Journal of Monetary Economics 55 (2008) 1143–1157

Contents lists available at ScienceDirect

Journal of Monetary Economics

journal homepage: www.elsevier.com/locate/jme

On the cyclical behavior of employment, unemployment and labor force participation ☆

Marcelo Veracierto *

Research Department, Federal Reserve Bank of Chicago, 230 South LaSalle Street, Chicago, IL 60604, USA

ARTICLE INFO

Article history:
Received 16 February 2006
Received in revised form
18 July 2008
Accepted 22 July 2008
Available online 30 July 2008

JEL classification:
E32
J63
J64

Keywords:
Business cycles
Employment
Unemployment
Labor force participation

ABSTRACT

In this paper I evaluate to what extent a real business cycle (RBC) model that incorporates search and home production decisions can simultaneously account for the observed behavior of employment, unemployment and out-of-the-labor-force. This contrasts with the previous RBC literature, which analyzed employment or hours fluctuations either by lumping together unemployment and out-of-the-labor-force into a single non-employment state or by assuming a fixed labor force. Once the three employment states are explicitly introduced I find that the RBC model generates highly counterfactual labor market dynamics.

1. Introduction

This paper is motivated by a very basic set of facts: that employment varies 60 percent as much as output and is highly procyclical, that unemployment varies 6 times more than output and is countercyclical, and that the labor force varies only 20 percent as much as output and is weakly procyclical. The purpose of this paper is to evaluate to what extent a real business cycle (RBC) model can jointly account for these observations.

Standard RBC models are not designed to address this type of evidence. These models typically lump together unemployment and out-of-the-labor-force into a single non-employment state and analyze variations in employment and hours worked by either studying a work–leisure decision (e.g. Hansen, 1985; Prescott, 1986) or a work-home production decision (e.g. Greenwood and Hercowitz, 1991; Benhabib et al., 1991). Given their assumption of frictionless labor markets, standard RBC models cannot be used to analyze unemployment fluctuations.

In recent years, a number of papers have introduced search frictions into RBC frameworks, some of them (like Andolfatto, 1996; Merz, 1995, 1999; Den Haan et al., 2000) using the Mortensen–Pissarides (1994) matching framework,

☆ I thank Fernando Alvarez, Bob Hall, Richard Rogerson and Ivan Werning for very useful comments, as well as seminar participants at the Federal Reserve Bank of Chicago, Northwestern University, Purdue University, University of Illinois at Urbana-Champaign, Universidad de Navarra (Spain), the 2002 SED Meetings, the 2002 NBER Summer Institute, the 2003 Midwest Macro Conference and the 2003 NBER EFGR Meeting in San Francisco. The views expressed here do not necessarily reflect the position of the Federal Reserve Bank of Chicago or the Federal Reserve System.

* Tel.: +1 312 322 5695; fax: +1 312 322 2357.
E-mail addresses: mveracierto@frbchi.org, mveracie@frbchi.org (M. Veracierto).

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doi:10.1016/j.jmoneco.2008.07.008

others (like Gomes et al., 2001) using the Lucas–Prescott (1974) islands framework. A common finding in this literature is that a RBC model that incorporates search frictions can account for salient features of U.S. business cycles and even outperform the standard model in several ways. While this is an important result, none of the above papers attempted to explain the joint behavior of employment, unemployment and out-of-the-labor-force: Merz (1995, 1999) and Gomes et al. (2001) assumed a fixed labor force, while Andolfatto (1996) and Den Haan et al. (2000) lumped together unemployment and out-of-the-labor-force into a single non-employment state.[1]

Explaining the joint behavior of employment, unemployment and labor force participation is important not only to obtain a better understanding of labor market dynamics, but to test the empirical plausibility of the search and leisure/home-production decisions embodied in a model. Consider, for example, the models by Merz (1995, 1999) or Gomes et al. (2001) that allow agents to search and enjoy leisure while they are unemployed but that restrict them to stay in the labor force. If the main reason why agents become unemployed in those models is to enjoy leisure (i.e. if intertemporal substitution in leisure is the main factor driving employment fluctuations), a significant number of agents would want to leave the labor force in order to enjoy even more leisure if they were given the chance. Thus, most of the flows from employment to unemployment during a recession could end up being flows from employment to out-of-the-labor-force once a labor force participation margin is allowed for, generating highly counterfactual behavior. Lumping together unemployment and out-of-the-labor-force into a single non-employment state (as in Andolfatto, 1996; Den Haan et al., 2000) may hide similar problems.

