



A new look at variation in employment growth in Canada: The role of industry, provincial, national and external factors



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ABSTRACT

We examine fluctuations in employment growth using Canadian data from 1976 to 2010. We consider a wide range of models and examine the sensitivity of our findings to modelling assumptions. The results from our most preferred model, which we selected using the Bayesian Information Criteria, indicate that most of the variance in employment growth that is not due to the idiosyncratic error comes from domestic sources, with most of this coming from industry and provincial factors. Overall, we find that external and national factors play a much smaller role in employment fluctuations than in earlier research. We provide some possible explanations for these differences and discuss the implications of our findings for public policy and theory.

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1. Introduction

Fluctuations in the labor market can have a number of different sources. They might be driven by broad business cycle trends for the economy as a whole. Or they might be specific to a region (e.g., due to policies pursued by regional governments or regional differences in economic growth rates). Fluctuations might also arise from industry-specific shocks, e.g., changes in productivity, changes in input prices or changes in demand for an industry's output. Alternatively, fluctuations might even be due to external forces from the world economy. Understanding the roles played by these various sources of shocks to the labor market should lead to better policy-making because the appropriate policy may differ depending on the source of fluctuations. For example, if fluctuations are due to regional-specific factors, then stabilization policy at the regional level may be more appropriate than a centralized response at the national level.

There are many papers which examine the sources of economic fluctuations and the empirical literature breaks into two main streams. One stream of research examines the sources of shocks and their relative contribution to economic

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fluctuations in industrial production and GDP. The other stream focusses directly on the labor market and investigates shocks and fluctuations in unemployment and/or employment. This paper relates to this second stream. In particular, we investigate the sources of fluctuations in employment growth in Canada using data disaggregated by industry and province.

We focus on the labor market since data is available at a disaggregated level such as province-industry. In contrast, industrial production and GDP data series are limited by aggregation issues. That is, they are sometimes not presented at very disaggregated levels. We consider employment (as opposed to unemployment) so as to avoid the definitional issues associated with unemployment measured at the industry level. Also, [Riddell \(1999\)](#) noted that some of the differences in unemployment rates across countries, e.g., Canada and the US as well as Europe versus the US, arise from differences in the definition of unemployment. For example, some persons that are considered unemployed in the US would be considered out of the labor force in Canada. Consequently, employment is more likely to be consistently measured at the industry level and comparable across countries.

While there are differences across the two streams of research in terms of the focus of their investigation, both streams have considered the role of disaggregate shocks versus aggregate shocks as a source of fluctuations. From a methodological perspective, these two branches of the literature have also used dynamic factor models (DFMs) in their empirical specifications. Our econometric methods will also use DFMs. DFMs have become an increasingly common way of quantifying the extent of movements in macroeconomic variables (e.g., among others, [Otrok and Whiteman, 1998](#); [Kose et al., 2003](#); [Crucini et al., 2011](#); [Mumtaz et al., 2011](#)) and financial time series (e.g., among others, [Aguilar and West, 2000](#); [Diebold et al., 2006](#); [Koopman et al., 2012](#)). In our setting, DFMs can quantify the degree of movement in employment growth across industries and regions and allow us to determine the sources of fluctuations in employment growth, i.e., how much of the fluctuations in employment growth can be attributed to industry factors, regional factors, national factors or external factors.

The existing literature has largely focussed on the US, although there have been several studies of Canada as well as some European countries. Canada is an instructive country to study for a number of reasons. First, it is a large country and a G7 nation with a great deal of variation in industrial composition across its regions. Second, its political structure is a federal system, with both a national government along with provincial governments. Third, it is an open economy and international factors (primarily the US) are thought to have a large effect on its economy. Consequently, Canada provides an ideal setting to study the contributions of different sorts of shocks to employment fluctuations.

In this paper we use an updated annual Canadian data through 2010 to thoroughly investigate the sensitivity of decompositions of fluctuations in employment growth to modelling assumptions. We consider both DFMs as well as VAR models augmented with dynamic factor structures. DFMs are driven by unobserved latent factors, so the results can be quite sensitive to identifying assumptions or assumptions about the dynamics of the factors. We consider a wide range of models, some that have been considered before in the literature, as well as some alternative specifications that have not been considered before. These models differ in terms of how they allow for persistence in employment fluctuations as well as spillovers of shocks from one region or industry to others. With VARs and factor models, Bayesian methods are enjoying an increasing popularity and we follow this trend. In addition to standard arguments in favour of Bayesian methods in such high-dimensional models (see, e.g., [Koop and Korobilis, 2009](#)), there are some advantages particular to this literature. First, assessing model fit is much more straightforward with Bayesian methods and does not encounter the problems with determining the degrees of freedom for goodness-of-fit tests with minimum distance estimators (e.g., [Altonji and Ham, 1987, 1990](#); [Clark, 1998](#)). This makes it possible for us to determine the most appropriate model, which we also compare to some other models commonly used in the literature to determine the sensitivity of our findings to model specification choices. Second, our MCMC methods provide us with draws of the factors which can be used to produce estimates of them or measures of uncertainty associated with them in a manner not considered before in the previous literature. Our paper also updates the literature and provides more timely and relevant information about the sources of labor market fluctuations in Canada. Earlier papers ([Altonji and Ham, 1987, 1990](#); [Prasad and Thomas, 1998](#)) have only considered data until the early-1980s or early-1990s, so their results may not capture the effects of the North American Free Trade agreement or outsourcing on the Canadian labor market ([Trefler, 2004](#)) as well as other changes in labor market policy (e.g., the major reform of unemployment insurance legislation and the labor market agreements between Canadian provinces reducing barriers to the mobility of workers across provincial borders).

In the next section we present the models that we consider in our analysis. [Section 3](#) presents a brief review of the previous literature considering the sources of employment fluctuations. [Section 4](#) describes our data sources as well as some patterns in the summary statistics. [Section 5](#) presents our empirical results and a comparison to the earlier literature. [Section 6](#) concludes the paper with a summary of our findings and their implications.

2. Dynamic factor models for employment growth

Before surveying the literature on employment growth decompositions, it is useful to specify our modelling framework so as to make clear the relationship of our model to previous empirical work. Let y_{ipt} be the employment growth rate of industry i (for $i = 1, 2, \dots, I$) in province p (for $p = 1, 2, \dots, P$) in year t (for $t = 1, 2, \dots, T$).

Employment growth is assumed to be driven by various latent factors and current and lagged US GDP growth. We assume that there is an idiosyncratic error term and three types of factors: I industry specific factors (f_{it} , one per industry),

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