CAUSAL NEXUS BETWEENENTREPRENEURSHIP ANDUNEMPLOYMENT RATE: THE CASE OF SISTAN AND BALUCHESTAN PROVINCE

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Abstract

Decreasing unemployment rate is one of the most striking objects for economic planners and decision makers; and achieves to this, will lead to solve a lot of economic and social problems. Among the many factors that affect unemployment rates, entrepreneurship has been an interesting topic for researchers for quite some time. The relationship between entrepreneurship and unemployment has posed a complex puzzle to scholars. One view, which has been called the unemployment push, or refugee effect, suggests that the decision to become an entrepreneur is a response to either being unemployed or else the perception of dismal future employment prospects. An alternative view suggests that entrepreneurship, by virtue of creating a new venture, contributes to the reduction of unemployment. While the first view suggests a positive relationship between entrepreneurship and unemployment, the second view suggests a negative relation between them. The present paper examines the relationship between entrepreneurship, and unemployment in Sistan&Baluchestan Province with using Toda-Yamamoto approach in the period from 1998 to 2010. The results indicate that, Schumpeter effect for Province studied is established as a definite (impact of entrepreneurship rate on unemployment rate), but refugee effect (impact of unemployment rate on entrepreneurship rate) Cannot be confirmed. The evidence generally supports the existence of a uni-directional causality that runs from entrepreneurship to unemployment rate for the case of Sistan&Baluchestan.

Keywords: Unemployment Rate, Entrepreneurship, Toda-Yamamoto approach.

JEL Classification: E24, L26, O17

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1. Introduction

The relationship between unemployment and entrepreneurship has received increased attention of researchers and policy makers. The investigate relationship between entrepreneurship and unemployment (Carlsson, 1992; AcsirAudretsch, 1993) began to study back in 1970 – 1980 years. In this decade, Technological changes, globalisation, knowledge economy, deregulation, changes in labour supply, variety of demand, market fragmentation and instability of economy determined changes in industry structure in many countries which caused the importance of small and medium sized businesses grow. On the other hand, the factors influenced the level of unemployment in one or the other way. In many studies, Entrepreneurship has been suggested as a remedy against high unemployment and stagnant economic growth (European Commission, 2003; Carree&Thurik, 2003; Thurik et al, 2008; Van Stel&Thurik&Verheul&Baljeu, 2007).

Despite the Scientific literature broadly analyse and stress the existing interrelationship between entrepreneurship and unemployment, however, there is no accord what is the interaction of these phenomena and how, i.e. in what methods or ways, it can be determined. The authors (Audretsch, Thurik, Carree, 2001; Stel, Thurik, Verheul, Baljeu, 2007; Baptista, Thurik, 2007 and others) analyse if there is an interaction between entrepreneurship and unemployment in framework effects of "Schumpeter" and "Refugee". When unemployed entrepreneurship has a refugee effect by which more people are pushed towards business ownership. We are basing our contribution on the Schumpeter effect by which the increase in the rate of entrepreneurship (business ownership) leads to greater levels of employment and economic growth (Baptista&Thurik, 2007: 76).

The geopolitical and geo-economic position of the Sistan&Baluchestan province has converted the atmosphere of the province into one of the most important hubs of national body in the country. In addition, the specific geographical position of the province from the viewpoint of access to international free water outside Straits of Hormoz and its outstanding location position from the viewpoint of transit of commodities to the bordering countries and the Central Asian countries have given special advantage to the province. But despite this advantages Many reports of statistical center of Iran have shown that unemployment rate in sistan&baluchestan is larger extent than other province. It is major reason that why In this paper we investigate the Causality relationship between entrepreneurship (business ownership) and unemployment rates for Sistan&Balucuestan Province on the period 1998 - 2010. Based on the theoretical platform our hypothesis is that the unemployment rate and the entrepreneurship rate are reversely correlated.

The structure of the contribution is based on seven parts where the introduction is followed by the theoretical background of unemployment and entrepreneurship. After that comes the description of the methodology used for the contribution followed by the presentation of our research and the discussion referring to the results of our study. There after comes the conclusion and the list of references used.

