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Testing the Association between Unemployment and Moonlighting in Slovakia using ARDL Bounds Cointegration Test

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[Abstract]

This paper is entrusted to examine the relationship between unemployment and moonlighting in Slovakia. The application of ADF test on quarterly data of Slovakia from the first quarter of 1998 to the last quarter of 2020 confirms that the series on moonlighting is I(0) while the series on unemployment is I(1). ARDL Bounds Test is applied to uncover any cointegrating relationship between unemployment and moonlighting in Slovakia. The estimated value of F test is less than the lower bound of ARDL Bounds Test. Therefore, long run relationship between unemployment and moonlighting in Slovakia is not confirmed.

Key Words: *Moonlighting, Unemployment, ARDL Bounds Cointegration Test*

I

INTRODUCTION

Moonlighting or multiple jobholding is a phenomenon where workers acquire one or more secondary jobs along with a primary job. Moonlighting is increasing across modern economies as working conditions in the labour market are becoming more flexible (Baines and Newell (2004), Combos, Mc Kay and Wright (2007)). Since moonlighters acquire multiple jobs, it is expected that there is a relationship between moonlighting and unemployment. Most literature on moonlighting primarily involves in finding out the determinants of moonlighting while the study on the association between moonlighting and unemployment is very infrequent.

The relationship between moonlighting and unemployment is ambiguous. During a downturn, a decrease in the hourly wage rate will compel the workers to increase the labour supply for maintaining the standard of living. The increased desire to supply more labour hours may be towards the existing job or towards other secondary jobs, depending on the demand conditions in the existing job and the availability of other secondary jobs. But on the demand side, since moonlighters are cheaper (Saini (2019), Kaur and Saini (2020)) and more flexible than regular full-time workers, recruiters may induce moonlighting to cope with the downturn (Robinson (2009)). The relationship between moonlighting and unemployment entirely depends on the conditions of the labour market (Coghill (1967)).

Indication of huge growth of moonlighting during economic expansion was confirmed by Stinson (1987) in the U.S. between 1960 and 1970 but no such indication was found during recessions. Moonlighting is viewed as hedging behaviour against future unemployment in the study of Bell, Hart and Wright (1997). In addition to the hours constraint motive of moonlighting (Shisko and Rostker (1976), O'Connell (1979), Krishnan (1990)), the study of Conway and Kimmel (1998) confirmed that job heterogeneity is also an important motive for moonlighting. They theoretically claimed that an increase in non-wage income may lead to a decline in moonlighting which logically opposes the pro-cyclicality of moonlighting. Amuedo-Dorantes and Kimmel (2005) have also concluded that moonlighting and unemployment are inversely related on the logic that the chance of moonlighting may increase during the periods of expansion. On the contrary, the pro-cyclical relation between moonlighting and unemployment was observed in the study of Partridge (2002) and this pro-cyclicality was also confirmed in the study of Lawrence Mishel (1999).
This paper is aimed to find out any long-run relationship between moonlighting and unemployment by applying the ARDL bounds cointegration test using quarterly data from 1998:Q1 to 2020:Q4 in Slovakia.

II
METHODOLOGY

To find out the nexus between moonlighting and unemployment in Slovakia, the ARDL Bounds Test developed by Pesaran (Pesaran et al., (2001)) is used. The ARDL equations to be estimated are:

$$\Delta MOON_t = \beta_0 + \beta_1 MOON_{t-1} + \beta_2 UNEMP_{t-1} + \sum_{i=1}^{p} \delta_{1i}\, \Delta MOON_{t-i} + \sum_{i=1}^{q} \gamma_{1i}\, \Delta UNEMP_{t-i} + u \quad (1)$$

$$\Delta UNEMP_t = b_0 + b_1 MOON_{t-1} + b_2 UNEMP_{t-1} + \sum_{i=1}^{p} \delta_{2i_i}\, \Delta MOON_{t-i} + \sum_{i=1}^{q} \gamma_{2i}\, \Delta UNEMP_{t-i} + v \quad (2)$$

