Scientific Annals
of the "Alexandru Ioan Cuza" University of Iaşi
Economic Sciences
60 (2), 2013, 241-248
DOI 10.2478/aicue-2013-0029

EXAMINING EUROZONE CRISIS AND UNEMPLOYMENT RELATIONSHIP USING VAR MODELS

Dimitrios DAPONTAS
Technological Institute of Ionian Islands
Zakynthos, Greece
dapontas@uop.gr

Abstract

This work examines the relationship between the Eurozone crisis and unemployment. We deploy distributed lag model using two binary (Crisis and crisis in another country) along with three (Government spending to GDP, Labor freedom, and urbanization) variables working as a long term factors applied on a six countries set (Cyprus, Greece, Ireland, Italy, Portugal and Spain respectively) spanning the period January1995-May 2012 in order to explain the unemployment change using VAR models on monthly data in contrast to longer frequency analyses. This innovative approach is determining the optimal lag length between unemployment and crises determining the time between turbulence and its effect to unemployment. The results show that optimal lag varies among two and eight months. Two variables seem to have negative effect on unemployment (Government spending to GDP, labor freedom) and one positive (urbanization).

Keywords: unemployment, crisis, contagion, labor legislation.
JEL classification: E24, J68, E30, F41.

1. INTRODUCTION

The impact of financial shocks in the labor market is a subject that hasn't been examined extensively and it has been paid minor attention in the crisis literature. The existing studies have focused on emerging or developing economies leaving apart possible candidates from the developed world. The recent financial crisis in Eurozone following world credit crunch and its consequences to the real economy attracted interest due its new characteristics. Turbulences become more severe and faster. Existing annual frequencies analyses didn't explain the crises. World economic and political integration has increased the contagion between countries and the infection spread is now larger and the crises deeper. In the present work we present a VAR model correlating the existence of crisis in a country or its counterparts, the mix of occupation and regional policy and the labor legislation with the raise of unemployment.

2. PREVIOUS WORKS

Financial crises raise unemployment and presented through output and investment decline, uncertainty raises and risk premia get higher. Initially, an early work in the field

(Pindyck, 1991) difficulties on measuring the effect of possible crisis to the economy was presented. Macroeconomic policy rules can emphasize on economy stimulation in order to smooth negative unemployment effects. This work was followed by (Pindyck and Solimano,1993) where unemployment seem to be unimportant effect on uncertainty compared to the inflation effect. Later authors (Blanckard and Wolfers,2000) connected the European unemployment rise with the economic shocks. Countries with poorer labor market institutions have larger effects on unemployment. They also concluded that the different labor market institutions have asymmetric effects on unemployment. Labor demand shifts prove favorite to employment. More favorite macroeconomic environment leads to decline in unemployment.

On his work for Asian crisis (Kittiprapas, 2002) included consequences in Thailand, connected the credit crunch and the demand output to the falling demand of labor and unemployment raise quadrupled in the aftermath of the crisis. The migration to the country side was an immediate effect in the following year. Argentinian crisis inspired latter authors (Perry and Sevren L. 2003), connecting the Tequila crisis with an increasing trend to the Argentinian unemployment. Insufficient government expenditures and inappropriate legal framework have also been blamed for high unemployment (Stockhammer, 2006).

Later (Reinhart and Rogoff. 2009), proved that the banking crises in the lower phase of the cycle which lasts in a business cycle for four years had an average decline of 7 per cent. Natural rate of unemployment seems to be important but monetary policy measures seem to be insignificant for long–run unemployment (Ball 2009, Verick 2009) mentioned that unemployment continues to raise after the recovery. Also (Hall 2010) concludes that workers don't benefit the bargain wages during crises. This was explained by the continuing reluctance to buy durables and houses. Crises impact on general and long-term on youth unemployment was analyzed in the most recent work on the field (Bernal-Verdugo, Furceri and Guillaume. 2012) using a novel panel data concluded that flexibility of labor market is the most important factor. Its effect seems sharper in countries with more flexible labor markets but also short lived.

