Testing the impact of unemployment on self-employment: empirical evidence from OECD countries

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Abstract

The impact of unemployment on self-employment is rather an ambiguous issue in economics. According to *refugee effect* approach, there are two counter arguments: the theory of income choice argument suggests that increased unemployment may lead to increased self-employment activities whereas the counter argument defends the view that an increase in unemployment rates may decrease the endowments of human capital and entrepreneurial talent causing a rise in unemployment rates further. The empirical evidence on this issue seems to support both hypotheses. This research presents fresh and more comprehensive evidence on this issue from 28 OECD countries using the ARDL approach to co-integration technique over the period 1986-2013. The empirical results indicate that the first hypothesis holds in the case of Belgium, Canada, Sweden and the UK whereas the second hypothesis is valid in the case of Greece, Luxembourg and Portugal. The empirical results for the remaining OECD countries did not reveal any long-run relationship between the variables in question. The empirical results are also evaluated briefly for policy recommendations.

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1. Introduction

The relationship between self-employment and unemployment presents a lively debate in economics. The origin of this debate is related to *refugee effect* which forms two conflicting hypotheses. According to the theory of income choice, as the level of unemployment raises it is expected that self-employment starts to increase too. As far as the counter argument is concerned, the increased level unemployment also leads to the depreciation of human capital and skills which exacerbates the existing unemployment situation. The first argument of the *refugee effect* is also known as the "*unemployment push*" hypothesis which states that high unemployment may reduce the opportunity to gain salaried employment and thus positively affect self-employment as discussed in Glocker and Steiner (2007). According to Audretsch et al. (2005), the second hypothesis is coined as the "*unemployment pull*" which suggests that unemployed people tend to possess lower endowments of human capital and entrepreneurial talent to start and sustain a new firm.

The empirical research on this issue seems to be rather ambiguous since the growing number of studies present evidence for the existence of both hypotheses. The ambiguity in this issue might be related to the fact that the time span, econometric methodology and the variables in question vary considerably as far as the studies are concerned.

The main motivation of this research is based on the fact that self-employment is regarded as one of the major economic policy solutions to reduce the unemployment in all countries. Thus, measuring the impact of unemployment on self-employment should reveal valuable policy information for policy makers.

This research aims to contribute to the existing literature by providing further time series evidence on the *refugee effect* from 28 OECD countries using Auto Regressive Distributed Lag (ARDL) approach to cointegration procedure. To our existing knowledge, there exists no other study utilizing this method previously in estimation of the *refugee effect*. Moreover, the data span and the extent of OECD countries in this study exceed the scope of other studies in the same category. Thus, the empirical results should be considered as more comprehensive. However, the primary aim of this study is to analyze empirically only the *refugee effect*; the econometric model is based on a univariate function disregarding other possible factors that may have impact on *the refugee effect*.

This research is outlined as follows: the next section provides a brief review of theoretical and empirical studies; section 3 outlines the econometric methodology; section 4 presents and evaluates the empirical results; and the final section is devoted to conclusions.

2. A Brief Literature Review

The discussions between self-employment and unemployment lead the way to a growing body of empirical studies in the literature in the last two decades. Considering the size limitations, this research focuses on selected number of studies to provide the main discussion points of the literature. The back bone of this discussion revolves around the concept of the *refugee effect*. The *refugee effect* originated from the simple theory of income choice which argues that increased unemployment will lead to an increase in start-up activity on the grounds that the opportunity cost of starting a firm is less than being unemployed. In the same strand of this literature, a counter argument indicates that the impact of unemployment might be detrimental on self-employment due to the fact that unemployed people not only lose their jobs but they may be deprived of the human capital and entrepreneurial skills which are required for new business activities. The second strand of the discussion is related to the *Schumpeter effect* which indicates that new-firm start up reduces the level of unemployment. That implies that the direction of relationship runs from self-employment to unemployment.

