IPRPD
International Journal of Arts, Humanities & Social Science
ISSN 2693-2547 (Print), 2693-2555 (Online)
Volume 02; Issue no 03: March 07, 2021

Dynamic Relationship between Income Inequality and Marriage in the U.S. with Vector Autoregressive Approach

Joo Young Lee [1], Youn Mi Lee[2]

[1] *Professor, Department of Accounting, Finance, and Economics, College of Business & Technology, The University of West Alabama, USA, E-mail: jlee@uwa.edu*

[2]*Associate Professor, Department of Psychology & Family Science, College of Arts & Sciences, Mississippi University for Women, USA, E-mail: ymlee@muw.edu*

Abstract

Marriage rate has been decreased continuously for past five decades in the U.S. (Ruggles et al. 2014). One of the most important factors to explain this downward trend is increasing income inequality at individual levels (Cherlin, 2014, Gould and Paserman, 2003, Burtless, 1999, Oppenheimer et al., 1997). Overall economic inequality including income inequality is also expected to affect marriage rate negatively. Based on economic decision models on marriage decision (Becker, 1973, 1974, 1977), this study investigates and verifies the negative relationship between economic inequality and marriage rate in the U.S with vector autoregressive model by analysing macroeconomic time-series data. Governmental efforts to ease economic inequality will help to reduce or even reverse declining trend in marriage rate.

Keywords: Income inequality, Marriage, Family policy, Vector autoregressive model

Introduction

Marriage rate has been decreased continuously for past 50 years in the U.S. (Ruggles et al. 2014). Various causes explain the steady decline of marriage rate. One of the most important factors to explain this downward trend is increasing income inequality. Marriage requires cost-benefit analysis with economic models on marriage decision (Becker,1973, 1974, 1977). While benefits of marriage have been reduced due to changes of cultural and sociological factors including increase of women's financial independence, marriage has been more expensive to afford due to increases of explicit and implicit costs of marriage and related decisions such as childbearing.

Literature Review

Several studies show that income inequality has a negative impact on marriage decision at individual levels. Marriage inequality, the difference of marriage rates between professional-class men and working-class men, tends to be widened due to income inequality (Cherlin, 2014). Gould and Paserman (2003) showed that marriage rate is negatively related to income inequality using city-level data in the U.S. They found out that about 30% of the marriage rate decline is due to male income inequality. Burtless (1999) discussed that income inequality between 1979 and 1996 contributed the changes of family composition in the U.S. by increasing single-adult families. Oppenheimer et al. (1997) showed that the marriage timing has been delayed during the period of rising income inequality, and eventually lower the marriage rate. Overall economic inequality has been increased since 1970 in the U.S. Negative relationship between economic inequality and marriage rate is also predicted, but few studies try to find the relationship between economic inequality and marriage rate.

Goal of Study

This study will show the relationship between marriage rate and economic inequality using systematic approaches with macroeconomic time-series data. Economic inequality can be measured in various ways including Gini index, census bureau income statistics, and internal revenue service data. The test hypothesis is that marriage rate is declining as economic inequality is increasing. To test the hypothesis, vector autoregressive (VAR) model will be

used. Vector autoregressive model allows flexible interactions between multiple variables in a systematic setting. It will find the short-run and long-run effects of economic inequality to marriage rate.

Research Methods

VAR has been widely used in various fields of finance and economics. A number of studies have utilized the vector autoregressive model in family studies. Bremmer and Kesselring (2004) constructed VAR models with divorce, female labor participation, birth rate, and female income to show causal relationship among those variables. Lee and Lee (2010) employed a VAR model to analyze the relationship between divorce and business cycle and showed that divorce rate is increasing during the time of recession. The VAR model in this study will be identified by long run restriction (Blanchard and Quah, 1989). The economic inequality measure and marriage rate are two key variables in this VAR model. Some macroeconomic and/or socioeconomic variables can be added to make the model accommodate more factors suggested by the previous studies. Each variable will be checked for the stability of the time series data with unit root test before it is used to estimate the VAR model.

Data Description

The annual marriage rate is calculated as the number of marriage per 1,000 population from the Center for Disease Control. Average number of person in household is used as secondary measure for marriage status. Income data is obtained from U.S. Census. Income inequality ratio as a measure of economic inequality is calculated as a ratio of average income for top 20% households and average income of bottom 20% households. The greater the ratio is, the greater the economic inequality is. Gini index is also used as an alternative of economic inequality. The greater the Gini index is, the greater the economic inequality. The sample range of the annual data will be 1980 to 2015.

