

**MODERATING EFFECT OF ECONOMIC FREEDOM ON THE
RELATIONSHIP BETWEEN HUMAN CAPITAL AND SHADOW
ECONOMY**

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EKONOMİK ÖZGÜRLÜĞÜN MODERATİF ETKİSİ*

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ABSTRACT: The empirical analysis of the relationship between human capital and shadow economy in the presence of economic freedom is conducted in this paper. Annual panel data are collected in the period 1999-2013 for the sample of 34 countries. The results of linear static and dynamic panel data estimators suggest an impact of economic freedom that is not significant. ARDL framework suggests a significant negative impact of human capital on shadow economy only in the long-run indicating that more educated workforce tends to avoid informal economic activities. Short-run impact is not found to be significant. This result is expected since human capital is considered to be a classic time-variant covariate, i.e. any change requires longer time period. The extended model suggests a significant negative impact of human capital only in the long-run. Economic freedom is not found to be significant in both, short- and the long-run. However, it is important to emphasize that the coefficient with moderator is significant and positive in the short-run indicating that economic freedom supports more educated workforce in their intention to decrease informal economic activity. Hence, as a policy implication there is a necessity to contribute to economic freedom in order to increase the human capital of workforce who will tend to decrease shadow economy.

Keywords: Human capital, Economic freedom, Moderating effect, Shadow economy

ÖZ: Bu yazıda ekonomik özgürlük varlığında insan sermayesi ile kayıt dışı ekonomisi arasındaki ilişkinin ampirik analizi yapılmaktadır. 34 ülke örnekleme için 1999-2013 dönemi yıllık panel verileri toplanmıştır. Doğrusal statik ve dinamik panel veri tahmin edicilerinin sonuçları, ekonomik özgürlüğün anlamlı olmayan etkisine işaret etmektedir. ARDL çerçevesi, eğitimin sadece uzun vadede kayıt dışı ekonomisi üzerindeki olumsuz etkisinin, daha eğitilmiş işgücünün kayıt dışı ekonomik faaliyetlerden kaçınma eğilimine işaret ettiğini göstermektedir. Kısa süreli etki anlamlı bulunmamıştır. İnsan sermayesinin klasik zaman varyantı değişkenleri olduğu için bu sonuç beklendiktir, yani herhangi bir değişiklik daha uzun bir zaman süresi gerektirir. Genişletilmiş model, eğitimin uzun vadede önemli bir negatif etkisine işaret etmektedir. Ekonomik özgürlük hem kısa hem de uzun vadede anlamlı bulunmamıştır. Ancak, moderatör katsayısının, kısa vadede, ekonomik özgürlüğün kayıt dışı ekonomik aktiviteyi azaltma niyetinde daha eğitilmiş işgücünü

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desteklediğini gösterecek şekilde anlamlı ve pozitif olduğunu vurgulamak önemlidir. Dolayısıyla, bir politika uygulaması olarak, kayıt dışı ekonomisini azaltma eğiliminde olacak insan sermayesi işgücünü arttırmak için ekonomik özgürlüğe katkıda bulunmak gereklidir.

Anahtar Kelimeler: İnsan Sermayesi, Ekonomik özgürlük, Moderatör etkisi, Kayıt dışı ekonomisi

1. INTRODUCTION

The role of human capital as the determinant of economic growth has been explored very broadly to date. Čiutienė, Meilienė, Savanevičienė, Vaitkevičius(2015:461) and Satrovic (2017:1, 2018b:20) claim that strong economy and growing economy is in general associated with high levels of human capital and real estate prices (Abul, 2019: 31). Therefore, both economic growth and human capital development are seeking for beneficial conditions (Satrovic, 2018a). Yet, these conditions are in general distorted by an informal economic sector.

Shadow economy receives much attention nowadays. It exists all over the world. In addition, it tends to influence the economic development of countries, standard of living as well as policies. Hence, there are many definitions of shadow economy. Shadow (informal, underground or hidden) is defined as a set of economic activities that are operated out of the framework of bureaucratic establishments. Ihrig and Moe (2004:541) give a similar definition indicating that shadow economy is a sector that produces goods that are legal but does not follow bureaucratic regulations. These definitions indicate that shadow economy is in contrary to formal economy since there are imperfect or no regulations by government (Elgin and Öztunali, 2012:2).