2. Relationship between entrepreneurship and unemployment

The relationship between unemployment and entrepreneurship has been shrouded with ambiguity. There are many views on the relationship between unemployment and entrepreneurial activity (Audretsh&Carree& Van Stel&Thurik, 2005; Baptista& Van Stel& Thurik,2006). Scholars distinguish two relationships between unemployment and entrepreneurship: First is a “refugee” effect or "shopkeeper" by which unemployment “pushes” more people towards business ownership (Blau, 1987; Evans & Leighton, 1990; Evans &Jovanovic, 1989; Blanchflower& Meyer, 1994) suggests that increased unemployment will lead to an increase in startup activity on the grounds that the opportunity cost of not starting a firm has decreased. This remarkable view dates back at least to Oxenfeldt (1943), who pointed out that individuals confronted with unemployment and low prospects for wage employment often turn to self-employment as a viable alternative. This observation was also an extension of Knight’s view that individuals make a decision among three states – unemployment, selfemployment and employment. However, the unemployed people tend to possess lower endowments of human and social capital and entrepreneurial talent required to start and sustain a new firm which may lead to early exit (Thurik,2007; Lucas, 1978; Jovanovic, 1982; Baptista& Van Stel& Thurik,2006) .High unemployment may also imply lower levels of personal wealth reducing the likelihood of becoming self-employed or the survival in the initial stages of business ownership (Hurst &Lusardi, 2004; Van Stel&Thurik&Verheul&Baljeu, 2007).High levels of unemployment may correlate with low economic growth leading to a low number of entrepreneurial opportunities (Audretsch&Thurik&Verheul& Wennekers,2002; Baptista& Van Stel&Thurik, 2006). A low rate of entrepreneurship may also be a consequence of the low economic growth levels, which also reflect higher levels of unemployment (Audretsch, 1995; Audretsch&Carree&Thurik, 2001). While some studies find that greater unemployment serves as a catalyst for startup activity (Reynolds & Miller & Makai, 1995; Reynolds &Storey&Westhead, 1994; Hamilton, 1989; Highfield& Smiley, 1987; Yamawaki, 1990; Evans & Leighton, 1989 &1990), but much of studies have found that unemployment reduces the amount of entrepreneurial activity (Audretsch& Fritsch, 1994; Audretsch, 1995; Audretsch&Carree&Thurik, 2001).

and second is a "Schumpeter" effect by which increasing rates entrepreneurship (business ownership) lead to greater levels of employment and economic growth (Thurik, Carree, Stel, Audretsch, 2008:682). The positive effect of entrepreneurship on economic performance has been referred to as the "Schumpeter" effect (Van Stel&Thurik&Verheul&Baljeu, 2007). New-firm startups hire employees, resulting in subsequent decreases in unemployment (Picot et al, 1998; Pfeiffer &Reize, 2000a; Audretsch&Carree&Thurik, 2001). On the other hand, why should an increased amount of entrepreneurial activity impact unemployment? One approach to address this question can be inferred from the literature on Gibrat's Law. Gibrat's Law asserts that firm growth is independent of size. Sutton (1997, p. 43) interprets "Gibrat's Legacy", as "The probability that the next opportunity taken up by any particular active firm is proportional to the current size of the firm." An important implication of Gibrat's Law is that shifting employment from large to small enterprises should have no impact on total employment, since the expected growth rates of both types of firms are identical. Thus, a restructuring of the economy away from large enterprises and towards small ones should have no impact on the unemployment rate.

In analysed literature, other concepts to describe unemployment/entrepreneurship relationships can be found: "recession-push or unemployment-push" and "prosperity-pull" effects (Parker, 2004; Johansson, 2000; Muehlberger, 2007). Other authors (Cowling, Bygrave, 2003) person's decision to start own business in order to get rid of unemployment status bases on the microeconomic theory of labour supply and of consumer choice theory, implying that individuals actively participate in the labour market, if: 1) the more benefit will gain from the work (such as income, employment status), compared with the benefits obtained from the leisure, 2) the lower income will get from the sources of unemployment; 3) the lower the income from their employment.

The ambiguities found in the empirical evidence reflect these two conflicting forces. For example, The simple theory of income choice lends credence to refugee effect by suggesting that increased unemployment will lead to an increase in startup business activity on the grounds that the opportunity cost of not starting a firm has decreased (Evans and Leighton, 1990; and Blanchflower and Meyer, 1994). Similarly, Picot et al. (1998) and Pfeiffer and Reize (2000) observe that new firms hire the needed employees to work for them, thus helping to reduce the level of unemployment in the society. Evans and Leighton (1990) found that unemployment is positively associated with greater propensity to start a new firm. Many other studies establish that greater unemployment serves as a catalyst for startup activity (Reynolds, Miller and Makai, 1995; Reynolds, Storey and Westhead, 1994).