3. METHODOLOGY, VARIABLES AND RESULTS

The dynamic impact of financial crises to unemployment was proposed by earlier works (Jorda. 2005 and Bernal-Verdugo, Furceri and Guillaume. 2012) using an autoregressive model on annual frequency with one year lag an initial level of unemployment and adding as exogenous variables the annual change of urban population, government spending as percentage of GDP and the existence or not of crisis with a dummy binary variable. A VAR model can find the optimal lag between crisis occurrence and unemployment raise.

The VAR model is suitable for analyzing the dynamic impact of random disturbances on the system variables. This approach sidesteps the need for structural modelling by treating every endogenous variable as a lagged value function of all endogenous variables in the system. The model is presented as follows:

$$y_t = A_1 y_{t-1} + \cdots + A_n Y_n + B_1 X_1 + e_t \qquad (1)$$

Where y_t is a *k* vector of endogenous variable, x_i is a *d* vector of exogenous variables, *A* and *B* are matrices of coefficients to be estimated and e_t is an innovative vector uncorrected for both all values. Simultaneity doesn't exist on the model because the lagged variables appear in the right side of the equation and OLS yields consistent estimates. OLS is efficient and equivalent to GLS since all equations have identical regressors.

The recent financial credit crunch show that a year time for the turbulence seems to be a very long time when phenomenon has been under contagion channels infected other countries. In the crisis literature developments (Dapontas. 2010) show that two months is an average time of incoming turbulence. Thus we have to limit the frequency to monthly as suggested.

The variables used in the analysis are chosen in light of theoretical considerations and empirical determinants of crises. Also previous works framework as analyzed in the second sector has considered.

The unemployment rate is a measure of the prevalence of unemployment and it is calculated as a percentage by dividing the number of unemployed individuals by all individuals currently in the labor force.

The exogenousvariables used in the analysis are chosen in light of theoretical considerations and empirical determinants of crises. Also previous works framework as analyzed in the second sector has considered. Some of them have been seasonally adjusted according to similar literature (Liargovas P. and Dapontas D. 2008).The variables used are the described as follows:

Crisis: The empirical literature provides little guidance as regards a generally accepted definition of "currency crisis". The majority of the studies refer to devaluation as large, unique and infrequent or a set of small and repeated incidents. Others use the weighted average of monthly depreciation compared to depreciation of the previous year. After considering many definitions [(Chionis and Liargovas. 2003)] define as a "currency crash" the nominal depreciation of the monthly average exchange rate of national currency against USD of at least 10%, no matter if this comes as result of a speculative attack or not. Pressure indexes concluding official rate, interest rates and reserves are also used.

Crisis elsewhere: It is a categorical binary variable which denotes the presence of a crisis in other country (1) or not (0). The so-called crisis elsewhere or, in chaos theory, "butterfly effect", has a significant role in an external currency crisis development. If a country has economic relations with a country hit by turbulence, it is possible that the country itself will be affected. Crises in countries having trading relationship with the referred country are denoted as important. This occurs both because of economic contagion between the two countries but also because of speculators' behavior. If a major trading partner of a regional economy collapses then the other partners will collapse with a time lag of one or two months. In the rubble crisis of 1998, the rubble collapse was followed by a delayed collapse in other countries of the former Soviet Union. When a speculator decides to attack he will hit multiple markets in the same region at the same time as it happened in the Asian crisis of 1997. Thus we expect positive effect.

Government spending as percentage of GDP: The cost of excessive government is a central issue both in terms of generating revenue (see fiscal freedom) and in terms of spending. Some government spending, such as providing infrastructure or funding research or even improvements in human capital, may be thought of as investments. There are public goods, the benefits of which accrue broadly to society in ways that markets cannot appropriately price. All government spending that must eventually be financed by higher

taxation, however, entails an opportunity cost equal to the value of the private consumption or investment that would have occurred had the resources involved been left in the private sector. In other words, excessive government spending runs a great risk of crowding out private economic activity. Even if an economy achieves fast growth through heavy government expenditure, such economic expansion tends to be only short-lived, distorting allocation of resources and private investment incentives. Even worse, a government's insulation from market discipline often leads to bureaucracy, lower productivity, inefficiency, and mounting debt that imposes an even greater burden on future generations. Raising funds promote employment growth. We expect thus a negative sign.

