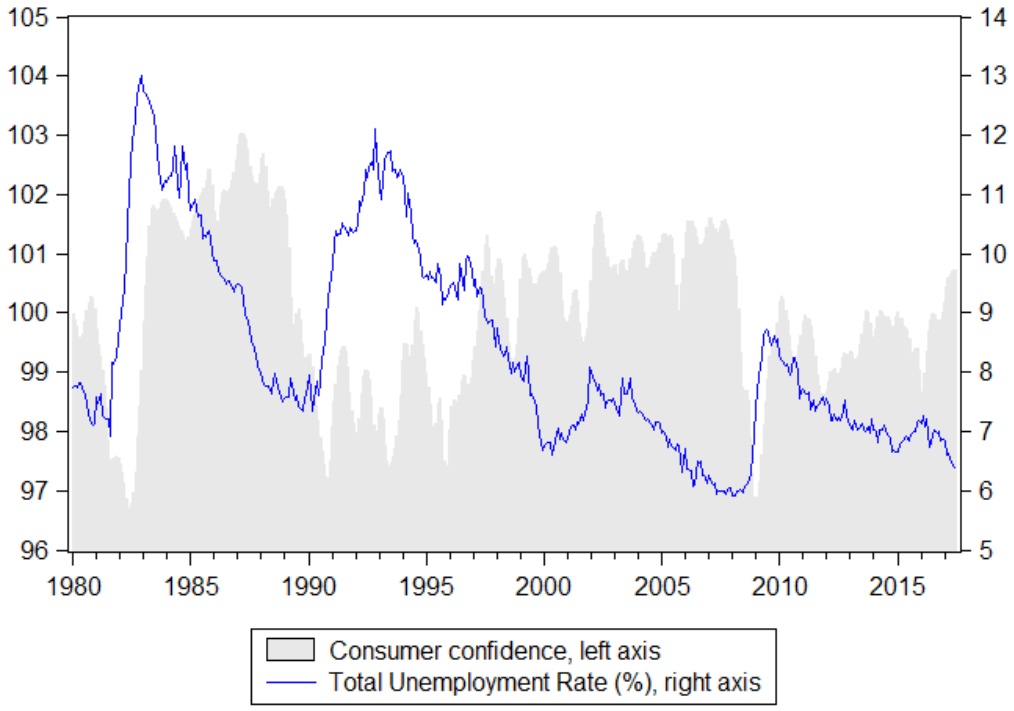

Figure 1. Consumer confidence and total unemployment rate between January 1980 to June 2017

4. Methodology

4.1 National-level analysis

To examines causal relation between national-level unemployment and confidence indices, the following equations are used:

$$U_t = \varphi_1 + \sum_{k=1}^{K} \varphi_k U_{t-k} + \sum_{k=1}^{K} \beta_k CI_{t-k} + \mu_t \quad (4)$$

$$CI_t = \varphi_2 + \sum_{k=1}^{K} \varphi_k U_{t-k} + \sum_{k=1}^{K} \beta_k CI_{t-k} + \mu_t \quad (5)$$

where U and CI are two stationary variable representing unemployment rate and confidence index, respectively, in *t* periods. *K* is the optimal lag. If the joint hypothesis $\beta_k = 0$ for any *k* is rejected, the causality from confidence to unemployment is found. I follow Toda and Yamamoto (1995) procedure. Comparing to traditional Granger (1969) method, their procedure has advantage as it can work if both series are either *I(1)* or I(0) or if they have different stationarity properties. The first step is to determine the maximum order of integration, *dmax*, for two time series. If one of them is I(0) and the other is I(1) , then *dmax* = 1. Then, estimate a kth optimal lag order vector autoregressive (VAR) model in levels regardless of their orders of integration. The optimal lag is selected by standard techniques.

Here I choose the Schwarz Info Criterion (SIC). Third, the extra *dmax* lags are added to the preferred VAR model as exogenous variables. Finally, a Wald test is used to the lags of the endogenous variables and its statistic has asymptotically chi-squared distribution when VAR (k + dmax) is estimated.