Different aspects of the *refugee* and *Schumpeter effects* have been discussed and evaluated theoretically and empirically in a large number of studies (Evans and Leighton, 1990; Alba-Ramirez, 1994; Audretsch and Thurik, 2000; Audretsch et al., 2002, 2005; Carree et al., 2002, 2007; Ritsila and Tervo, 2007; Baptista and Preto, 2007; Glocker and Steiner, 2007; Faria et al., 2010; Fairlie, 2011; Yu et al., 2014; and Aubry et al., 2015). Self-employment is regarded as the major proxy variable for the concept of entrepreneurship and it is also viewed as the engine of economic and social development in world economies. Thus, the problem of unemployment can be alleviated substantially with the incentives provided for

the self-employment activities. With a few exceptions, a large number of empirical studies provide support for this view. The empirical studies on the *refugee effect*, by and large, appear to be focusing on developed countries especially in OECD countries. This tendency is related to the fact that the data availability and quality are better and more easily accessible in developed countries. However, in recent empirical studies, the numbers of developed countries were also investigated for this issue. Another aspect of the empirical studies is that analyses contain large number of local regions within countries in order to provide regional disparities.

Table 1 summarizes some of the empirical studies on the *refugee effect*. It is crystal clear that the results should be evaluated on the basis of the time span of the data, the empirical methodology and the countries or regions in question. Nevertheless, Table 1 also demonstrates that the econometric methodology seems to be getting more sophisticated as the time gets close to the current date. The econometric methodologies range from Ordinary Least Squares (OLS) to sophisticated Panel Econometric Methods (PEM). In the recent empirical studies, the researchers seem to be adopting more sophisticated econometric procedures and longer data time span or the number of observations. Increased data quality and advanced econometric procedures encourage the researchers to conduct more comprehensive analyses on the *refugee effects*. However, it should be emphasized again that the previous empirical studies on the *refugee effects* have not utilized yet the econometric procedure of the ARDL approach to cointegration as far as this research is concerned.

Table 1. Summary Empirical Results on *Refugee Effect*

Author(s) and Date	Data	Method	Countries	*Refugee Effect (+/-)*
Evans and Leighton (1990)	CS	OLS	23 OECD	+
Audretsch and Fritsch (1994)	CS	OLS/WLS	75 regions in Germany	-
Alba-Ramirez (1994)	CS	OLS	Spain and US	+
Audretsch and Thurik (2000)	CS	OLS	23 OECD	+
Audretsch et al. (2001)	CS	WLS	23 OECD	+
Caree et al. (2002)	CS	WLS	23 OECD	+
Ritsila and Tervo (2002)	CS	Probit	Finland	+
Audretsch et al. (2005)	TS	VAR	23 OECD	+
Baptista and Preto (2007)	TS	VAR	30 regions in Portugal	+
Carree et al. (2007)	PD	WLS	23 OECD	+
Glocker and Steiner (2007)	PD	PEM	Germany	+
Golpe and Steel (2007)	TS	VAR	17 regions in Spain	Mixed
Faria et al. (2009)	TS	VAR	US, UK, Ireland, Spain	Mixed
Faria et al. (2010)	TS	VAR	10 OECD	+
Fairlie (2011)	PD	PEM	US	+
Ghavidel et al. (2011)	PD	SEM	7 Developing and 23 OECD	Mixed
Yu et al. (2014)	PD	PEM	US	+
Aubry et al. (2015)	PD	PEM	22 regions in France	Mixed

Notes: CS (Cross-Section), TS (Time Series), PD (Panel Data), OLS (Ordinary Least Squares), PEM (Panel Econometric Methods), SEM (Simultaneous Equation Modelling), WLS (Weighted Least Squares), VAR (Vector Auto Regression).

3. Model and Econometric Methodology

3.1 The Model

Following the literature, we form the following long-run relationship between self-employment and unemployment rates, in double logarithmic linear form as:

$$s_{tj} = a_0 + a_1 u_{tj} + \varepsilon_t \qquad (1)$$

where s_{tj} is self-employment rates and u_{tj} unemployment rates with the subscript t indexes time period with $t = 1986, \ldots, 2013$; and j indexes for the country in question, and is ε_t the classical error term.