Evans and Leighton (1990) found that unemployment is positively associated with a greater propensity to start a new firm, Garofoli (1994) and Audretsch and Fritsch (1994) in their separate studies found that unemployment is negatively related to new-firm startups, that is, as new businesses are established employability is stimulated and unemployment reduces substantially, and Carree (2001) found that no statistically significant relationship exists. Audretsch&Thurik (2000); show that an increase in the number of business owners reduces the level of unemployment. They identify a ―Schumpeter effect in terms of the positive impact on employment resulting from the entry of new firms (Audretsch&Carree&Thurik, 2001). Thurik et al. (2007) examine the relationship between entrepreneurship and unemployment in Japan .They find that, although Japan‘s unemployment rate has been influenced by specific exogenous shocks, the effects of entrepreneurship on unemployment are not different when compared to other OECD countries. They find that entrepreneurship significantly lowers unemployment but that it takes a lag of four yearly data (VanStel&Thurik&Verheul&Baljeu, 2007). VanStel&Baptista&Thurik, (2006), examine the relationship between entrepreneurship and unemployment, as measured by the variation in business ownership rates, and unemployment in Portugal. It concludes that Portugal has been a relative outlier in regard to the effects of entrepreneurship on unemployment when compared whit the OECD average. They found that the industrial restructuring effects brought about by increases in business ownership rates probably do not have a significant impact on the reduction of unemployment.

Thurik (2003), the influence of industrial structure, more specifically of entrepreneurship, is investigated on the level of unemployment in the UK. It will be concluded that the UK is a relative outlier when using a simple model of the relationship between unemployment and the rate of business ownership. The model is calibrated using recent data of some 23 OECD countries. It underestimates the decrease in unemployment in the UK in the period 1982-1990. Thus, while there are not just theoretical reasons, but also empirical support as well, that while unemployment leads to increased entrepreneurial activity, entrepreneurship leads to reduced unemployment. Unraveling the relationship between entrepreneurship and unemployment is crucial, because policy is frequently on assumptions that do not reflect this ambiguity (Baptista&Thurik& Van Stel, 2006).

There is also a counterargument. Baptista and Thurik (2007: 78) also noted that the low rates of survival combined with the limited growth of the majority of small firms imply that the employment contribution of start-ups is limited at best, which would argue against entrepreneurial activities reducing unemployment. According to Audretsch and Keilbach (2007: 351) and their study made in Germany low-tech entrepreneurship capital is rather increased by regional unemployment and driven by direct incentives such as subsidies. Faria, Cuestas and Gil-Alana (2009: 2) also stress that on the one hand new firm startups hire workers, which may result in a fall of unemployment. On the other hand, high unemployment may lead to an increase in startup activity, since the opportunity cost of starting a new firm is lower for the unemployed. This suggests that both variables impact each other dynamically.

3. Toda-Yamamoto Augmented Granger Causality Approach

Various tests are present to check the causality among variables *i.e.* Granger (1969), Engle & Granger (1987) and Johansen &Jesulious (1990). These tests are not free from errors like they require stationarity requirements, selection of maximum lag length and they are very sensitive to model specification. It is necessary to pretest the unit root and cointegration while applying these tests. To overcome these problems, the present study applies a more robust causality technique given by Toda Yamamoto (1995) and it is further explained by Rambaldi& Doran (1996) and Zapata &Rambaldi (1997).The Augmented Granger Causality Approach given by Toda Yamamoto (1995) is very simple to apply and it also follows asymptotic Chi-square distribution. The major advantage of above said approach is that, in this technique, it is not necessary to check the pre testing of the order of integration or cointegration properties among variables (Toda Yamamoto, 1995; Dolado&Lütkepohl, 1996; Giles &Mirza, 1999). Rambaldi& Doran (1996) have modified Wald test that is considered more efficient when Seemingly Unrelated Regression (SUR) Model is used in the estimation. One of the attractiveness of using SUR is that it takes care of possible simultaneity bias in the system of equations.