Estimation Results

The first step of vector autoregression is to perform unit root test to check the stability of the time series variables in the model. To check the stationarity of the four variables in the model, augmented Dickey-Fuller test and Phillip-Perron test will be used among various tests for unit root process. With Dickey-Fuller and Phillip-Perron unit root tests, all variables in the first order difference are rejecting the null hypothesis of unit root with 1% significance level.

According to the unit root test results, all variables have unit root and nonstationary. They have the first order integrated as the first order difference of these variables show no sign of unit root. Without making first difference of these variables, vector auto regression model with these variables could result a spurious relationships. Since three variables have unit root process in their level, all variables are transformed into the first difference variable. Vector auto regression model is set up with the variables of first difference.

Variables		Augmented Dickey-Fuller		Phillip-Perron	
		Test Stat.	Probability	Test Stat.	Probability
Level	Marriage Rate	-0.9866	0.7469	-0.7825	0.8117
	Ave.# in House	-2.0288	0.2737	-2.0583	0.2619
	Inequality Ratio	-1.6686	0.4379	-2.3051	0.1760
	Gini Index	-1.9889	0.2901	-2.0416	0.2686
Difference	Marriage Rate	-8.8954	0.0000	-8.8694	0.0000
	Ave.# in House	-6.1104	0.0000	-6.1152	0.0000
	Inequality Ratio	-5.2925	0.0001	-5.8811	0.0000
	Gini Index	-6.1286	0.0000	-6.5018	0.0000

Table 1: Unit Root Test Results

*** All variables in first-order difference rejected the null with 1% significance level**

After testing unit root in the variables, lag length of the model should be determined. Three test statistics are often used to check the lag length of the vector auto regression model: Akaike information criterion, Schwartz information criterion, final prediction error, Hannan-Quinn information criterion, and the likelihood ratio test. The following table is the result of these five test statistics for lag length determination with vector auto regression model with female income for the first hypothesis and with earnings gap to test the second hypothesis.

Lag	Log Likelihood	Likelihood Ratio	Final Prediction	Akaiken Iformation	Schwartz Information	Hannan-Quinn
0	237.464	N/A	8.42e-12*	-14.1493*	-13.9679*	-14.0883*
1	252.3736	25.3013	9.08E-12	-14.0833	-13.1763	-13.7781
2	261.1061	12.7017	1.48E-11	-13.6428	-12.0102	-13.0935

Table 2: Lag Length Test Results of Vector Autoregression Model

*** indicates lag order selected by the criterion.**

Lag length test results with five different criteria in the model with earnings gap show that all criteria indicate the lag order of zero by the test statistics. Next step is to test co-integration of the system. The test shows that the existence of one co-integrating equation in the systems. Once the co-integration process is verified by the co-integration test, vector error correction model is used to estimate the model. Vector error correction model is to impose a long-run restriction. With this restriction, all variables can be estimated with vector auto regression model.

After estimating the vector auto regression model, the impulse response functions are estimated to show the dynamic relationship among the variables in the system. The first figure shows the impulse response of marriage rate to a unit positive exogenous shock of income inequality. The second figure has the impulse response of marriage rate to a unit positive exogenous shock of Gini index. As we estimate the models with first order difference, the shock is the rate of change for the variables. To see the effects on the level value of divorce rate, the impulse responses are accumulated.

