Employment "Cycles" Of Married Women

This study investigates whether married women with spouse present change their employment status as the general economy changes. The empirical findings show not only the evidence of shifting employment pattern for married women but also information of the periods of employment cycles. The employment cycles of married women are closely related to general economic cycles.

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Introduction

It has been well documented that female labor supply has grown rapidly since 1940s. Labor force participation of married women with spouse present has increased as well. While much research has studied women's static and life-cycle decision to participate in the labor force, there are few studies examining how women's employment patterns varies over time. Among potential issues, it is interesting and important to understand how the employment of married women respond to changing business conditions. It is essential to know how married women response to different economic situations because their employment often suffers from business downturns.

The purpose of this study is to investigate whether married women with spouse present change their employment status as the general economy changes. The research question addressed is: What is the relationship between married women's "employment cycles" and the business cycles? Findings of this study can be used to design appropriate female labor supply policies according to economic changes.

Literature Review

Optimal employment decision rules for workers are subject to constraints imposed by market conditions and by the decisions of employers. Some, married women especially, choose not to work during business downturns. Women leave labor market during business slumps and re-enter in prosperity. Women's higher propensity to move in and out of the labor force than men is a major reason for their higher unemployment. Studies have shown that there is a positive relationship between labor demand relative to supply and labor market participation in the aggregate as more job opportunities are created in prosperity than in depression. As a result, employment pattern in a booming economy usually differs from that in a recession period. Women's labor force participation is particularly more "procyclically" timed.

Two research studies are related to this study. First, Toikka (1976) developed a Markovian optimization model of labor market choices assuming individual's decision occurs at the beginning of each period. Between decision points a person is in one of three states: employment, unemployment, or out of the labor force. Assuming workers are maximizing their expected payoff functions, Toikka has demonstrated that the optimal decision rule can be derived as a function of payoffs (in terms of wages and income) and the probability of a job offer and acceptance for each employment status. Empirically, he used quarterly data from the Current Population Survey over 1967:8-1973:12 to estimate his model for both males and females. The empirical results support the added-worker effect and the argument of the existence of a positive relationship between labor demand and aggregate demand for consumer goods and services. He also concluded that unemployed women tend to leave the labor force with greater frequency than employed women.

Second, Blank (1989) was interested in female labor market transitions and the role of part-time work in women's labor force participation choices. She used 1976-84 Panel Study of Income Dynamics data to trace the employment transitions of women who were either head of a household or a spouse in each year of the nine years. Her research concludes that women working part-time are more likely to change their labor market commitments in the next year than those who are working full time, or who are out of the labor market entirely. She also found that

changes in marital status are relatively unimportant in determining the length of time spent in a particular labor market status. Marital status is important only in inducing part-time workers to go into full-time work.

Further extensions of Blank's (1989) and Toikka's (1976) work are possible. First, their sample periods are rather short. Neither has the ability to characterize the nature of the long-term trend in female labor supply nor incorporates unobserved shifting labor force participation behavior. Second, a fixed growth may persist for a while once the economy is in stability. The life-cycle labor force participation based on data related to individual labor market decisions may fail to provide shifting patterns of labor force participation in aggregate. In this study, aggregate employment data are used to infer the probability that married women's employment is in a state of fast growth based on available information. No causal relationships between employment and other macro variables are pursued.

Markovian Labor Supply Switching Model

A Markovian model estimates process or changes. Markovian models are appropriate for studying labor supply of family members since family development is a process in which families move from one life stage to another and the probability of transition from one stage to another depends on the duration of time in the previous stage.

Based on the change in employment trend of married women with spouse present, consider a case in which their employment is generated as the sum of two independent unobserved components. One follows a random walk with a Markov-switching error structure and the other follows an autoregressive process. The model is described as follows (Kim, 1994; Lam, 1990):

$$\tilde{y} = n_t + x_t \quad (1)$$

$$n_t = n_{t-1} + \beta_{st}, \quad (2)$$

$$\beta_{st} = \alpha_0 + \alpha_1 S_t, \; S_t = 0, 1, \quad (3)$$

$$x_t = \phi_1 x_{t-1} + \phi_2 x_{t-2} + \ldots + \phi_p x_{t-p} + u_t, \quad (4)$$

$$u_t \sim \text{iid } N(0, \sigma^2), \quad (5)$$

$$\text{prob}[S_t = 1 \mid S_{t-1} = 1] = p, \quad (6)$$

$$\text{prob}[S_t = 0 \mid S_{t-1} = 0] = q. \quad (7)$$

where $\tilde{y}$ is (the log of) the number of employed women with spouse present; n_t and x_t are random walk and autoregressive components of $\tilde{y}$, respectively; the parameters of an autoregression are viewed as the outcome of a discrete-state Markov process. β_{st} is the error term which is assumed to evolve according to a two-state Markov process. One of two states is defined as the fast-growing state, $S_t = 1$; the other is defined as the slow-growing state, $S_t = 0$. The probability of transition from a fast-growth period to the next fast-growth period is assumed to be p and the probability of transition from a slow-growth period to next slow-growth period is assumed to be q.