$$Y_t = \alpha_0 + \beta_{1i} \sum_{i=1}^{k} Y_{t-i} + \beta_{2j} \sum_{j=k+1}^{d_{max}} Y_{t-j} + \gamma_{1i} \sum_{i=1}^{k} X_{t-i} + \gamma_{2j} \sum_{j=K+1}^{d_{max}} X_{t-j} + \varepsilon_{1t}$$

$$X_t = \alpha_1 + \lambda_{1i} \sum_{i=1}^{k} X_{t-i} + \lambda_{2j} \sum_{j=k+1}^{d_{max}} X_{t-j} + \delta_{1i} \sum_{i=1}^{k} Y_{t-i} + \delta_{2j} \sum_{j=K+1}^{d_{max}} Y_{t-j} + \varepsilon_{2t}$$

This test has an asymptotic chi-squared distribution with k degrees of freedom in the limit when a VAR[k+dmax] is estimated (where dmax is the maximal order of integration for the series in the system). Two steps are involved with implementing the procedure. The first step includes determination of the lag length (k) and the maximum order of integration (dmax) of the variables in the system. Measures such the Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Final Prediction Error (FPE) and Hannan-Quinn (HQ) Information Criterion can be used to determine the appropriate lag order of the VAR. , we use Akaike Information Criterion (AIC) and Schwarz Information Criterion (SC) to select the optimal lag to include in models. We use the Augmented Dickey-Fuller tests to determine the maximum order of integration. Given the VAR(k) selected, and the order of integration dmax is determined, a levels VAR can then be estimated with a total of p=[k+ dmax] lags. The second step is to apply standard Wald tests to the first k VAR coefficient matrix (but not all lagged coefficients) to conduct inference on Granger causality.Also ,Toda and Yamamoto cannot be used if the maximum number of unit-roots in the VAR is larger than the optimal lag-length. Thus, in some cases, it might not be possibleto conduct causality tests.

4. Dataand Econometric Methodology

This study aims to provide empirical evidence on the relationship between the Relationship between entrepreneurship and unemployment rate and give insights on the causality patterns.

Therefore, in this paper the Toda Yamamoto approach is used to check the causality between the entrepreneurship and unemployment. However before going to estimate the data it is necessary to check the unit root presence in the data and for that in this study the ADF test is used in order to know the order of integration of the series. Although,,to determine lag length of model , we employee Final prediction error (FPE), Akaikeinformation criterion (AIC) and Schwarz information criterion (SC). annual time series variables data which utilized in this paper are include the ratio of Number of Exploitation Permit to Number of Establish Permitas a proxy to entrepreneurship (Do) and unemployment rate(Un) compiled from various issues of the Statistical Yearbooks published by the Statistical Center of Iran. Time series data covering the 1998-2010 periods for Sistan&Baluchestan Province.

5. Findings and Discussion

Testing for order of integration:

Most of time series have unit root as many studies indicated including (Nelson and Polsser, 1982), and as proved by (Stock and Watson, 1988) and (Campbell and Perron, 1991) among others that most of the time series are non-stationary. The presence of a unit root in any time series means that the mean and variance are not independent of time. Conventional regression techniques based onnon stationary time series produce spurious regression and statistics may simply indicate only correlated trends rather than a true relationship (Granger and Newbold, 1974). One of the most widely used unit root test is the Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979, 1981). Our main reason for conducting unit root tests is to determine the extra lags to be added to the vector autoregressive (VAR) model for the Toda and Yamamoto test.Prior to testing for a causality relationship between the time series, it is necessary to establish whether they are integrated of the same order. To this end, the Augmented Dickey-Fuller (ADF) test was carried out on the time series in levels and differenced forms. If we accept the null hypothesis that a time series is non-stationary (has at least one unit root), we then re-apply the procedures after transforming the series into the first differenced forms. If the null hypothesis of non-stationarity (when the time series is expressed in the first differenced form) can be rejected, we then may establish that the time series is integrated of order one. The number of the lags included was determined using Akaike Information Criteria (AIC)

Table1.Augmented Dickey-Fuller Unit Root Test

Variable	With constant & trend	Without Constant & trend
do	-2/56	-0/95
Un	-2/17	-1/97
Δdo	-4/033*	-3/40*
ΔUn	-5/59*	-2/62*

Note : do is entrepreneurship and Un is unemployment, Δ is first difference operator (*), indicate the rejection of null hypotheses in a level of 5 % respectively.