A first attempt to evaluate this possibility was made by Tripier (2003), who analyzed an efficient RBC version of the Mortensen–Pissarides matching model that makes an explicit distinction between employment, unemployment and out-of-the-labor-force.[2] His main finding was that the model fails to reproduce the countercyclical unemployment rate observed in U.S. data. While this result suggests that RBC models can have serious difficulties in generating empirically reasonable labor market dynamics, it was obtained under two restrictive assumptions: (1) that workers accept the first job-offer that they receive (since all jobs have the same productivity level), and (2) that jobs are destroyed at a constant rate. Given these assumptions, the main mechanism that can give rise to a significant increase in aggregate employment level after a positive productivity shock hits the economy is an increase in labor force participation.[3] Since new market participants must search for a job before they become employed, it is not surprising that this mechanism will give rise to a pro-cyclical unemployment rate. This paper extends Tripier's analysis by introducing endogenous job-acceptance and job-separation decisions. Incorporating these margins is important because a higher aggregate employment level can now be obtained by increasing the job-acceptance rate or by decreasing the job-separation rate, without having to increase the size of the labor force. Thus, contrary to Tripier's analysis, the theory is given a fair chance at generating a counter-cyclical unemployment rate.

The benchmark model considered is a version of one used by Alvarez and Veracierto (2000), which in turn is based on the Lucas and Prescott (1974) equilibrium search model. Output, which can be consumed or invested, is produced by a large number of islands using capital and labor. Contrary to the deterministic steady state analysis of Alvarez and Veracierto (2000), the islands are subject both to idiosyncratic and aggregate productivity shocks. Once the shocks are observed, agents must decide whether to work in the islands where they are currently located or to leave. The reallocation of workers across islands is subject to search frictions. An important difference with Lucas and Prescott (1974) is that search is undirected, leading to an endogenous average duration of unemployment. Another difference is that an explicit out-of-the-labor-force margin is introduced: Agents are allowed to obtain more home production leaving the labor force than becoming unemployed.

Parameter values are chosen so that the deterministic steady state of the model economy reproduces important observations from the National Income and Product Accounts (NIPA) and some key labor market statistics. Aggregate productivity shocks in turn are selected to match the behavior of measured Solow residuals. Under such parametrization, I find that the model fails to account for the joint behavior of employment, unemployment and out-of-the-labor-force. The search and home production decisions embodied in this version of the neoclassical growth model generate drastically counterfactual behavior, mainly: (1) unemployment fluctuates as much as output while in the data it is six times more variable, (2) unemployment is weakly procyclical while in the data it is strongly countercyclical, (3) employment fluctuates as much as the labor force while in the data it is three times more variable, and (4) the labor force is strongly procyclical while it is weakly procyclical in the actual economy. These results are robust to a wide variety of specifications for the search technology.

Even though the paper fails to account for U.S. observations, it fails in an informative way. The paper finds that the empirical performance of an RBC model can become quite poor once unemployment and endogenous labor force

[1] Strictly speaking, Den Haan et al. (2000) lumped together unemployment and out-of-the-labor-force workers that claim to want a job.

[2] Greenwood et al. (1996) also analyzed a RBC model that incorporates the three employment states (but no search frictions). However, their focus was on the cyclical behavior of job creation and job destruction instead of decomposing the cyclical behavior of non-employment into unemployment and out-of-the-labor-force. Other papers that have explicitly modeled the three employment states include Alvarez and Veracierto (2000), Andolfatto and Gomme (1996), Garibaldi and Wasmer (2005), Kim (2004), Moon (2005), Pries and Rogerson (2004) and Veracierto (2007a), but none of them analyzed business cycle dynamics.

[3] In principle, a higher employment level could also be obtained by increasing the number of vacancies posted. However, efficient versions of the Mortensen–Pissarides model fail to generate large fluctuations in vacancies (see Shimer, 2005).