3.1 Regional-level analysis

Initially the cross-dependence tests proposed by Pesaran (2004), and Breusch and Pagans (1980) are used. However, the Pesaran (2004) method is more suitable for large N and small T, which does not exist in this study. When the dataset contains large T and small N, the Lagrange Multiplier (LM) test by Breusch and Pagans (1980) is more appropriate. The LM test statistic is as follows:

$$\mathrm{CD}_{BP} = T \sum_{i=1}^{N-1} \sum_{k=i+1}^{N} \hat{\rho}_{ik}^2 \tag{6}$$

where $\hat{\rho}_{i,k}$ is the estimated pair-wise correlation of the residuals. Under the null hypothesis of cross-sectional independence, CD_{LM} is asymptotically distributed as $\chi^2_{N(N-1)/2}$.

There are several ways to test causality in the panel data.[1] The first approach is to use the generalized method of moments (GMM) estimator to estimate a panel vector error correction model. However, this approach does not consider cross-sectional dependence and heterogeneity, and GMM estimators may produce inconsistent and misleading parameters (Pesaran *et al*. 1999). The second approach is based on testing heterogeneous causality in panels. This approach is proposed by Dumitrescu and Hurlin (2012) and considers cross-sectional dependence and heterogeneity. Using this method requires pre-testing the stationarity of variables. If the variables are not stationary in levels, data loss will emerge as the first or second differences of variables must be used. On the other hand, based on the seemingly unrelated regressions (SUR) estimation, Kónya (2006) proposed an approach taking into account both cross-sectional dependency and heterogeneity. This approach is tested using WALD tests with country specific bootstrap critical values. Thus, it does not require a joint hypothesis for all members of the panel, and does not require pre-testing for the panel unit root and cointegration (Kónya 2006). I apply Kónya (2006) to test the causality between regional confidence and regional unemployment. The system of equations can be formulated as,

$$\begin{aligned}
\mathrm{U}_{1,t} &= a_{1,1} + \sum_{i=1}^{p_1} \beta_{1,1,i} \mathrm{U}_{1,t-i} + \sum_{i=1}^{p_1} \theta_{1,1,i} \mathrm{CI}_{1,t-i} + \varepsilon_{1,1,t} \\
\mathrm{U}_{2,t} &= a_{1,2} + \sum_{i=1}^{p_1} \beta_{1,2,i} \mathrm{U}_{2,t-i} + \sum_{i=1}^{p_1} \theta_{1,2,i} \mathrm{CI}_{2,t-i} + \varepsilon_{1,2,t} \\
&\vdots
\end{aligned} \tag{7}$$

[1] Please see Kar et al. (2011) for a review of the ways used to test causality.

$$\mathrm{U}_{N,t} = a_{1,N} + \sum_{i=1}^{p_1} \beta_{1,N,i} \mathrm{U}_{N,t-i} + \sum_{i=1}^{p_1} \theta_{1,N,i} \mathrm{CI}_{N,t-i} + \varepsilon_{1,N,t}$$

and

$$\begin{aligned}
\mathrm{CI}_{1,t} &= a_{2,1} + \sum_{i=1}^{p_2} \beta_{2,1,i} \mathrm{U}_{1,t-i} + \sum_{i=1}^{p_2} \theta_{2,1,i} \mathrm{CI}_{1,t-i} + \varepsilon_{2,1,t} \\
\mathrm{CI}_{2,t} &= a_{2,2} + \sum_{i=1}^{p_2} \beta_{2,2,i} \mathrm{U}_{2,t-i} + \sum_{i=1}^{p_2} \theta_{2,2,i} \mathrm{CI}_{2,t-i} + \varepsilon_{2,2,t} \\
&\vdots \\
\mathrm{CI}_{N,t} &= a_{2,N} + \sum_{i=1}^{p_2} \beta_{2,N,i} \mathrm{U}_{N,t-i} + \sum_{i=1}^{p_2} \theta_{2,N,i} \mathrm{CI}_{N,t-i} + \varepsilon_{2,N,t}
\end{aligned} \tag{8}$$

where N is the number of regions (j=$1, \cdots, N$), and t is the time period ($t = 1, \cdots, T$). P denotes the length of lag, which is chosen by Schwarz Bayesian Criterion in this study. Equations (4) and (5) are estimated by the SUR method. If not all $\theta_{1,j,i}$s are zero, the causality from confidence to unemployment is found. There is causality from unemployment to confidence if not all $\beta_{2,j,i}$s are zero.