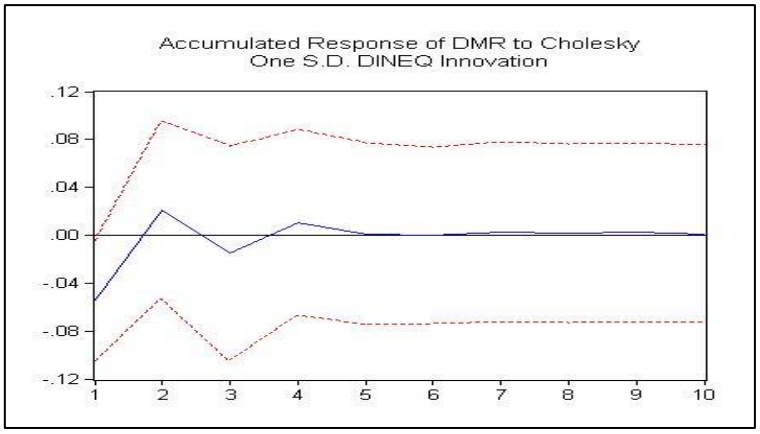

Figure 1: Impulse Response of Marriage Rate to Income Inequality Shock

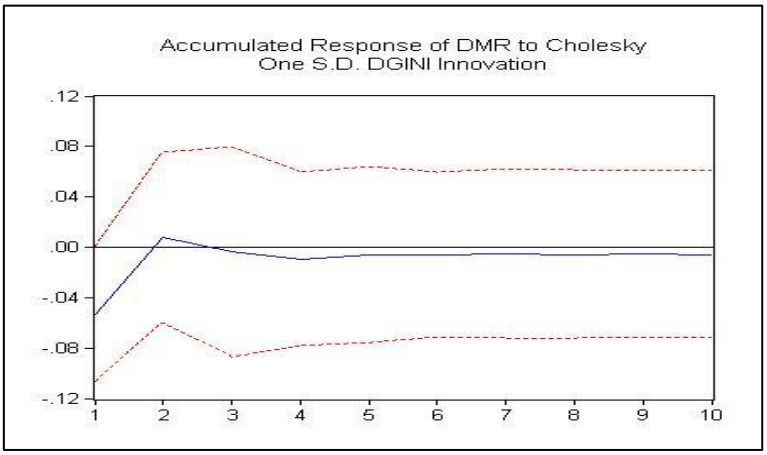

Figure 2: Impulse Response of Marriage Rate to Gini Index Shock

As shown in figure 1 and 2, both positive shocks of income inequality and Gini index decrease the marriage rate. The hypotheses in this study are accepted with the results from these two impulse response functions. Since both impulse response functions have negative values from the beginning, both income inequality and Gini index have instant impact on marriage rate decrease. Both gradually increase with long-term convergence at a stable level near zero percent.

Conclusion

The empirical result shows that the economic inequality will be negatively related to marriage rate for the short run. The negative long run effect of economic inequality on marriage will be diminished and stabilized as the VAR model has a long run restriction. Impulse response function analysis will be used to check the impact of economic inequality on marriage rate. While most previous studies are focusing on micro-level analysis, this study distinguishes itself for its macro-level analysis with VAR. Instant availability of the key data sources can make international comparisons among several countries easier. The further development, therefore, will be international comparisons and extension to other important demographic factors such as fertility and divorce. To extend this model, future study needs to include additional macroeconomic variables such as unemployment rate, money supply and government spending as indicators of government economic policy to the vector auto regression system.

Works Citation

Alam, S., Ahmed, M. H., & Butt, M. S. (2003). The dynamics of fertility, family planning and female education in Pakistan. Journal of Asian Economics, 14, 447-463.

Becker, G. S. (1973). A theory of marriage: Part I. Journal of Political Economy, 81(4), 813-846.

Becker, G. S. (1974). A theory of marriage: Part II. Journal of Political Economy, 82(2), S11-S26.

Becker, G. S., Landes, E. M., & Michael, R. T. (1977). An economic analysis of marital instability. Journal of Political Economy, 85(6), 1141-1187.

Blanchard, O. J., & Quah, D. (1989). The dynamic effects of aggregate demand and supply disturbances. American Economic Review, 79(4), 655-673.

Bremmer, D., & Kesselring, R. (2004). Divorce and female labor force participation: Evidence from times-series data and cointegration. Atlantic Economic Journal, 32(3), 175-190.

Burtless, G. (1999). Effects of Growing Wage Disparities and Changing Family Composition on the U.S. Income Distribution. Working Paper No. 4, Center on Social and Economic Dynamics.

Cherlin, A. (2014). Investigating the Link between Income Inequality and Marriage Rates. Russell Sage Foundation Review, March 2014.

CDC/National Center for Health Statistics (each year).

Gould, E. D., & Paserman, M. D. (2003). Waiting for Mr. Right: Rising Inequality and Declining Marriage Rates. Journal of Urban Economics, 53, 257-281.

Lee, J. Y., & Lee, Y. M. (2010). Dynamic Responses of Marital Instability to Economic Hardship. Review of Business Research, 10(4).

Oppenheimer, V. K., Kalmijn., M., & Lim, N. (1997). Men's Career Development and Marriage Timing During a Period of Rising Inequality. Demography, 34(3), 311-330.

Ruggles, S. (2014). Marriage, Family Systems, and Economic Opportunity in the United States Since 1850. Working Paper No. 2014-11, Minnesota Population Center, University of Minnesota. U.S. Census Bureau (each year).