Labour freedom: The ability of individuals or businesses to contract freely for labor and dismiss redundant workers when they are no longer needed is a vital mechanism for enhancing productivity and sustaining overall economic growth. The core principle of any market is free, voluntary exchange. That is as true in the labor market as it is in the market for goods. State intervention generates the same problems in the labor market that it produces in any other market. Government regulations take a variety of forms, including wage controls, hiring and firing restrictions, and other restrictions. In many countries, unions play an important role in regulating labor freedom and, depending on the nature of their activity, may be either a force for greater freedom or an impediment to the efficient functioning of labor markets. In general, the greater the degree of labor freedom, the lower the rate of unemployment in an economy.

Urbanization: This entry provides two measures of the degree of urbanization of a population. The first, urban population, describes the percentage of the total population living in urban areas, as defined by the country. The second, rate of urbanization, describes the projected average rate of change of the size of the urban population over the given period of time. An urban agglomeration is defined as comprising the city or town proper and also the suburban fringe or thickly settled territory lying outside of, but adjacent to, the boundaries of the city. Generally it refers to towns and cities over than 2,000 population. In large urban areas unemployment is higher due to the internal immigration of young and well educated people from less developed rural areas where unemployment is already high (open unemployment). Labor market structures enhance unemployment within the urban area through "disguised" workers unemployment referring to people who won't search for a new occupation actively although they would like to find one. The higher urbanization leads to higher unemployment, thus we expect a positive sign.

The sample consists of six countries hit severe by Eurozone debt crisis (Cyprus, Greece, Ireland, Italy, Spain and Portugal respectively) for seventeen years (1995-2012). Data is provided by Eurostat (Unemployment rates), IMF statistics (government spending as percentage of GDP), Heritage foundation (Labor freedom) and United Nations World Organization Projects (Urban population as percentage of total population). Thus my model objective function based on (1) lays as follows:

$$\boldsymbol{Unemp_t = A_1 Unemp_{t-1} + \cdots + A_n Unemp_n + B_1 Crisis_t + B_2 Crisis\_E_t + B_3 \left(\frac{G}{GDP}\right)_t + B_4 Labor\_fr_t + B_{45} Urban_t + e_t} \quad \textbf{(2)}$$

Where $\boldsymbol{Crisis_t}$ denotes the presence of crisis in the examined country for the present month and $\boldsymbol{Crisis\_E_t}$ in another country as proposed. $\boldsymbol{Labor\_fr_t}$ is the labor freedom and $\boldsymbol{Urban_t}$ is the level of Urbanization To specify the VAR of unemployment ($\boldsymbol{Unemp_t}$) initially WE have to determine the maximum lags. Due to monthly frequency the maximum lags should be equal to 12. The final number of lags is determined by a set of several information criteria consisting of:

- Sequential modified LR testing (LR)
- Final Prediction Error(FPE)
- Akaike Information Criterion(AIC)
- Schwartz Information Criterion(SC)
- Hannan- Quinn information Criterion (HQ)

The lags are determined by the maximum number of criteria fullfiled. The results are shown on the following table:

Table no. 1 Lag selection criteria

Country	lag length	Number of fullfiled criteria
Cyprus	2	3
Greece	7	3
Ireland	8	3
Italy	3	2
Spain	5	4
Portugal	7	4

The results show that optimal lag varies from two months (Cyprus) to eight (Ireland). We have chosen 3 months lag for Italy as earlier works (Khim and Liew. 2004) suggest using as major criteria AIC and FPE compared to other three. Thus a general model is not suitable for explaining the relationship between crisis and unemployment. The results after the optimal lag analysis is given to the table no. 2 presenting value and standard error (in parentheses).

The first lag in any case is positive and important. The effects of the unemployment seem to be clear a month before the crisis. Surprisingly in the second lag in two cases and in the third in four the sign seems to be negative. This can be explained by possible employment policy applied to defend unemployment. The measures seem to work against frictional unemployment but the cyclical and persistent structural unemployment seem to raise when economy is coming closer to a turbulence.