It is also important to emphasize that shadow economy strongly influences economic as well as social security of citizens. Hence, the research question of this paper is whether or not human capital influences shadow economy? Čiutienė et al. (2015:463) emphasize that shadow economy tends to have a negative impact on the drivers of human capital development. Apart from the fact that human capital receives much attention in research to date it is important to emphasize that the relationship between shadow economy and human capital has not been researched quite extensively. This gap arose due to the issue with the shadow economy's estimation. Hence, many authors and institutions propose different ways of measurement. These formulas differ and very often lack in terms of validity.

In terms of economic freedom it is important to emphasize that good institutions that guarantee economic freedom tend to increase the formal economy and reduce the informal. This is since it enables individuals to take personal choice on their economic activity (Muslija, 2018: 52). Hence, Dreher, Meon, Schneider (2007:1) claim that the positive relationship between bad institutions and lower

amount of income can occur due to the decrease in recorded output. In this light, production did not vanish, it rather went underground. Moreover, Johnson, Kaufmann, Zoido-Lobaton (1998:387) suggest that corruption has no significant impact on the economic output while controlling for shadow economy. Dreher et al. (2007:1) have anticipated the negative relationship between quality of institutions and the shadow economy. Apart from this it is important that the model that controls for shadow economy suggests a weaker relationship between the institutional quality and economic output.

In the last line in this section it is important to emphasize that many organizations support and encourage the education especially in developing countries. This is since human capital is considered to be one of the most important drivers of economic and social development. Hence, Buehn and Farzanegan (2013:2053) suggest that human capital tends to increase the productivity, enlarge innovation and consequently contribute to the economic development of the country. However, problems occur in the case when formal economy does not supply jobs due to structural unemployment or institutions that do not support labor market. Under these circumstances, some of the individuals enroll into informal economy in order to earn some money.

Hence this paper aims to fill in the gap in literature by examining the relationship between human capital and shadow economy while controlling for the impact of economic freedom as a moderator variable. This paper provides a detailed overview of literature on the matter. Moreover, the description of the data is given together with the variables of interest as well as the methodology. Most important part of this paper is the empirical part. Empirical findings are reported together with the interpretations. Paper ends by presenting concluding remarks and policy implications.

2. LITERATURE REVIEW

The relationship between human capital and economic growth has been investigated quite extensively in research to follow. However, the empirical evidence on the relationship between human capital and shadow economy while taking into account the moderating role of economic freedom is scarce. This part gives an overview on the empirical studies on the matter.

The issue of the development of human capital under the constraints of hidden economy is explored by Čiutienė et al. (2015:460). This paper aims to explore the interdependence, if any, between the shadow economy and human capital in the case of Lithuania. Linear regression model is used initially to give empirical evidence on the matter. Independent variables of interest are: GDP, unemployment, trade, population and labor force. In addition, the authors have used appropriate proxy variables of human capital. The data are collected over the

period ranging between 2005 and 2012. The first result of this study reports that the most important determinants of shadow economy are human capital and unemployment. Secondly, a positive association between shadow economy and foreign direct investments is found. The empirical and theoretical assumptions of this paper are in accordance with Torgler (2003:283), Alm and Torgler (2006:224) and Gomis-Porqueras, Peralta-Alva, Waller (2014:1).

Dreher et al. (2007:1) have investigated whether or not there exists the relationship between institutions, productivity and output under the conditions of informal economy. The results of this paper suggest a positive relationship between the quality of institutions, productivity and formal economy. Apart from these findings, it is important to emphasize that authors report a negative impact of the quality of institutions on hidden economy. Moreover, the authors suggest higher shadow economy in countries that record lower level of formal economy. Hence, the authors suggest that there is a necessity to take into account this bias. Hindriks et al. (1999:395) provide supportive evidence to these results.

The macroeconomic evidence of higher education is suggested to be mixed in Buehn and Farzanegan (2013:2053). Hence, the aim of this paper is to explore whether or not the quality of institutions can explain this result. The data are collected for 80 economies in the period ranging between 1999 and 2007. A negative relationship between the participation in education and shadow economy is found. However, this holds true only in the case of the high quality political institutions.