Table 1 reports the results for testing the null hypothesis of unit root using ADF tests with constant and time trend variables as well as without constant and time trend variables were included in the regression. As shown in Table 1, ADF test statistics fail to reject the null of a unit root at five percent level of significance in the level of all variables. When a time-series is resulted to be non-stationary, the most common option is taking the first difference of the variable to attempt to have a stationary series. The first differences of Un and E are implemented in ADF test, accordingly. However, test statistics clearly indicate a rejection of the null for the first difference and thus entrepreneurship and unemployment are integrated of order one, at the 5% significance level are integrated of order one, I(1) .

After the ADF tests and having determined that $d_{max} = 1$, we then proceeded in estimating the lag structure of a system of VAR in levels and our results indicate that the optimal lag length based on AIC is 2, that is k = 2. Therefore, the estimated VAR model is using 3 lag as the optimum lag lengths. The results of the Granger no-causality and MWALD statistics are presented in Table 2.

Following the modelling approach described earlier ,In the first step we employee stationary test to find maximum integration number (d_{max}) of time series. To this end, we use Augmented Dickey-Fuller Unit Root Test According ADF test results the number of maximum integration number is one.

Then to determine lag length of VAR(k) , we employee Final prediction error (FPE), Akaike information criterion (AIC) and Schwarz information criterion (SC), lag selection criteria are used. The result of selecting optimal lag length of VAR is reported in Table 2. FPE, AIC and SC information criterion indicate that lag order of VAR (k) is one. According to lag length of VAR process, we employee modified Wald test for VAR(2) to get results of causality test between entrepreneurship and unemployment.

Table2: Lags under different criteria for VAR model

Lag	FPE	AIC	SC
0	0.7424	5.3765	5.4370
1	0.4443*	4.8264*	5.0080*
2	0.7780	5.2276	5.5301
3	1.1401	5.1377	5.5613

Notes:* indicates lag order selected by the criterion; FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion,

5.1.**Results of Toda Yamamoto Augmented Granger Causality Technique**

The present study applies Toda Yamamoto Augmented Granger Causality approach to examine the causal nexus among Entrepreneurshipto unemployment rate.

Table 3: Todo- Yamamoto Causality (modified Wald) test results

Null hypothesis	Lag(k)	k+dmax	MWald statistics	p-values	Decision
H_0: Un does not Granger cause do	1			0.88	
H_0: do does not Granger cause Un	1			0.07*	

*indicate rejection of the null at the 10% level

The empirical results of Granger Causality test based on Toda and Yamamoto (1995) methodology is estimated through MWALD test and reported in Table: 3. The estimates of MWALD test show that , there is strong evidence of causality running from Entrepreneurship to unemployment rate at the 10% level of significance. The results do not reveal causality from unemployment rate to Entrepreneurship. Therefore, we can conclude that there is a uni-directional of causality that runs from Entrepreneurshipto unemployment rate for the case of Sistan&Baluchestan Province. This Results indicates that unemployment rate can also be reduced Entrepreneurship.

6. Conclusions

Entrepreneurship promotion is usually recommended as a way to foster economic and employment growth and innovation. Arguments in favor of policies targeted to entrepreneurs as a way to reduce unemployment are commonly used, especially in economies with high unemployment rates, as the Sistan&Baluchestan case. However, it is quite difficult to identify entrepreneurs. Firstly, we need a definition of 'entrepreneur' but there is no commonly accepted definition. However, a second issue is how entrepreneurship can be measured in order to have data and information easily available to be considered. In this paper entrepreneurs are measured as the ratio of Number of Exploitation Permit to Number of Establish Permit.

The third issue is to have evidence about the relationship of entrepreneurship and unemployment rate and what is the interaction between entrepreneurship and unemployment. There are different theoretical viewpoints on the linkage between of entrepreneurship and unemployment. For example, Past studies indicated that this relationship as a dynamic. The Means that, increasing entrepreneurship rate reduce unemployment rate, so relationship is negative (Schumpeter effect). On the other hand, unemployment rate increased entrepreneurship rate (refugee effect).