5. Empirical results

5.1 National level

To test the causal relationship between confidence and the unemployment rate, I employ the Granger causality test by following the Toda and Yamamoto (TY) (1995) procedure. Although some studies have tested cointegration between variables before performing causality tests, while the TY procedure tests for long-run Granger causality, it does not require pre-testing for cointegration (Zapata and Rambaldi 1997). Therefore, it is directly applied without pre-testing cointegration. Before doing this, the unit root test is required to properly specify the vector auto-regressive (VAR) model and determine the maximum order of integration, *dmax*. The results of the unit root tests are reported in Table 2. According to Table 2, the integration orders of total unemployment, youth unemployment, long-term unemployment, male unemployment, female unemployment, and the confidence index do not appear to exceed 1.[2] After determining the highest integration order *dmax* =1, I proceed with the TY procedure.

Table 2. Unit root test results

		ADF		PP	
		Intercept	Intercept and Trend	Intercept	Intercept and Trend
Total U	level	-2.213	-3.616**	-1.768	-2.892
	Δ	-5.865***	-5.900***	-20.674***	-20.667***
Youth U	level	-3.051**	-3.515**	-2.595*	-2.957

[2] All variables are stationary in second differences and the results are available from the author upon request.

	Δ	-7.318***	-7.331***	-25.718***	-25.722***
LT U	level	-2.828*	-3.053	-2.643*	-2.878
	Δ	-4.960***	-5.011***	-28.682***	-28.762***
Female U	level	-1.251	-2.929	-1.361	-2.929
	Δ	-7.671***	-7.685***	-23.950***	-23.939***
Male U	level	-2.869**	-3.857**	-2.270	-2.968
	Δ	-8.025***	-8.054***	-21.723***	-21.721***
CCI	level	-3.520***	-3.529**	-3.042**	-3.039
	Δ	-8.229***	-8.220***	-4.993***	-4.980***

Notes: *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively. U refers to unemployment rate; LT denotes long-term; CCI refers to consumer confidence index. ADF refers to augmented Dickey-Fuller test statistics (Dickey and Fuller, 1979). PP refers to Phillips-Perron test statistics (Phillips and Perron, 1988).

The Granger causality results presented in Table 3 indicate evidence of unidirectional Granger causality running from confidence to unemployment in Canada at the national level. Consumer confidence Granger causes total unemployment, youth unemployment, long-term unemployment, and female and male unemployment at the 5% significance level. The estimated effects of lags of confidence are negative, indicating that confidence helps reduce unemployment, especially in youth unemployment. However, there is no causality from any type of unemployment to confidence in most cases. These results are like the Farmer series of papers that show that confidence can cause unemployment, but not vice versa. One interesting observation is that the long-term unemployment rate could also cause the consumer confidence index but at a very small magnitude.

Table 3. Toda and Yamamoto Granger Causality test

	Lag structure	From confidence to unemployment	From unemployment to confidence
		p-value	p-value
Total unemployment	4, 4	0.0002***	0.2600
		(-0.9125)	(0.0017)
Youth unemployment	4,4	0.0445**	0.1630
		(-2.2201)	(0.0012)
Long-term unemployment	6,6	0.0000***	0.0489**
		(-1.7662)	(0.0003)
Female unemployment	4,4	0.0007***	0.6137
		(-1.2848)	(0.0014)
Male unemployment	4,4	0.0016***	0.2655
		(-0.7523)	(0.0010)

Notes: *, **, and *** denotes significance at the 10%, 5%, and 1% level, respectively. The sum of estimated effects of lags are reported in parentheses.

