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An estimated search and matching model of the Japanese labor market

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ABSTRACT

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This paper studies how well a simple search and matching model can describe aggregate Japanese labor market dynamics in a full information setting. We develop a discrete-time search and matching model with a convex vacancy posting cost and three shocks: productivity, separation, and markup shocks. We use the model as a data-generating process for our empirical analysis and estimate it by using Bayesian methods. The model is successful in replicating the behavior of unemployment and vacancies in Japan. However, we also find that the success of the model relies on shock processes that are not empirically plausible. *J. Japanese Int. Economies* **xxx** (xx) (2014) xxx–xxx. International University of Japan, 777 Kokusai-cho, Minami Uonuma-shi, Niigata 949-7277, Japan.

1. Introduction

The search and matching model has been often used for studying aggregate labor markets. However, the model has recently criticized for its inability to account for the cyclical properties of the US labor market. Shimer (2005) demonstrates that the model cannot generate the observed

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unemployment and vacancy fluctuations in response to productivity shocks of reasonable size. This failure of the model has come to be known as the "Shimer puzzle".[2] Recently, a number of papers study whether the Shimer puzzle holds for the Japanese labor market (Esteban-Pretel et al., 2011; Miyamoto, 2011; Tawara, 2011).[3] In order to examine whether the model is able to capture the data, these studies use the calibration method and concentrate on the model's ability to replicate a few key statistics. One issue with such an approach is that information on some parameters in the model is difficult to pin down.[4] Furthermore, it is hard to study the quantitative implications of the entire model.

The purpose of the paper is to study how well the search and matching model can describe aggregate Japanese labor market dynamics in a full information setting. We treat our model as a data-generating process for aggregate labor market variables, and estimate a set of key parameters that drive cyclical labor market dynamics. We also examine the source and size of fluctuations and evaluate the ability of the search and matching model to replicate cyclical behaviors of the Japanese labor market.

We develop a simple discrete-time search and matching model with a convex vacancy posting cost and three shocks: productivity, separation, and markup shocks. We incorporate the convex vacancy posting cost since it is known that the curvature of the vacancy posting cost affects the quantitative property of the search and matching model (Fujita and Ramey, 2007; Yahiv, 2006). Incorporating a persistent shock to the separation rate is motivated by the fact that the unemployment inflow rate significantly contributes the unemployment dynamics in Japan (Miyamoto, 2011; Lin and Miyamoto, 2012).[5] Beside these two extensions, we also introduce a markup shock into our model, since recent studies find that markup shocks largely accounts for the labor market dynamics.

We first ignore the markup shock and estimate the model using Bayesian methods for data on unemployment and vacancies in Japan. While model parameters are chosen to match selected data moments in calibration methods, they are selected by taking into account all moments of the data in our structural estimation.[6] The structural estimation of the full model allows us to examine the ability of the model as a plausible description of labor market dynamics. We find that parameters are tightly estimated and shifted away from their priors, indicating the data are informative and parameters are identified. In order to match the data, the model estimates requires a high replacement ratio and a low worker's bargaining power. These parameter estimates are consistent with what Hagedorn and Manovskii (2008) suggest in their calibration.

We also find that the model is capable of replicating the behavior of unemployment and vacancies remarkably well. Specifically, the model replicates the volatility of unemployment and vacancies and a negative relationship between them (the Beveridge curve) in the data. Given that the model parameters are estimated to match the data, in general, this is not surprising. However, it is well known that search and matching models cannot generate the observed negative relationship between unemployment and vacancies when the separation rate is counter-cyclically moving in the model

[2] In the literature, many solutions have been proposed to solve this problem. See Hornstein et al. (2005) and Mortensen and Nagypál (2007) for surveys.

[3] While the methodology to answer the question is different among these studies, all papers reach the same conclusion that the Shimer puzzle holds for the Japanese economy.

[4] As Lubik (2009) mentioned, calibrating the search and matching model tends to be problematic since some of the model parameters, such as the flow value of unemployment and the worker's bargaining power, are difficult to pin down.

[5] Recent empirical studies demonstrate that both unemployment inflow and outflow rates significantly contribute the unemployment dynamics in Japan. Miyamoto (2011) and Lin and Miyamoto (2012) examine the relative importance of inflow and outflow rates for fluctuations in unemployment, and find approximately a 50:50 inflow/outflow split to unemployment variation in Japan.

[6] Instead of using calibration methods, the advantage of using estimation in the analysis of the business cycle is as follows. In calibrating business cycle models, researchers use a set of parameters that have been estimated in other research works separated from their present research. Given the calibrated parameters, the model may or may not match the data, and researchers want to know what makes the model successful or unsuccessful. In order to diagnose a failure of the model, researchers change calibrated parameters and repeat the exercise with no explicit criterion to stop the trials. Although direct estimation of parameters is involved with massive computational tasks, the procedure proposes a posterior set of parameters and variables that are most consistent with the data of the real economy. We can also obtain alternative estimates by trying a limited number of combinations of observable variables and parameters.