3.2 The Econometric Methodology

Advances in econometric literature dictate that the long-run relation in Eq. (1) should incorporate the short-run dynamic adjustment process. It is possible to achieve this aim by expressing equation (1) in an error-correction model as suggested by Engle-Granger (1987). Then, equation (1) becomes as follows:

$$\Delta s_{t,j} = b_0 + \sum_{i=1}^{m1} b_{1i,j} \Delta s_{t-i,j} + \sum_{i=0}^{m2} b_{2i,j} \Delta u_{t-i,j} + \gamma \varepsilon_{t-1,j} + \mu_t \qquad (2)$$

where Δ represents change, m_i is the number of lags, γ is the speed of adjustment parameter and ε_{t-1} is the one period lagged error correction term, which is estimated from the residuals of equation (1). The Engle-Granger method requires all variables in equation (1) are integrated of order one, $I(1)$ and the error term is integrated order of zero, $I(0)$ for establishing a cointegration relationship. If some variables in equation (1) are non-stationary we may use a new cointegration method proposed by Pesaran et al. (2001). This approach is also known as autoregressive-distributed lag (ARDL) that combines Engle-Granger (1987) two steps into one by replacing ε_{t-1} in equation (2) with its equivalent from equation (1). ε_{t-1} is substituted by linear combination of the lagged variables as in equation (3).

$$\Delta s_{t,j} = c_0 + \sum_{i=1}^{n1} c_{1i,j} \Delta s_{t-i,j} + \sum_{i=0}^{n2} c_{2i,j} \Delta u_{t-i,j} + c_3 s_{t-1,j} + c_4 u_{t-1,j} + v_t \qquad (3)$$

To obtain equation (3), one has to solve equation (1) for ε_t and lag the solution equation by one period. Then this solution is substituted for ε_{t-1} in equation (2) to arrive at equation (3). Equation (3) is a representation of the ARDL approach to cointegration.

Pesaran et al. (2001) cointegration approach, also known as bounds testing, has some methodological advantages in comparison to other single cointegration procedures. Reasons for the ARDL are: i) endogeneity problems and inability to test hypotheses on the estimated coefficients in the long-run associated with the Engle-Granger (1987) method are avoided; ii) the long and short-run coefficients of the model in question are estimated simultaneously; iii) the ARDL approach to testing for the existence of a long-run relationship between the variables in levels is applicable irrespective of whether the underlying regressors are purely stationary $I(0)$, purely non-stationary $I(1)$, or mutually cointegrated; iv) the small sample properties of the bounds testing approach are far superior to that of multivariate cointegration, as argued in Narayan (2005). The procedure is no longer valid in presence of $I(2)$ series.

The ARDL approach involves two steps for estimating the long run relationship. The

bounds testing procedure is based on a Wald type (F-statistics) and is the first step of the ARDL cointegration method. Accordingly, a joint significance test that implies no cointegration under the null hypothesis, (H_0: $c_3 = c_4 = 0$), against the alternative hypothesis, (H_1: at least one of c_3 to $c_4 \neq 0$) should be performed for equation (3). The F test used for this procedure has a non-standard distribution. Thus, Pesaran et al. (2001) computed two sets of asymptotic critical values for testing cointegration for a given significance level with and without a time trend. One set assumes that all variables are $I(0)$ and the other set assumes they are all $I(1)$. If the computed F-statistic exceeds the upper bound critical value, then the null hypothesis of no cointegration can be rejected. Conversely, if the F-statistic falls below the lower bound critical value, the null hypothesis cannot be rejected. Lastly, if the F-statistic falls between these two sets of critical values, the result is inconclusive.

The short-run effects between the dependent and independent variables are inferred by the size of coefficients of the differenced variables in equation (3). The long-run effect is measured by the estimates of lagged explanatory variables that is normalized on estimate of c_3.