Gerxhani and Werfhorst (2011:464) have examined the engagement in shadow economy in the case of Albania. They are interested in the impact of education while controlling for institutional, individual as well as social factors. These authors suggest that the human capital can decrease the engagement in shadow economy due to the lower pecuniary motivations. The empirical evidence suggests a significant negative impact of education on the engagement in shadow economy. Moreover, this relationship is found to be independent from income.

Lastly, there is a necessity to point out the fact that many researchers have explored the relationship between variables of interest relying on the pioneering study Boeke (1953). The results to date are mixed in the case of time series as well as panel data framework. This debate was also the point of interest for Neef (2002:299) and Leonard (2002:42).

3. DATA, VARIABLES AND METHODOLOGY

This part of the paper summarizes the data used in the empirical research. Moreover, we have presented the variables of interest and the employed methodology.

3.1. Data and variables

This part of the paper gives an overview of the proxy variables of human capital, shadow economy and economic freedom. For this purpose, annual panel data are collected in the period ranging from 1999 to 2013 for the sample of 34 countries (Appendix 1). The sources of the data are: The Heritage Foundation, The World Bank and Schneider, Buehn, Montenegro (2010) and Schneider (2013 and 2015). Shadow economy size as a percentage of GDP (SE) is considered to be the appropriate proxy of activity of shadow economy.

On the other hand, education as a proxy of human capital is believed to play an important role in shadow economy. However, adequate measuring remains controversial. The hypothesis that education plays an important role in the development process is theoretically well substantiated in the literature, but empirical results on the matter remain mixed. This is due to the poor measuring of the education. This concern, therefore, brought up a question - how to measure education adequately? Only when an adequate and consistent measure of education is used it can be understood how it affects the growth process. Hanushek and Woessmann (2011:81) among others use school enrolment rates as proxies for education. Therefore, school enrollment, secondary (% gross - *EDU*) is used as a proxy of human capital. This variable presents the proportion of the population in secondary education in total population.

Lastly, Ozcan, Aslan, Nazlioglu (2017:80) propose the Index of Economic Freedom (*EFI*) to be an adequate proxy of economic freedom. Hence, this variable is accepted in this paper as well. The Heritage Foundation indicates that the economic freedom is “the fundamental right of every human to control his or her own labor and property”.

3.2. Methodology

The econometric methodology applied in this paper follows three steps. First, the panel unit root is tested for the variables. Furthermore, panel regression model is formed and estimated using linear static and dynamic estimators. Lastly, long- and short-term relationships are estimated using ARDL approach (Mangir, Kabaklarlı, Ayhan 2017: 67).

Panel unit root test

The stationary properties have been tested using Harris–Tzavalis test. This test assumes the fixed number of time periods. An additional assumption of this test is infinite number of panels.

Linear static panel data estimators

Models will be initially estimated using linear static panel data estimators. Hausman test will be used to decide between fixed and random effects.

Generalized method of moments

Dynamic will be incorporated into the model by formalizing model equation as AR (1) model as following (Eq. 1) (Satrovic and Muslija, 2018: 69; Dag, Kizilkaya, Demez, 2018: 21):

$$y_{it} = \alpha_t + (v + 1)y_{it-1} + \beta x_{it} + u_i + \varepsilon_{it} \quad (1)$$

where y_{it} represents the outcome variable, y_{it-1} is the lagged value of the outcome, x_{it} represents a vector of explanatory variables and moderator, u_i is individual effect, ε_{it} – error term while α_t denotes intercept that is period specific.

The coefficients in equation (1) can be derived using Arellano-Bover two-step GMM estimator. The overall validity of the instruments will be tested as well as the autocorrelation. Diagnostic tests include: Sargan test of overall validity of instruments and the test of second order autocorrelation.

ARDL approach

Moreover, the impacts in the short- and long-run will be examined using ARDL approach. ARDL is considered appropriate since it controls for the relationship in the long run disregarding the order of integration of variables (Pesaran, Shin, Smith 1999: 2). Attaoui, Ammpurim, Gargouri (2017: 13039) formalizes the model as following (Eq. 2):

$$\Delta Y_{1,it} = \alpha_{it} + \gamma_{it} Y_{1,it-1} + \sum_{l=2}^k \gamma_{li} X_{1,it-1} + \sum_{j=1}^{p-1} \delta_{lij} \Delta Y_{1,it-j} + \sum_{j=0}^{q-1} \sum_{l=2}^k \delta_{lij} \Delta X_{1,it-j} + \varepsilon_{1,it} \quad (2)$$

where Y is the outcome and X is the regressor. Error term is denoted by ε_{it} while Δ represents the first difference operator.