Where $MOON_t$ stands for percentage of multiple jobholders (moonlighters) to the total employed persons at time t. $UNEMP_t$ stands for unemployment rate at time t. Δ is the first difference operator and u and v are the random disturbance terms assumed to follow white noise. First, we have to examine whether the series $MOON_t$ and $UNEMP_t$are $I(0)$ or $I(1)$ because the ARDL Bounds Test cannot be applied to $I(2)$ variables. Then we have to determine the lag lengths(p, q) using Akaike Information Criterion (AIC). In equation (1), the short-run dynamic coefficients are denoted by the parameters δ_{1i} and γ_{1i}, long-run coefficients are represented by β_1 and β_2. Similarly in equation (2), the short-run dynamic coefficients are denoted by the parameters δ_{2i} and γ_{2i}, while b_1 and b_2 are long-run coefficients. In order to test for the existence of any long-run relationship between moonlighting and unemployment, the F-test for the joint significance of $H_0: \beta_1 = \beta_2 = 0$ will be performed against $H_1: \beta_1 \neq \beta_2 \neq 0$ in case of equation (1) where the dependent variable is $MOON_t$. Similarly, in order to test for the existence of any long-run relationship between unemployment and moonlighting, the F-test for the joint significance of $H_0: b_1 = b_2 = 0$ will be performed against $H_1: b_1 \neq b_2 \neq 0$ in case of equation (2) where the dependent variable is $UNEMP_t$. There are two bounds on the critical values for the asymptotic distribution of the F-statistic. The lower value is based on the assumption that the regressors are I(0) and the upper value is based on the assumption that the regressors are I(1). The cointegration between moonlighting and unemployment will be confirmed if the computed F-statistic exceeds the upper value, provided by Pesaran et al. (2001).

If the cointegration is confirmed through the ARDL bounds test, we have to perform the Granger causality tests under a Vector Error Correction Model by incorporating an error correction term to capture the short-run divergence of the time series from their long-run equilibrium with the following equations:

$$\Delta MOON_t = \beta_0 + \sum_{i=1}^{p} \delta_{1i}\, \Delta MOON_{t-i} + \sum_{i=1}^{q} \gamma_{1i}\, \Delta UNEMP_{t-i} + \varphi_1 ECT_{t-1} + u \quad (3)$$

$$\Delta UNEMP_t = b_0 + \sum_{i=1}^{p} \delta_{2i_i}\, \Delta MOON_{t-i} + \sum_{i=1}^{q} \gamma_{2i}\, \Delta UNEMP_{t-i} + \varphi_2 ECT_{t-1} + v \quad (4)$$

where ECT_{t-1} is the Error correction term. The coefficients φ_1 and φ_2 are representing the speed of adjustment to equilibrium position whenever there is deviation due to shocks and they must be negative and significant.

We have to perform diagnostic and stability tests to check the robustness of the model by testing for heteroskedasticity, autocorrelation and normality of the variables. Finally, we have to carry out Cumulative Sum (CUSUM) and Cumulative Sum Squares (CUSUMSQ) test for checking the stability of the estimated coefficients.

III
EMPIRICAL RESULTS

For empirical analysis we have considered the quarterly data of Slovakia from the first quarter of 1998 to the last quarter of 2021 on the 'number of employed persons, 'number of employed persons having second job' and 'unemployment rate' from the official statistics portal of the European Union, http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/. Then data on percentage of employed persons having second job is calculated. Table – 1 shows the summary statistics of the data. The abbreviations MOON stands for percentage of employed persons having second job (moonlighters) and the abbreviation UNEMP stands for unemployment rate respectively.

Table – 1: Summary Statistics

	MOON	UNEMP
Mean	1.066825	13.10652
Median	1.053675	13.35000
Maximum	1.453086	19.90000
Minimum	0.695129	5.600000
Std. Dev.	0.178096	4.066718
Skewness	0.039983	-0.175322
Kurtosis	2.293017	2.070848
Jarque-Bera	1.940507	3.780714
Probability	0.378987	0.151018
Sum	98.14790	1205.800
Sum Sq. Dev.	2.886348	1504.976
Observations	92	92

Source: Own computation based on secondary data from http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/.

Table 1 clearly states that in Slovakia moonlighting rate varies from 0.69 percent to 1.45 percent for all employed persons. The unemployment rate varies from 5.6 to 19.9. Therefore, variability of unemployment rate is higher than the variability of moonlighting rate.

The unit root test results on the basis of ADF test for the null hypothesis that the series is not stationary is presented in Table – 2 where the ADF unit root test results are based on Akaike Information Criterion with maximum lag eleven. The ADF test confirms that MOON is $I(0)$ whereas UNEMP is $I(1)$. Since MOON is $I(0)$, it can never be used as dependent variable (Montenegro (2019)) and we can safely apply ARDL bound test for cointegration between unemployment and moonlighting in Slovakia using equation (2).

Table 2. Unit Root Test

Variables	ADF at Level		ADF at First Difference	
	Trend and Intercept	Intercept	Trend and Intercept	Intercept
MOON	-4.328758 (0.0045)	-3.921838 (0.0028)	-5.586170 (0.0001)	-5.624677 (0.0000)
UNEMP	-3.085085 (0.1167)	-1.830703 (0.3634)	-3.218176 (0.0879)	-3.388437 (0.0141)

Numbers in brackets indicate p value.
Source: Own computation based on secondary data from http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/.