Once a long-run relationship has been established, equation (3) is estimated using an appropriate lag selection criterion. At the second step of the ARDL cointegration procedure, it is also possible to obtain the ARDL representation of the error correction model. To estimate the speed with which the dependent variable adjusts to independent variables within the bounds testing approach, following Pesaran et al. (2001) the lagged level variables in equation (3) are replaced by EC_{t-1} as in equation (4):

$$\Delta s_{t,j} = \alpha_0 + \sum_{i=1}^{k1} \alpha_{1i,j} \Delta s_{t-i,j} + \sum_{i=0}^{k2} \alpha_{2i,j} \Delta u_{t-i,j} + \lambda EC_{t-1,j} + \mu_t \qquad (4)$$

A negative and statistically significant estimation of λ not only represent the speed of adjustment but also provides an alternative means of supporting cointegration between the variables.

3.3 Alternative Evidence of Cointegration

It has been proven by Bahmani-Oskooee and Goswami (2003) that F-testing stage is very sensitive to the selected lag lengths in equation (3). Therefore, the results obtained at this stage are not very conclusive. According to Bahmani-Oskooee and Ardalani (2006), this situation can be avoided if the lagged linear combination of all variables in equation is substituted by EC_{t-1} as expressed in equation (4). Equation (4) presents an alternative evidence of co-integration by the coefficient estimate of EC_{t-1}. A negative and significant coefficient of EC_{t-1} could also reflect cointegration among the variables. In particular, this indicates clear support for the short-run adjustment toward long-run equilibrium as well as cointegration. Moreover, Kremers et al. (1992) and Banerjee et al. (1998) also proved that a negative and significant EC_{t-1} could be used as an alternative evidence of cointegration in the case of the Engle-Granger (1987) approach. Therefore, this study will utilize the results from error correction model to establish the existence of cointegration alternatively if the pre-testing stage of the Pesaran et al. (2001) fails to do so.

3.4 Data

The data period for each country along with variable definitions and data sources are presented in this section. All data comes from OECD Main Economic Indicators.
The data span is not the same for all the countries due to missing years. The countries and

their annual data span used in this study are as follows: Australia (1986-2013), Austria (1986-2013), Belgium (1986-2013), Canada (1986-2013), Finland (1986-2013), France (1986-2013), Germany (1994-2013), Greece (1986-2013), Hungary (1993-2013), Iceland (1986-2013), Italy (1986-2013), Japan (1986-2013), South Korea (1986-2013), Luxembourg (1986-2013), Mexico (1991-2013), The Netherlands (1970-2004), New Zealand (1986-2013), Norway (1986-2013), Poland (1991-2013), Portugal (1990-2013), Spain (1986-2013), Sweden (1981-2004), Switzerland (1992-2013), Turkey (1989-2013), UK (1986-2013), and USA (1986-2013).

Variables
s is the annual percentage of self-employment in total employment in natural logarithm. Source: OECD
u is the harmonized annual unemployment rate in natural logarithm. Source: OECD.

4. Empirical Results

4.1 The F-test

Equation (3) is estimated for 28 OECD countries using selected annual data over the period 1986-2013. Time series properties of the variables are checked with alternative unit root testing procedures. The unit root results demonstrate that all variables are in the order of integration of either $I(0)$ or $I(1)$. However, this stage of the econometric results is not reported here due to space considerations. The pre testing stage of the ARDL approach to cointegration is sensitive to the number of lags to be imposed on each differenced variable in equation (3). To avoid this problem, an initial lag of 2 is imposed on each differenced variable to minimize the loss of degrees of freedom since we use limited annual data. Then, $\bar{R}^2$ AIC (Akaike Information Criterion), SBC (Schwarz Bayesian Criterion) or HQC (Hannan Quinn Criterion) are being employed to select the optimum number of lags. All results, therefore, belong to optimum models. The summary results from the ARDL approach to cointegration are reported in Table 2. In regards to F statistics, there are only three cointegration relationships namely in the case of Belgium, France and the UK. Considering a negative and statistically significant EC_{t-1} is considered to be an alternative way of supporting cointegration, Austria, Canada, Belgium, France, Greece, Luxembourg, Portugal, Spain, Sweden and the UK fall into this category. Finally, as far as the statistically significant long-run parameter and lagged error correction term in question is being considered to be plausible choice, there exist only seven countries, namely Belgium, Canada, Greece, Luxembourg, Portugal, Sweden and the UK[1]. For more on this and some other application of this procedure, see for example, Dell'Anno and Halicioglu (2010), Andres et al. (2011), Halicioglu (2013, 2011), Andres and Halicioglu (2011, 2010), Altinanahtar and Halicioglu (2009), and Halicioglu and Karatas (2013, 2011).