The paper has investigated the relationship between unemployment rate and Entrepreneurship for the period 1998- 2010, using Toda-Yamamoto approach for Sistan&Baluchestan Province. We have applied time series econometric techniques such as; unit root analysis and Final prediction error (FPE), Akaike information criterion (AIC) and Schwarz information criterion (SC) for determine lag length of model.The result of our study shown that there is strong evidence of unidirectional causality running from Entrepreneurship to unemployment rate at the 10% level of significance.

References

1- Acs, Z. J. &Varga, A., (2005) *Entrepreneurship, agglomeration and technological change*, "Small Business Economics", Netherlands, Springer.

2- Audretsch, D.B., Carree, M.A., Van Stel, A.J., &Thurik, A.R. (2008). Does Self employment Reduce Unemployment? Journal of Business Venturing, forthcoming.

3- Audretsch, D.B., Carree, M.A., &Thurik,A.R.(2001). Does entrepreneurship reduce unemployment? Tinbergen Institute discussion paper T IOL-074/30.Erasmus University Rotterdam.

4- Baptista,R., Thurik, R., Van Stel, A.J.(2006). The relationship between entrepreneurship and unemployment in Portugal. Technological Forecasting & Social Change 74, 75–89.

5- Baptista, R. &Thurik, A. R., (2007) *The relationship between entrepreneurship and unemployment: Is Portugal an outlier?*, "Technological Forecasting & Social Change", Elsevier Inc.

6- Blanchflower, D. G., (2000) *Self-employment in OECD countries*, "Labor Economics", Netherlands, Elsevier.

7- Caree M. A., Stel A., Thurik R., Audretsch D. B. (2007). Does Self-Employment reduce Unemployment? Discussion Papers on Entrepreneurship, Growth and Public Policy, ISSN 1613-8333, 1-18.

8- Cowling, M. &Bygrave, W. D., (2002) *Entrepreneurship and Unemployment: Relationship between unemployment and entrepreneurship in 37 nations participating in the Global Entrepreneurship Monitor (GEM)*, URL: www.gemconsortium.org.

9- Earle, J. S. &Sakova, Z., (2000), *Business start-ups or disguised unemployment? Evidence on the character of self-employment from transition economies*, "Labor Economics", Netherlands, Elsevier.

10- Faria, J. R., Cuestas, J. C., Gil-Alana, L. A., (2009) *Unemployment and entrepreneurship: A cyclical relation?*, "Economics Letters", Netherlands, Elsevier

11- Fritsch, M. and Schroeter, A. (2011): "Why does the effect of new business formation differ across regions?" *Small Business Economics*, vol. 36, pp. 383-400.

12- Henderson, J. and Weiler, S. (2010): "Entrepreneurs and job growth: probing the boundaries of time and space." *Economic Development Quarterly*, vol. 24(1), pp. 23-32..

13- Remeikienė R., Startienė G. (2008). Relationship between Entrepreneurship and Unemployment. Economics and management – 2008 : 13-osios tarptautinėsmokslinėskonferencijospranešimųmedžiaga. ISSN 1822-6515, 643-651.

14- Remeikiene, R., Startiene, G. (2009). DoestheInteraction Between Entrepreneurshipand Unemployment Exit? EKONOMIKA IR VADYBA, 14, ISSN 1822-6515.

15- Stel A., Thurik R., Verheul I., Baljeu L. (2007). The Relationship between Entrepreneurship and unemployment in Japan. Tinbergen Institute Discussion Paper, TI 2007-080/3, 1-18.

16- Thurik, A. R. (2003). Entrepreneurship and unemployment in the uk. Scottish Journal of political Economy, 50(2), 264-290.

17- Thurik, A. R., &Verheul, I. (2003). The relationship between entrepreneurship and unemployment: the case of spain (in spanish).

18- Thurik, R. A., Carree, M. A., Van Stel, A., Audretsch, D. B., (2008) *Does self-employment reduceunemployment?*, "Journal of Business Venturing", Netherlands, Elsevier.

19- Verheul,I., Stel, A.J.V., Thurik, A.R.,&Urbano,D.(2006).The relationship between business ownership and unemployment in Spain: a matter of quantity or quality?.Estudios de EconomiaAplicada, 24(2), 435-457.