Based on AIC, the ARDL (2, 0) is selected. Fig. 1 portrays corresponding AIC values against various possible ARDL models. After performing regression on ARDL (2,0), we perform the cointegration test using ARDL bounds which is presented in Table 3. Since the calculated F statistics (1.971261) is lower than the lower bound, the null hypothesis of no cointegration between unemployment and moonlighting in Slovakia is accepted. Therefore, expected result that unemployment may be associated with moonlighting is absent at least in Slovakia. Since no long run relationship between moonlighting and unemployment is detected, the analysis of Vector Error Correction Model is not continued.

Fig. 1: Akaike Information Criteria

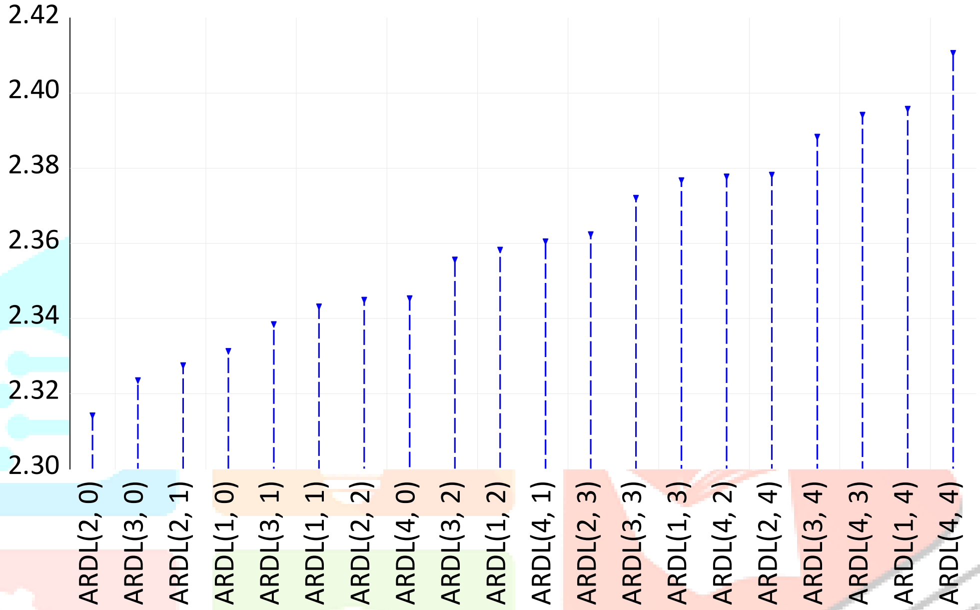

Table 4. Cointegration test results.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	1.971261	10%	4.04	4.78
K	1	5%	4.94	5.73
		2.5%	5.77	6.68
		1%	6.84	7.84

t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-1.997089	10%	-2.57	-2.91
		5%	-2.86	-3.22
		2.5%	-3.13	-3.5
		1%	-3.43	-3.82

Source: Own computation based on secondary data from http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

IV
CONCLUSION

Moonlighting considerably coexisted with unemployment as working conditions in the labour market in modern economies are becoming more flexible. Moonlighters acquire more than one job. Therefore, the association between moonlighting and unemployment is expected since moonlighting may lower the supply of vacancies to the unemployed persons. Alternatively, during economic expansion, moonlighting may decrease due to substitution effect of less working. Hence, an association between moonlighting and unemployment is expected. The motive behind moonlighting as a hedging behavior against unemployment is also established by Bell, Hart and Wright (1997). But application of ARDL bounds test in the quarterly data from 1998:Q1 to 2020:Q4 of Slovakia disregards any such relationship between moonlighting and unemployment in the long run.

REFERENCES

1. Allen, W.D.,(1998), "The Moonlighting Decision of Unmarried Men and Women: Family and Labor Market Influences" *Atlantic Economic Journal;*vol. 26(2), 190-205.
2. Averett, S.L., (2001) "Moonlighting: multiple motives and gender differences" *Applied Economics 33,*: 1391-1410, Available at https://doi.org/10.1080/00036840010007957
3. Adhikary, M., and Pal, S. (2012), "Political Business Cycle of Moonlighting in Slovakia",*Radix International Journal of Research in Social Science*, Volume 1, Issue 3, 64 - 83.
4. Amuedo-Dorantes, C, and Kimmel, J, (2005), "Moonlighting Behavior Over the Business Cycle", *IZA Discussion Paper No. 1671*, Available at SSRN: https://ssrn.com/abstract=761664 or http://dx.doi.org/10.2139/ssrn.761664
5. Baines, J. and Newell, J. (2004), "Multiple Job Holding in New Zealand: A Growing Presence in New Zealand's Labour Markets, 20-Year Trends", *Paper presented at the Eleventh Labour Employment and Work (LEW) conference*, Wellington, 22-23 (November 2004), available at www.tba.co.nz/conference_papers/
6. Bell, D, Hart, R and Wright, R. (1997). "Multiple Job Holding as a 'Hedge' Against Unemployment". London, Centre for Economic Policy Research. Availabe at: https://cepr.org/active/publications/discussion_papers/dp.php?dpno=1626
7. Böheim and Taylor, (2004)."And in the Evening She's a Singer with the Band - Second Jobs,Plight or Pleasure?," *IZA Discussion Papers 1081*,
8. Coghill (1967), "Moonlighters in a Tight Labor Market. Some Legal and Social Views of Recent Experience", ERIC, available at https://eric.ed.gov/?q=unemployment+&pg=276&id=ED034017
9. Combos, C., McKay, A. and Wright, P.(2007), "A New Labour Force: An econometric analysis of multiple jobholding", *Discussion Paper No. 07/02*, University of Nottingham.
10. Conway, K. S. and Kimmel, J.,(1998), "Male labor supply and the decision to moonlight". *Labour Economics* 5,: 135–66.