An efficient way to estimate the parameters ($\alpha_0, \alpha_1, \phi_1, \phi_1, \ldots, \phi_p, \sigma$, p, q) in (1)-(7) is a Markov-switching model with a state-space representation (Kim, 1994). In the model, dependence in the switching process, and switching in both measurement and transition equations, are allowed. Also, state-space representation can be estimated without introducing additional state variables and makes estimation simpler. Since estimation starts with the first observation, no information will be lost.

Data used in this study are from tables of "Employed Persons by Marital Status" published by Bureau of Labor Statistics from 1967: I to 1994: IV. All numbers are seasonally adjusted and measured in thousand. Because seasonal events such as changes in weather and major holidays follow a more or less regular pattern each year, adjusting the statistics from period to period can eliminate their influences on trend. These adjustments make it easier to observe the cyclical and other non-seasonal movements in the employment of married women with spouse present.

Results Discussion

Preliminary data examination indicates the log version of number of married women with spouse present to be a nonstationary series and its first difference reaches stationality. Sample descriptions of first difference show that the series obeys a normal distribution and the sample autocorrelations suggest the difference series to be an AR(1) to AR(2) component with a white noise.[2]

The Markovian labor supply switching model (1)–(7) was estimated using 100 times the log-difference in quarterly employment data of married women with spouse present. Kim's (1994) estimation algorithm is adopted because it is fast and efficient for calculating smoothed inferences on the unobserved states. The empirical results are very encouraging in that all parameters are in their regular domains. The results suggest that the growth of employment of married women with spouse present have a random walk with Markov-switching intercepts and an AR(2) component. Table 1 reports the maximum likelihood estimates and likelihood value.

Table 1
Maximum Likelihood Estimates of State-Space Model

Parameter	Estimates	Std errors
P	0.9012	(0.0473)
Q	0.8203	(0.0809)
α_0	0.1603	(0.0652)
α_1	0.7554	(0.0821)
ψ_1	0.5518	(0.1307)
ψ_2	-0.0761	(0.0361)
x_0	-3.2784	(0.5984)
x_{-1}	19.7905	(16.0533)
σ	0.5682	(0.0467)
Likelihood value	-121.35	

The estimated Markov transition probabilities indicate that married women with spouse present are likely to stay in their previous employment status. There is an average 90% (p) chance that these women are still employed when the economy is in the fast-growth state and an average 82% (q) chance of staying in the labor market when the economy in a slow-growth state. Married women with spouse present are more likely to work in a fast-growing period than in the slow-growing period.

Empirical results indicate a continuous growth in married women's employment. Their employment growth rate is 0.16% per quarter during the slow-growing state and a bigger positive growth of ($\alpha_0+\alpha_1$) 0.92% per quarter in the fast-growing state. The growth rate in the fast-growing state is about 5 times bigger than that in the slow-growing state. Both positive growth rates of employment of married women with spouse present confirm the historical trends in their employment.

Due to the transformation of state-space representation of the Markovian switching model, there are two extra parameters to be estimated. The significant initial value for the autoregressive component (x_0) indicates that there is a long-term impact of initial employment, rather than past employment (x_{-1}), on future labor force participation.

Identify the Employment Cycle

There is a significant piece of evidence of existence of the employment cycles for married women with spouse present. Using the by-products of the maximization likelihood estimation of the switching model (1)-(5), it is possible to make inferences of fast-growth (or slow-growth) probabilities with current (or full) sample information. Furthermore, the cause of the effect of such business cycle changes on employment of married women with spouse present can be identified. With this information, policy-makers can examine the relationships between employment changes and the general economy. According to Hamilton (1989), a criterion for judging the incidents of fast-growing state in employment is, more likely than not, whether Prob[S_t= 1] > .5. When this criterion is met in a specific quarter, then employment in that quarter is in fast growth. Otherwise, employment is slow growing. The inferred probability of fast growth using full sample information is shown in Figure 1.

The cyclical movements of employment of married women with spouse present remarkably match the business cycles identified by NBER and others (Blanchard, 1993; Filardo, 1994; Ghysels, 1994; Hamilton, 1989), particularly in the timing of changing states. These transitions started in 1970: IV, 1974: VI, 1980: II, and 89:II. Such information suggests that married women suffer from the inverse impacts of general economy during two oil shocks and the quiet recession in 1990-1991. The impacts of the second oil shock and the quiet recession are more

severe and have persistent impacts on married women's employment than in the first oil shock. Table 2 lists the trough periods identified by both NBER and this study with current and full sample information.