5.2 Regional level

Next, discussing the results of the regional-level evidence, the Pesaran cross-sectional

dependence (CD) and Breusch-Pagan Lagrange Multiplier (LM) tests are used. Clearly, according to the results in Table 4, the null hypothesis of cross-sectional independence is strongly rejected for each variable in every case. Therefore, I assume that the variables have cross-sectional dependence.

Table 4. Cross-Sectional Dependency test

Variable	Breusch-Pagan LM	Pesaran CD
Confidence index	689.4494****	22.2223***
Total unemployment	490.9571***	16.9285***
Youth unemployment	336.2708***	12.0723***
Long-term unemployment	459.9185***	13.6526***
Female unemployment	504.9740***	13.9191****
Male unemployment	403.2504***	15.9923***

Note: *** indicates significance at 1%

Finally, the Kónya (2006) causality test results suggests all p-values of causality from confidence to unemployment are below 1%, indicating confidence causes all types of unemployment considered in this study. According to Table 5, the estimated effects of the lag of confidence on unemployment is negative, indicating that rising confidence could decrease unemployment. In particular, there would be a greater impact (more negative coefficients) on long-term unemployment. This is different from the result of the national analysis, which found confidence has the greatest impact on youth unemployment rather than long-term unemployment. Similarly, there is no causal relationship from regional unemployment to regional confidence. Overall, the regional analysis results support previous findings that unidirectional causal relationships from confidence to unemployment exist in Canada.

Table 5. Panel Granger Causality test

	Lag structure	From confidence to unemployment	From unemployment to confidence
Total unemployment	2, 2	0.0000***	0.8104
		(-0.1568)	(-0.0030)
Youth unemployment	3, 3	0.0000***	0.6567
		(-0.2026)	(0.0069)
Long-term unemployment	3, 3	0.0000***	0.5865
		(-0.4387)	(0.0035)
Female unemployment	2, 2	0.0000***	0.8986
		(-0.1175)	(-0.0011)
Male unemployment	2, 2	0.0000***	0.9592
		(-0.2030)	(-0.0026)

Note: **, and*** denote significance at 5%, and 1% level, respectively. The sum of estimated effects of lags are reported in parentheses.

6. Conclusion and discussion

This study examined the relationship between confidence and unemployment for Canada from both national and regional perspectives. Both the results from national and regional data suggest that confidence causes unemployment. However, at the national level, the results suggest that confidence has the greatest negative causality with youth unemployment, while the regional analysis suggests that confidence has the greatest impact on long-term unemployment. Moreover, the national long-term unemployment could Granger cause the national confidence level, but this result is not observed in the regional analysis. A possible reason for this is that time series causality tests using national-level data imposes that the impacts of confidence are homogeneous across different labour markets. In other words, it does not consider cross-sectional dependence and heterogeneity among regions.

The results presented in this study lend support to Farmer's (2012a, 2012b, 2013, 2015) views and are also consistent with Caleiro (2006, 2007) and Mandal and McCollum (2013), who find causality from consumer confidence to unemployment. It also implies confidence could be a good predictor for unemployment. The results further complement existing literature in two respects. First, they highlight the importance of considering regional differences and cross-sectional dependence when performing the analysis, because not considering them may yield different results. Second, this study shows improving confidence would help ameliorate the unemployment problem not only at the aggregate level, but also for specific groups, such as youth and females. It also reduces the duration of unemployment.

These research results provide benefits for policymaking. Regional governments should focus on improving psychology matters for job seekers rather than job requirements in response to an increase in the adjustment mechanism in the labour market. Although this study focuses on whether confidence affects unemployment, much less research has been done on what causes movements in confidence itself (see, for example Fuhrer, 1993). It is possible that a nonlinear or more complex relationship exists between these two variables, and more work is needed to understand it.

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