11. Devereux, Paul J. (2001). "The Cyclicality of Real Wages Within Employer-Employee Matches." Industrial and Labor Relations Review, Vol. 54, No. 4, pp. 835-850
12. Lawrence Mishel (1999), "Economic Indicators" *Economic Policy Institute*, available at https://doi.org/10.1080/00036840010007957
13. Gujarati, N.D. and Porter, D.C. (2009), *Basic Econometrics*. McGraw-Hill/Irwin, A Business Unit of The McGraw-Hill Companies, Inc., New York.
14. Hyder, A. and Ahmed, A. M. (2011). "The Dynamics of Moonlighting in Pakistan" *UC. Los Angeles: The Institute for Research on Labor and Employment.*
15. Kaur, H. and Saini, K. (2020), "A Review Study on the Concept of Moonlighting and it's Impact", *Journal of Xi'an University of Architecture & Technology*
16. Kimmel, J., Conway, K.S., (1998),"Male Labor Supply Estimates and the Decision to Moonlight", *Labour Economics*.
17. Kimmel, J. and Conway, K.S., (2001), "Who Moonlights and Why? Evidence from the SIPP*"Industrial Relations*; 40(1): 89-120.
18. Krishnan, P.(1990), "The Economics of Moonlighting: A Double Self-Selection Model,"*Review of Economics and Statistics*, vol. 72(2),.: 361-367.
19. Montenegro, Alvaro (2019), The ARDL Bounds Cointegration Test: Tips for Application and Pretesting. Available at SSRN: https://ssrn.com/abstract=3425994 or http://dx.doi.org/10.2139/ssrn.3425994
20. Panos, G. A., Pouliakas, K., and Zangelidis, A. (2011), "Multiple Job Holding as a Strategyfor Skills Diversification and Labour Market Mobility", *University of Essex CER Working Paper No. 4.*
21. Paxson, C.H. and Sicherman, N. (1996), "The dynamics of dual job holding and job mobility". *Journal of Labor Economics 14(3)* vol. 14, issue 3,: 357-93.
22. Partridge, Mark, (2002), ''Moonlighting in a High Growth Economy: Evidence from U.S. State-Level Data'. *Growth and Change*, Vol. 33, No. 4: 424-452.
23. Pesaran, M.H. and Pesaran, B. (1997). *Microsoft 4.0: Interactive Econometric Analysis*, Oxford University Press, Oxford.
24. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). "Bounds testing approaches to the analysis of level relationships". *Journal of Applied Econometrics*, 16(3), available at https://doi.org/10.1002/jae.616.
25. Pouliakas, K,. (2017), "Multiple job-holding: Career pathway or dire straits?" IZA World of Labor, Institute of Labor Economics (IZA), pages 356-356, May.
26. Renna, Francesco, (2006). "Moonlighting and Overtime: A Cross-Country Analysis". *Journal of Labor Research.* Vol. 27, No. 4 (Dec.): 575-591.
27. Robinson (2009), "Do Employees Have the Right to Moonlight", *Workforce*.
28. Saini, G.K. (2019), "A Caseleton Moonlighting: A Challenge for HR Manager", *Gjra - Global Journal for Research Analysis*, Volume-8, Issue-6.
29. Shisko, R and Rostker, B (1976), "The Economics of Multiple Job Holding", *American Economic Review*, 66(3): 298-308.

30. Stinson, J. F. (1987). “Moonlighting: a key to differences in measuring employment growth,” Monthly Labor Review 110(2), February, pp. 30-31.

31. Wu, Z., Baimbridge, M. and Zu, Y,(2008),"*Multiple Job Holding in the United Kingdom:Evidence from the British Household Panel Survey*," Nottingham Trent UniversityWorking Paper 2008/1.. available at https://ideas.repec.org/p/nbs/wpaper/2008-1.html