The exogenous variables results show that the existence of crisis in a country has raised unemployment and was statistically significant with the expected positive sign in 3 cases (Greece, Ireland and Portugal respectively). Crisis in other countries was statistically important in the case of Portugal only leading to the conclusion that the raise of unemployment in this country has both internal and external causes lying to the European debt crisis. The ratio of government spending to GDP was significant and with the expected sign in 3 cases (Cyprus, Greece and Portugal). The negative sign indicates that the unemployment falls when the government raises its spending and G/GDP ratio raises. Labor freedom is important and negative in four cases. The increase of liberation in the labor market seems to have negative effect on unemployment. When the legal framework looses more and more people find jobs. Finally, the urbanization is statistically significant and positive in 3 cases. A possible raise of unemployment can be explained of the presence of a

great number of available workers in urban areas where the positions are limited in contrast to the rural ones.

Table no. 2 VAR analysis results

Variable/ Country	Cyprus	Greece	Ireland	Italy	Portugal	Spain
Unemp(-1)	1.1994 (0.093)	0.9095 (0.0749)	1.5205 (0.0071)	0.7609 (0.0744)	1.4982 (0.0739)	1.3333 (0.0925)
Unemp(-2)	-0.1904 (0.099)	0.1057 (0.1026)	-0.3711 (0.1334)	0.2246 (0.0935)	-0.1457 (0.1328)	0.0591 (0.1621)
Unemp(-3)		-0.0132 (0.1024)	-0.3553 (0.1356)	-0.2062 (0.0949)	-0.2891 (0.1353)	-0.633 (0.2019)
Unemp(-4)		0.1167 (0.1018)	0.25287 (0.1381)		0.0957 (0.1393)	0.4228 (0.2066)
Unemp(-5)		-0.1483 (0.1021)	-0.0682 (0.1389)		0.2174 (0.1405)	-0.1854 (0.1112)
Unemp(-6)		0.1039 (0.1028)	0.1522 (0.1389)		0.0244 (0.1381)	
Unemp(-7)		-0.1712 (0.0751)	0.01392 (0.13398)		-0.1595 (0.0075)	
Unemp(-8)			-0.1508 (0.0725)			
Constant	-18.278 (5.347)	69.351 (25.083)	0.1087 (0.0347)	13.042 (14.133)	-2.8324 (2.9117)	-7.8885 (6.7258)
Crisis	0.1505 (0.0991)	0.2664 (0.0823)	0.1768 (0.0347)	-0.0303 (0.0464)	0.0014 (0.0324)	0.0263 (0.0474)
Crisis_E	-0.0451 (0.0526)	0.0068 (0.0365)	0.0141 (0.0219)	-0.0067 (0.0255)	0.0311 (0.0215)	0.1465 (0.0516)
G/GDP	-0.0113 (0.0492)	-0.0243 (0.009)	-0.0012 (0.0032)	0.0006 (0.0051)	0.0071 (0.0088)	-0.0058 (0.0049)
Labor Freed.	-0.0210 (0.0072)	0.0034 (0.0103)	0.1773 (0.0573)	-0.0156 (0.004)	-0.0242 (0.0008)	-0.0157 (0.0123)
Urban	0.2326 (0.7029)	1.0426 (0.3792)	0.0002 (0.0246)	-0.1712 (0.1991)	0.0628 (0.0438)	0.0966 (0.0873)
R^2	0.9882 (0.1731)	0.9767 (0.1837)	0.9999 (0.1189)	0.9941 (0.1316)	0.9981 (0.1178)	0.9991 (0.1582)

4. CONCLUSIONS

The nature and the cumulative effect of unemployment seem to be important and it can be explain the unemployment level and related positive in the following month. The two month lag seems to be important in three cases of Ireland and Portugal to have negative sign and the case of Italy positive. Although unemployment in Ireland seems to be explained by crisis in the country and autoregressive factors Greece seems also influenced by high Urbanization andGovernment underfunding. Portugal is influenced by lack of liberation on labor legislation framework. Finally Spain seems to be influenced by all exogenous factors. When employing policy implies frictional unemployment seems to decline temporary. The

rate usually raises again due to cyclical and structural effects. As the results show in a country facing crisis the unemployment raises. Cyprus, Italy and Portugal seem to be the exceptions of this conclusion Turbulences hit other countries as presented on crisis elsewhere variable didn't have significant role in unemployment raise in all cases except Spain. External factors led the country's unemployment to raise and national crisis didn't effect.