4. RESULTS OF THE RESEARCH

Results of the research section starts by presenting summary statistics on the variables of interest.

Table 1 presents the results for the overall sample of countries. Average shadow economy as a percentage of GDP equals 19.39% for 34 observed countries. The highest reported value of SE equals 37.30 while the lowest equals 6.60. Education variable equals on average 103.56%. The maximum reported value equals 161.02 while the minimum reported value equals 68.34. In terms of economic freedom, proxy variable equals on average 68.93. The highest reported value is equal 83.10 while the lowest reported value equals 46.20.

Table 1: Descriptive Statistics

Statistics	SE	EDU	EFI
mean	19.39	103.56	68.93
sd	7.94	14.79	7.72
max	37.30	161.02	83.10
min	6.60	68.34	46.20
skewness	0.23	1.67	-0.25
kurtosis	1.85	6.68	2.67
countries		34	

Furthermore, pair-wise correlations have been calculated. Correlations table-2 also contains first differences of the level variables. The highest correlation among all pair is reported between EFI and SE which is quite expectable assuming the fact that economic freedom tends to decrease significantly informal economic activity. Correlation table also indicates low correlation coefficients between first differences of the level variables. Therefore, first difference values control for the potential multicollinearity issues.

Table 2: Correlation Table

	SE	EDU	EFI	D.SE	D.EDU	D.EFI
SE	1					
EDU	-0.2761	1				
EFI	-0.7898	0.2993	1			
D.SE	-0.0787	-0.0427	0.0699	1		
D.EDU	0.0226	0.1591	-0.0185	-0.014	1	
D.EFI	0.0875	-0.0069	0.0161	-0.0517	0.0575	1

The results of unit root test are reported in Table 3. It is clear from the results that the assumption on stationary properties can be rejected in the case of all first differences in terms of 34 observed countries (for 1% level of significance). Therefore, first difference variables are used in research to follow in order to control for possible estimation issues.

Since Harris-Tzavalis unit-root tests confirm the rejection of the null hypothesis on the existence of unit root, a panel regression model is formed and estimated using linear static and dynamic panel data estimators. Results of Hausman test suggest random effects. Two models are estimated, one initial and one that controls for the moderating effect of economic freedom. Both of the

models claim an impact of education that is not significant. Hence, there is a necessity to take into account the potential estimation issues.

Table 3: Harris-Tzavalis Unit-Root Test

	Statistic	z	p-value
SE	0.831	0.559	0.712
D.SE	-0.082	-25.101	0.000
EDU	0.694	-3.605	0.000
D.EDU	-0.084	-25.158	0.000
EFI	0.771	-1.257	0.104
D.EFI	-0.001	-22.783	0.000

The impact of economic freedom is not reported to be significant as well as the coefficient with moderator. Hence, these modes are not reported to be significant indicating potential estimation issues.

Table 4: Linear Panel Data Estimators

VARIABLES	(1) RE	(2) RE	(3) GMM	(4) GMM
L1.D.SE			0.1327*** (0.0072)	0.1237*** (0.0112)
D.EDU	-0.0112 (0.0041)	0.0013 (0.0046)	-0.0018** (0.0008)	-0.0015 (0.0011)
D.EFI		-0.0094 (0.0120)		0.0036 (0.0036)
Moderator (D.EDU*D.EFI)		-0.0040 (0.0037)		-0.0001 (0.0001)
Constant	-0.3166*** (0.0199)	-0.3122*** (0.0203)	-0.2778*** (0.0035)	-0.2778*** (0.0040)
Hausman test	0.28	1.25		
p value	0.597	0.742		
Sargan test p value			1.000	1.000
AR(II) p value			0.911	0.871
Observations	476	476	442	442

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

The robustness tests indicate that the assumptions on no-autocorrelation and homoscedasticity are not satisfied. In addition, the dynamic trend is expected in the observed variables. Therefore, system GMM two step estimator is suggested to deal with the aforementioned estimation issues.