Table 2. ARDL Approach to Cointegration Summary Results

Country	Order of ARDL[a]	F statistics	Long-run slope	EC_{t-1}	$\bar{R}^2$	χ^2_{SC}	χ^2_{FF}	χ^2_N	χ^2_H
						Short Run Diagnostics			
Australia	SBC (2,2)	4.09	0.23**	0.19	0.46	3.38	0.19	1.74	3.87
Austria	AIC (2,0)	4.44	-0.11	-0.50*	0.23	0.33	0.85	1.47	0.46
Belgium	$\bar{R}^2$ (2, 2)	7.24**	0.77*	-0.27*	0.39	1.60	0.07	1.90	0.46
Canada	HQC (1,0)	4.10	0.97**	-0.13**	0.44	0.83	5.27	1.02	0.55
Denmark	$\bar{R}^2$ (2, 1)	3.15	-1.43	-0.02	0.11	4.44	0.76	2.24	3.50
Finland	SBC (0,0)	NA	0.10	NA	NA	NA	NA	NA	NA
France	SBC (2,1)	6.81**	-0.91	-0.04*	0.76	1.67	3.53	0.94	0.46
Germany	SBC (1,0)	1.32	0.27	-0.12	0.17	2.18	1.21	7.36	0.16
Greece	SBC (1,2)	4.27	-0.97**	-0.06**	0.30	3.08	0.03	2.37	2.30
Hungary	SBC (1,0)	0.22	0.35	NA	NA	NA	NA	NA	NA
Iceland	$\bar{R}^2$ (2, 1)	0.16	0.29	-0.02	0.01	1.92	1.64	0.68	0.02
Ireland	SBC (1,0)	0.33	0.23	-0.06	-0.0	0.45	3.07	0.53	0.04
Italy	SBC (1,0)	1.53	0.73	-0.03	0.01	2.00	1.42	8.15	0.13
Japan	$\bar{R}^2$ (2, 0)	1.92	1.54	-0.01	0.02	1.33	1.34	9.81	0.20
South Korea	$\bar{R}^2$ (2, 1)	0.09	-0.34	-0.01	0.18	0.13	0.49	2.02	1.61
Luxembourg	AIC (1,1)	4.46	-0.48*	-0.08*	0.54	0.10	2.55	1.35	1.32
Mexico	AIC (1,0)	0.89	-0.05	-0.07	0.01	0.77	3.49	0.89	2.87
Netherlands	SBC (1,1)	0.76	5.38	-0.05	0.19	0.12	2.14	1.53	0.53
New Zealand	HQC (1,0)	3.31	0.96	-0.05	0.24	0.29	3.31	0.02	0.50
Norway	AIC (1,0)	3.15	0.54	-0.01	0.31	0.17	3.65	0.75	0.21
Poland	SBC (1,0)	3.20	0.04	-0.50**	0.17	2.90	8.40	41.4	0.33
Portugal	$\bar{R}^2$ (1, 0)	4.73	-0.11**	-0.63**	0.22	3.66	5.29	59.4	2.78
Spain	HQC (2,0)	2.61	0.33	-0.06**	0.32	0.14	0.81	0.26	0.87
Sweden	AIC (1,2)	2.75	0.09*	-0.40**	0.52	0.04	0.84	0.13	0.04
Switzerland	HQC (1,0)	1.32	2.22	-0.02	0.10	0.74	1.66	0.09	0.17
Turkey	HQC (1,0)	0.69	1.20	-0.04	0.09	0.23	2.90	0.13	0.04
UK	SBC (1,0)	7.98**	0.25*	-0.50*	0.38	0.19	0.99	0.90	0.03
USA	AIC (1,0)	0.34	-2.45	0.01	0.01	0.80	0.04	9.49	0.23