When the government spending ratio to GDP raises unemployment falls. The same effect has a possible raise of labor freedom. When the market is liberated the unemployment falls. Finally, the urban population percentage raise seems to have positive influence on unemployment raise. These three factors importance gives to the policy makers possible lessons on the fighting against unemployment. If the governments raise their spending, loose the labor market legal framework and motivate through development channel possible workers return to the countryside unemployment can be reduced. The choice though remains to the politicians and their choice criteria which could enhance the current analysis.

References

Bakare A.S. 2011, "The determinants of urban unemployment crisis in Nigeria: An econometric analysis", *Journal of emerging trends in economics and management sciences,* vol. 2-2011, 184-192.

Ball L. 2009, "Hysteresis and unemployment: Old and new evidence", NBER working paper series, Working paper 14818.

Blanckard O. and Wolfers J. 2000, "The role of shocks and institutions in the rise of European unemployment: The aggregate evidence", *the economic journal*, No. 462 Vol. 110,1-22.

Bernal-Verdugo L., Furceri D. and Guillaume D. 2012, "Crises, Labor Market Policy and unemployment", WP 12/65, IMF working paper.

Chionis D. and Liargovas P. 2003 "currency crises in transition economies: An empirical analysis", Akademai kiado, Budapest.

Dapontas D. 2009 "Currency crises the case of Hungary 2008", 3rd SEE, 19-21 November 2009, Bank of Greece, Athens.

Dapontas D. 2010 "Currency crises emphasized on central and eastern European countries", PhD Thesis in Greek, University of Peloponnese, Tripolis.

Dapontas D. 2011 "Currency crises the case of Hungary 2008 using two stage least squares", *Bank of Greece special conference papers,* Bank of Greece, Athens.

Dapontas D. 2013 "Explaining the Hungarian crisis 2008-2009 using feasible generalized least squares". *International review of applied financial issues and economics,* vol.3-2012.

Gujarati D. 2004. "Basic Econometrics", 4th edition, McGraw- Hill.

Hall R.2010, "Why Does the Economy Fall to Pieces after a Financial Crisis?" *Journal of Economic Perspectives,* vol.24, No.4, 3–20.

Jorda O. 2005, "Estimation and Inference of Impulse Responses by local projectors", *American economic review,* No.1 vol. 95, 3-20.

Khim V. and Liew S. 2004, "Which Lag Length Selection Criteria Should We Employ?" *Economics Bulletin*, Vol. 3, No. 33, 1−9.

Kittiprapas S. 2002, "Social Impacts of Financial and Economic Crisis in Thailand*", EADN Regional Project on the Social Impact of the Asian Financial Crisis.*

Liargovas P. and Dapontas D. 2008 "Currency crises in transition economies some further evidence" Journal of economic issues, volume XLII, Number 4, 1083-1100

Perry G. and Sevren L. 2003, "The anatomy of a multiple crisis: why Argentina was special and what we can learn from it", World Bank Policy Research Working Paper 3081.

Pindyck R. 1991, “Irreversibility, uncertainty and investment”, *Macroeconomic adjustment and growth*, World Bank, 1-58.

Pindyck R. and Solimano A., 1993 “Economic instability and aggregate investment”, NBER Macroeconomic annual, vol. 8 259-318.

Reinhart C. and Rogoff K., 2009. “The aftermath of financial crises”, NBER Working Paper No. 14656.

Stockhammer E. 2006, “Explaining European Unemployment: Testing the NAIRU Hypothesis and a Keynesian Approach”, *International Review of Applied Economics*, Vol. 18, No. 1, 3–23.

Verick S. 2009, “Who Is Hit Hardest during a Financial Crisis? The Vulnerability of Young Men and Women to Unemployment in an Economic Downturn”, IZA DP No. 4359.

Teulings C. and Zubanov N. 2011 "Is Economic Recovery a Myth? Robust Estimation of Impulse Responses”, CESifo Working Paper Series 3027, CESifo Group Munich.