Figure 1
Inferred Probabilities that Female Employment is in the Slow-growing State Based on Full Sample Information, 1967:II-1994:IV

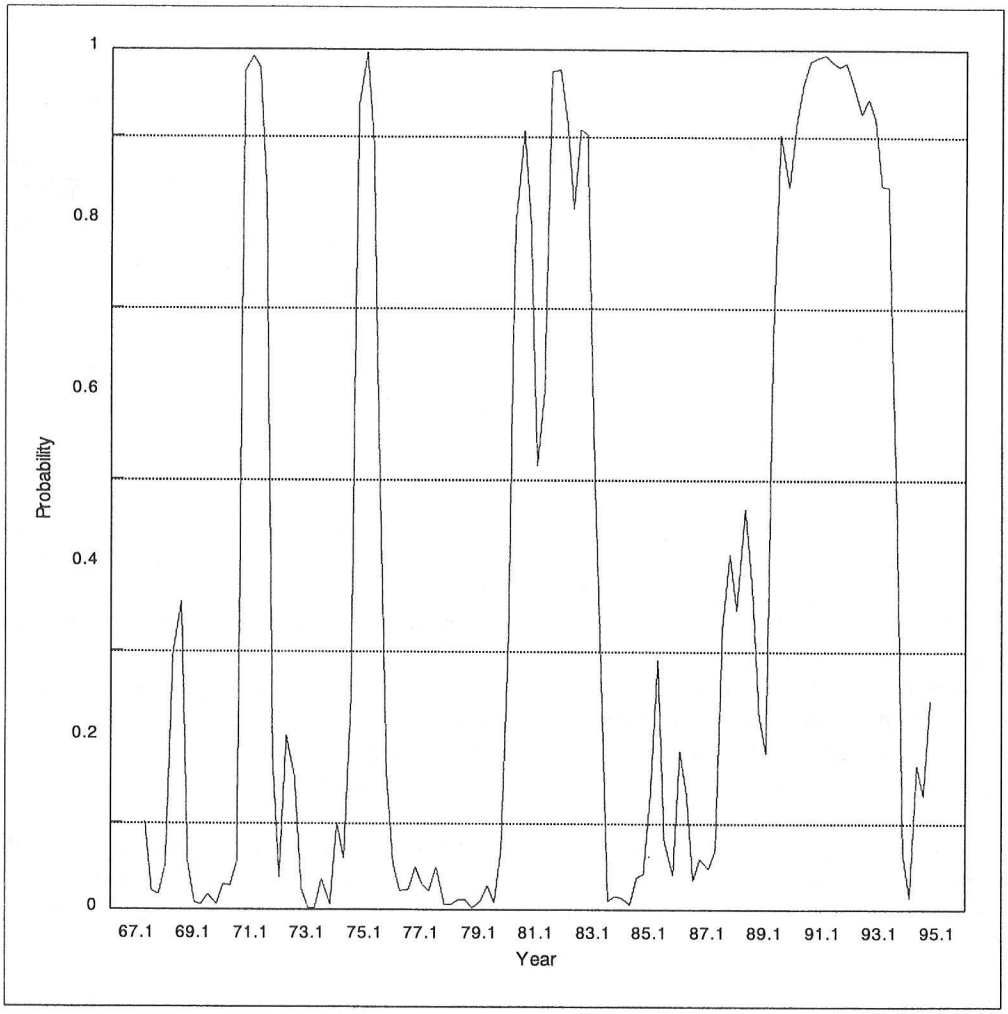

Table 2
Trough Periods and Duration Identified by NBER and this Study

NBER		This study			
		Full sample information		Current sample information	
Trough	Quarters	Trough	Quarters	Trough	Quarters
				68:III	1
70:IV	3.67	70:IV	4	70:IV	4
75:I	5.33	74:IV	3	74:IV	4
80:III	2	80:II	11	80:III	2
				81:III	3
82:IV	5.33			82:III	4
				85:II	1
				88:II	2
91:I	2.67	89:II	17	89:III	17

Conclusion

This study investigates whether married women with spouse present change their employment status as the general economy changes. This is fulfilled by modeling the employment pattern of married women with spouse present as a first order endogenous Markov-switching regime and estimated with non-stationary time-series analysis methods introduced by Hamilton (1989), Lam (1990), Kim (1994) and others. A state-space version of a first order Markov-switching model proposed by Kim (1994) is tested using quarterly employment data from 1967:I to1994: IV. This data set establishes not only the evidence of switching employment pattern for married women but also information of the periods of employment cycles.

The empirical results are encouraging and reveal important policy implications. The trend of employment of married women with spouse present is growing in the long run. But their employment will still suffer from general economic downturns, in spite of demand- or supply-side factors. Their previous employment status and sudden shocks will affect their employment. The employment cycles of these women considerably match postwar business cycles. Therefore, it is suggested that before general economic situation starts to decline, government and firms establish proper employment policies to ensure job availability for their female employees. Also, when unemployment rate begins to rise, government should consider boosting the demand for female labor to reduce negative impact on the employment of married women with spouse present.

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Endnotes

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[2] The AR(1) and AR(2) autoregression coefficients were used as the initial parameters and helped the maximum likelihood estimation converge. The AR(2) specification worked quite well.