Appendix:

Table1: Lags under different criteria for Var model:

VAR Lag Order Selection Criteria
Endogenous variables: UN DO
Exogenous variables: C
Date: 11/24/13 Time: 17:02
Sample: 1377 1389
Included observations: 10

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-24.88284	NA*	0.742417	5.376569	5.437086	5.310182
1	-18.13225	9.450835	0.444313*	4.826449*	5.008000*	4.627288*
2	-16.13803	1.994221	0.778081	5.227605	5.530190	4.895670
3	-11.68877	2.669556	1.140197	5.137753	5.561372	4.673044

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table A2. Unit root test for the period 1998-2010 :

Null Hypothesis: UN has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.170034	0.4537
Test critical values:	1% level	-5.295384	
	5% level	-4.008157	
	10% level	-3.460791	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 10

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UN)
Method: Least Squares
Date: 11/23/13 Time: 16:28
Sample (adjusted): 1380 1389
Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UN(-1)	-1.084321	0.499679	-2.170034	0.0821
D(UN(-1))	0.525440	0.342535	1.533975	0.1856
D(UN(-2))	0.466667	0.354664	1.315802	0.2453
C	31.68749	17.47734	1.813062	0.1296
@TREND(1377)	-1.694024	1.176530	-1.439847	0.2095

R-squared	0.530797	Mean dependent var	-1.093000
Adjusted R-squared	0.155435	S.D. dependent var	5.519143
S.E. of regression	5.072104	Akaike info criterion	6.392241
Sum squared resid	128.6312	Schwarz criterion	6.543534
Log likelihood	-26.96121	Hannan-Quinn criter.	6.226274
F-statistic	1.414093	Durbin-Watson stat	2.058892
Prob(F-statistic)	0.350911		

Null Hypothesis: D(UN) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Fixed)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.597589	0.0093
Test critical values:	1% level	-5.521860	
	5% level	-4.107833	
	10% level	-3.515047	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 9

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UN,2)
Method: Least Squares
Date: 11/23/13 Time: 16:31
Sample (adjusted): 1381 1389
Included observations: 9 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UN(-1))	-1.256787	0.224523	-5.597589	0.0050
D(UN(-1),2)	-0.039869	0.186253	-0.214060	0.8410
D(UN(-2),2)	-0.009823	0.139310	-0.070514	0.9472
C	-15.19024	2.783324	-5.457589	0.0055
@TREND(1377)	1.577030	0.333278	4.731877	0.0091

R-squared	0.957286	Mean dependent var	-0.674444
Adjusted R-squared	0.914572	S.D. dependent var	8.041525
S.E. of regression	2.350380	Akaike info criterion	4.847212
Sum squared resid	22.09714	Schwarz criterion	4.956781
Log likelihood	-16.81245	Hannan-Quinn criter.	4.610762
F-statistic	22.41158	Durbin-Watson stat	1.928421
Prob(F-statistic)	0.005318		

Null Hypothesis: D(DO) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.033330	0.0485
Test critical values:	1% level	-5.295384	
	5% level	-4.008157	
	10% level	-3.460791	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 10

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DO,2)
Method: Least Squares
Date: 11/23/13 Time: 16:33
Sample (adjusted): 1380 1389
Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DO(-1))	-2.403862	0.595999	-4.033330	0.0069
D(DO(-1),2)	0.798425	0.368458	2.166935	0.0734
C	-0.218581	0.133981	-1.631435	0.1539
@TREND(1377)	0.031281	0.017427	1.795036	0.1228

R-squared	0.793704	Mean dependent var	-0.002642
Adjusted R-squared	0.690556	S.D. dependent var	0.228107
S.E. of regression	0.126891	Akaike info criterion	-1.001809
Sum squared resid	0.096607	Schwarz criterion	-0.880775
Log likelihood	9.009045	Hannan-Quinn criter.	-1.134583
F-statistic	7.694811	Durbin-Watson stat	1.954372
Prob(F-statistic)	0.017652		

Null Hypothesis: D(DO) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.408763	0.0032
Test critical values:	1% level	-2.816740	
	5% level	-1.982344	
	10% level	-1.601144	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 10

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DO,2)
Method: Least Squares
Date: 11/23/13 Time: 16:34
Sample (adjusted): 1380 1389
Included observations: 10 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DO(-1))	-1.761248	0.516683	-3.408763	0.0092
D(DO(-1),2)	0.421521	0.327989	1.285168	0.2347