[a] $\bar{R}^2$, AIC, SBC, and HQC criteria are utilized appropriately to select the order of ARDL. The order of optimum lags is based on the specified ARDL model. For example, SBC (2, 2) for Australia suggests that 2 lags are imposed on Δ Self-employment rate and 2 lags on Δ Unemployment rate in equation (3). F stands for the computed F statistics for the bounds test. F critical value for testing the existence of a long-run relationship at 95 and 90 % level of significances respectively for *I(0)* and *I(1)* . *, ** and *** indicate, 1%, 5% and 10% significance levels, respectively.

NA (Not Available) stands for the fact that there exist no dynamic econometric results from these cases. χ^2_{SC}, χ^2_{FF}, χ^2_N, and χ^2_H are Lagrange multiplier statistics for tests of residual correlation, functional form mis-specification, non-normal errors and heteroskedasticity, respectively. These statistics are distributed as chi-squared variates with degrees of freedom in parentheses. The critical values for $\chi^2(1) = 3.84$ and $\chi^2(2) = 5.99$ at 5% significance level.

4. 2 The Long-Run Results

According to the results displayed in Table 2, the statistically significant slope parameters are available in two different accounts. If one deems that the results from ARDL approach to cointegration procedure should be considered only appropriate long-run outcomes, in this case there are 3 countries: Belgium, France and the UK. The empirical results from these countries

are also associated with satisfactory econometric diagnostics which make the inferences reliable and consistent. Within this category, the case of Belgium and the UK extend the support for the hypothesis of the *refugee effect* that increased unemployment will also raise the self-employment level, whilst the reverse hypothesis is valid in the case of France. As far as the degree of positive impact of unemployment is concerned, it is the highest in Belgium. The slope parameter of the Belgium econometric model, 0.77 indicates that a 1% rise in unemployment on average increases self-employment by 0.77 % on average during the estimation period. If we assume in broad terms that the long-run relationships occur with a statistically significant lagged error term and long-run slope parameter, within this category there are seven countries: Belgium, Canada, Greece, Luxembourg, Portugal, Sweden and the UK. It appears that the long-run slope parameter of Belgium, Canada, Sweden and the UK econometric equations provide support for the positive relationship between unemployment and self-employment whereas the results of Greece and Luxembourg are related to negative effect of the *refugee effect.*

It is clear that the negative impact of the *refugee effect* on self-employment is not a desirable choice. However, in this situation the countries should design proactive economic policies to combat these impacts effectively. Designing appropriate economic policies will be related to the extent of the problem and the economic structure of the country question.

5. Conclusions

The aim of this paper was to test the existence of the *refugee effect* for 28 OECD countries. This objective was aided by the technique of Pesaran et al. (2001) approach to cointegration which presents non-spurious estimates. Subsequently, our work provides fresh evidence on the relationship between self-employment and unemployment. The results reveal that there exist long-run relationships in the case of only seven countries in broad terms. Within these long-run relationships, Belgium, Canada, Sweden and the UK offer support for the positive impact of increased unemployment on self-employment suggesting that increased unemployment will stimulate the new business starts ups whilst it is observed empirically that Greece, Luxembourg and Portugal will be suffering the detrimental effect of increased unemployment further. The econometric results did not reveal any long-run relationships in the case of 21 out of 28 countries of OECD.

It is crystal clear that the empirical results in this study are subject to some limitations in regards to the data time span and omitted variable bias. However, this is the first time series study that has utilized the ARDL approach to cointegration procedure. It is envisaged that this paper will stimulate further empirical studies in this nature to reveal more comprehensive insights into the understanding of the *refugee effect*. As for policy recommendations, countries should provide further incentives for entrepreneurial spirits for sound and sustainable economic growth. Self-employment as the most plausible proxy of entrepreneurship is the backbone of economies. Therefore, it is essential that this type of business activities requires special attention and incentives all the time so that countries maintain sound and sustainable economic growth rates.

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