Table 5. ARDL Approach

		Coef.	St. Error	z	P>z	95% Conf. Interval	
Basic model	ECT						
	D.EDU	-0.019	0.004	-4.730	0.000	-0.027	-0.011
	SR						
	ECT	-0.915	0.043	-21.280	0.000	-1.000	-0.831
	D.EDU	-0.004	0.013	-0.300	0.762	-0.030	0.022
	D1.						
	_cons	-0.281	0.018	-15.210	0.000	-0.317	-0.245
	ECT						

Extended model	D.EDU	-0.013	0.006	-2.120	0.034	-0.025	-0.001
	D.EFI	0.010	0.018	0.560	0.574	-0.025	0.045
	Moderator	-0.184	0.149	-1.240	0.217	-0.477	0.108
	SR						
	ECT	-0.907	0.044	-20.460	0.000	-0.994	-0.820
	D.EDU	0.012	0.020	0.610	0.541	-0.027	0.052
	D1.						
	D.EFI	-0.005	0.016	-0.290	0.776	-0.036	0.027
	D1.						
	Moderator	0.147	0.028	5.290	0.000	0.092	0.201
D1.							
_cons	-0.290	0.022	-13.250	0.000	-0.333	-0.247	

Results of system GMM support the results of linear static panel data estimators indicating the need to take into account the potential endogeneity issue. Sargan test suggests that the assumption on overall validity of instruments is not rejected while AR(II) test does not provide evidence on the second order autocorrelation for all models.

The subject of interest in this paper is to analyze short- and long-run relationship between the variables of interest while controlling for the potential endogeneity issue. This is why ARDL framework is employed. Table 5 summarizes the estimations in the short- and long-run. The significant error correction (for a 5%) suggests that the process may diverge in the long-run. Initial model suggests a significant negative impact of human capital on shadow economy only in the long-run indicating that more educated workforce tends to avoid informal economic activities. Short-run impact is not found to be significant. This result is expected since human capital is considered to be a classic time-variant covariate, i.e. any change requires longer time period. The extended model suggests a significant negative impact of human capital only in the long-run. Economic freedom is not found to be significant in both, short- and the long-run. However, it is important to emphasize that the coefficient with moderator is significant and positive in the short-run indicating that economic freedom supports more educated workforce in their intention to decrease informal economic activity.

5. CONCLUSION

The aim of this paper is to revise the relationship between human capital and shadow economy while estimating the moderating role of economic freedom. The panel data are collected on annual basis for the sample of 34 countries over the period ranging between 1999 and 2013. Panel data econometrics is employed in order to provide empirical evidence on the matter. Two models are estimated. The initial one that explores the impact of human capital on shadow economy and the extended one that controls for the moderating role of economic freedom.

Initial model suggests a significant negative impact of human capital on shadow economy only in the long-run indicating that more educated workforce

tends to avoid informal economic activities. Short-run impact is not found to be significant. This result is expected since human capital is considered to be a classic time-variant covariate, i.e. any change requires longer time period. The extended model suggests a significant negative impact of human capital only in the long-run. Economic freedom is not found to be significant in both, short- and the long-run. However, it is important to emphasize that the coefficient with moderator is significant and positive in the short-run indicating that economic freedom supports more educated workforce in their intention to decrease informal economic activity.

Based on the results of this paper, policy recommendations include reducing the shadow economy and increasing the investments in human capital. In order to reach that, there is a necessity to contribute to economic freedom in order to increase the human capital of workforce who will tend to reduce the engagement in informal economic activity and to increase the formal economic output. By stimulating human capital via investments in education, several social benefits can be obtained. Firstly, more educated workforce is able to increase formal economic activity especially high-technology one, secondly to decrease unemployment rate and thirdly to decrease informal economic activity.

APPENDIX 1 – List of the countries

Australia	Denmark	Latvia	Portugal	United Kingdom
Austria	Finland	Lithuania	Romania	United States
Belgium	Germany	Luxembourg	Slovak Republic	
Bulgaria	Greece	Malta	Slovenia	
Canada	Hungary	Netherlands	Spain	
Croatia	Ireland	New Zealand	Sweden	
Cyprus	Italy	Norway	Switzerland	
Czech Republic	Japan	Poland	Turkey	

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