R-squared	0.680465	Mean dependent var	-0.002642
Adjusted R-squared	0.640523	S.D. dependent var	0.228107
S.E. of regression	0.136765	Akaike info criterion	-0.964252
Sum squared resid	0.149637	Schwarz criterion	-0.903735
Log likelihood	6.821262	Hannan-Quinn criter.	-1.030639
Durbin-Watson stat	1.726774		

Null Hypothesis: D(UN) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.629371	0.0138
Test critical values:	1% level	-2.792154	
	5% level	-1.977738	
	10% level	-1.602074	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UN,2)
Method: Least Squares
Date: 11/23/13 Time: 16:29
Sample (adjusted): 1379 1389
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UN(-1))	-0.811680	0.308697	-2.629371	0.0252

R-squared	0.408713	Mean dependent var	-0.061818
Adjusted R-squared	0.408713	S.D. dependent var	7.327162
S.E. of regression	5.634233	Akaike info criterion	6.382107
Sum squared resid	317.4458	Schwarz criterion	6.418279
Log likelihood	-34.10159	Hannan-Quinn criter.	6.359306
Durbin-Watson stat	1.984393		

Null Hypothesis: DO has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.565913	0.2989
Test critical values:	1% level	-5.124875	
	5% level	-3.933364	
	10% level	-3.420030	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 11

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DO)
Method: Least Squares
Date: 11/23/13 Time: 16:33
Sample (adjusted): 1379 1389
Included observations: 11 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DO(-1)	-1.001139	0.390169	-2.565913	0.0372
D(DO(-1))	0.144648	0.317432	0.455683	0.6624
C	0.086619	0.104450	0.829294	0.4343
@TREND(1377)	0.020280	0.011925	1.700678	0.1328

R-squared	0.536777	Mean dependent var	0.001561
Adjusted R-squared	0.338252	S.D. dependent var	0.138421
S.E. of regression	0.112602	Akaike info criterion	-1.254621
Sum squared resid	0.088755	Schwarz criterion	-1.109932
Log likelihood	10.90042	Hannan-Quinn criter.	-1.345828
F-statistic	2.703833	Durbin-Watson stat	2.225973
Prob(F-statistic)	0.125727		

Null Hypothesis: DO has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.954414	0.2840
Test critical values:	1% level	-2.771926	
	5% level	-1.974028	
	10% level	-1.602922	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DO)
Method: Least Squares
Date: 11/23/13 Time: 16:32
Sample (adjusted): 1378 1389
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DO(-1)	-0.134341	0.140758	-0.954414	0.3604

R-squared	0.075777	Mean dependent var	-0.003509
Adjusted R-squared	0.075777	S.D. dependent var	0.133142
S.E. of regression	0.127998	Akaike info criterion	-1.193942
Sum squared resid	0.180220	Schwarz criterion	-1.153534
Log likelihood	8.163655	Hannan-Quinn criter.	-1.208903
Durbin-Watson stat	2.273606		

Null Hypothesis: UN has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.509607	0.4741
Test critical values:	1% level	-2.771926	
	5% level	-1.974028	
	10% level	-1.602922	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 12

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UN)
Method: Least Squares
Date: 11/23/13 Time: 16:28
Sample (adjusted): 1378 1389
Included observations: 12 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UN(-1)	-0.041409	0.081257	-0.509607	0.6204

R-squared	0.022730	Mean dependent var	-0.098333
Adjusted R-squared	0.022730	S.D. dependent var	5.553510
S.E. of regression	5.490030	Akaike info criterion	6.323400
Sum squared resid	331.5447	Schwarz criterion	6.363809
Log likelihood	-36.94040	Hannan-Quinn criter.	6.308439
Durbin-Watson stat	1.553615		

Table 3:Toda and Yamamoto Causality MWALD Test Results:

Wald Test:
System: SYSUN1

Test Statistic	Value	df	Probability
Chi-square	0.022093	1	0.8818

Null Hypothesis: C(2)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.001188	0.007992

Restrictions are linear in coefficients.

Wald Test:
System: SYSUN1

Test Statistic	Value	df	Probability
Chi-square	3.109209	1	0.0779

Null Hypothesis: C(4)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(4)	23.06016	13.07788

Restrictions are linear in coefficients.