16th Annual Conference on Finance and Accounting, ACFA Prague 2015, 29th May 2015

Impact of Shadow Economy on Quality of Life: Indicators and Model Selection

Anna Kireenko[a]* Ekaterina Nevzorova[b]

[a]*Baikal State University of Economics and Law, Department of Taxation and Customs, Lenina Str. 11, Irkutsk 664003, Russian Federation*
[b]*Baikal State University of Economics and Law, Department of World Economy and Public Administration, Lenina Str. 11, Irkutsk 664003, Russian Federation*

Abstract

The purpose of the study was to examine the effect of shadow economy on the level and quality of life. It was supposed that shadow economy effects positively on the level of life (as shadow income increased total revenues). But it can impact negatively on the quality of life. The relationship between growth of life level and quality of life depends from the level of the shadow economy. Some of studies demonstrate the link of shadow economy with the separate quality of life indicators. However, in that cases, the quality of life is the casual variable, witch changes leads to the changes in the latent variable (the shadow economy). Our task is to determine the reverse effect - the shadow economy on the quality of life. At the initial stage of our analysis, the original sample of 150 countries was divided into 5 groups, according to the shadow economy size. Than the average values of each indicator for each cluster was calculated. Next, the determination a regression equation for each cluster and for general sample was done. For this purpose we use averages for each indicator for the period of 1999-2007. As a result of regression analysis, we found that «life expectancy at birth» and «Children in-school rate» are significant for each cluster and for the whole sample. The level of life increases according to the shadow economy's growth. In the same time, life quality indicators which reflects a long and healthy life and access to knowledge - decreases.The regression coefficient increases with the growth of the shadow economy. Our results demonstrate the correctness of the hypothesis about interrelationship between shadow economy and life quality.

Keywords: Shadow economy; Quality of life; Informal economy; Underground economy

---

* Corresponding author.
  E-mail address: kireenko-ap@isea.ru

1. Introduction

The shadow economy - is not only a Russian phenomenon. All, developed and developing countries facing this problem. There are activities that are directly related to the shadow economy, and cannot be legal (drugs and racketeering, etc.) and activities that can be legal or illegal depending from risks and benefits.

The shadow economy is sometimes considered a good thing. There are opinions that the shadow economy in the post-Soviet countries support the economic and social balance, and allows the population surviving. In our opinion, this characteristic of the shadow economy is the most dangerous. It means that the criminal economic behavior becomes the condition for business survival, and the citizens and authorities actual behavior marginally regulated by formal rules. Significant informal sector allows to increase revenues and to invest additional money. But it ignores the main purpose of the society - the preservation and development of human capital and well-being.

Shadow economy becomes a very popular object of study now. There are multitude definitions this phenomenon in literature. Handbook by OECD «Measuring the non-observed economy»[1] contains 27 terms, Williams (2004) indicates 35 terms. Also we should note the paper by Georgiou (2007) which expands this list. We took into consideration these sources, and drew up a conjoint list containing 49 definitions: alternate, autonomous, black, cash, cash-in-hand, clandestine, concealed, corrupt, counter, covert, dual, everyday, ghetto, grey, hidden, household, illegal, illegitimate, informal, invisible, irregular, marginal, moonlight, non-observed, non-official, occult, off-the-books, other, parallel, peripheral, precarious, second, secondary, secret, shadow, submerged, subterranean, twilight, underground, underwater, unexposed, unobserved, unofficial, unorganized, unrecorded, unregulated, unreported, unsanctioned, untaxed. Many studies have been also devoted to classification and typing of these activities, among which we cannot fail to mention the researches by E. L. Feige.

However, the impact of the shadow economy on the quality of life of the population is currently not sufficiently investigated. Inverse relationship between the level and quality of life was first suggested by J. Forester (founder of system dynamics). But, his model does not take into account the impact of the informal sector.

Hypothesis of the study: the shadow economy has variable effects on the level and quality of life. It effects positively on the level of life (as shadow income increased total revenues). But it can impact negatively on the quality of life (quality of working life, health, safety, etc.). Thus, the relationship between growth of life level and quality of life depends from the level of the shadow economy.

2. Review the models, reflecting shadow economy's effect on quality of life

Determination of the shadow economy is complicated by several factors: complexity assessments, multiplicity of shadow activity. Also, different methods provide overstated or understated results.

Various methods of measuring the size of the shadow economy can be divided into three approaches:

1. Direct approach
This is micro approach in whole. Direct approach includes:
- tax auditing
- surveys and other researches based on voluntary replies.

2. Indirect approach
This approach is mostly macroeconomic. Indirect approach includes:
- the method using differences between income and expenditure statistics
- the method using differences between officially measured and actual participation rates
- the transactions method
- the monetary methods

————————

[1] Measuring the non-observed economy – a Handbook (OECD-IMF-ILO-CIS Stat, 2002)

- the physical input method (based on data of electricity consumption), including Kaufmann–Kaliberda method and Lackó method

3. Model approach

This approach is implemented by compiling of econometric models using statistical tools to assess the shadow economy as «unobservable» variable. To date two types of such research were formed:

- Structural equation modeling (SEM), which lets to examine statistical links between unobservable and observable variables – see e.g. Buehn and Schneider (2009), Quintano and Mazzocchi (2013), Ruge (2010).
  - ○ Special cases of SEM - MIMIC (multiple indicator multiple cause model) and DYMIMIC (dynamic multiple-indicator multiple-cause model). The shadow economy is investigated as a «latent» variable, which is connected, on the one hand, with a set of observable indicators (reflecting changes in the size of the shadow economy) and, on the other hand, with a set of observed independent variables, which are considered as most significant factors determining unrecorded economic activity. (see e.g. Dell'Anno (2007), p. 256). MIMIC-method is most widely used at present.
- Dynamic stochastic general equilibrium (DSGE models) – see e.g. Orsi, Raggi, Turino (2012), Orsi, Raggi, Turino (2014), Colombo, Onnis, Tirelli (2013) These models are based on the assumption of rational behavior of agents which solve optimization problems; they use formal methods to parameters' estimation. The model considers two sectors: formal and informal, and 3 types of agents: firms, households, government. All interactions between firms, households and the government occur in a stochastic environment where short-term dynamics of the economy depends on performance, preferences, investment and financial shocks.
  - ○ A variant of these models are real business cycle models (RBC models). Here unobserved economy is introduced in a standard real business cycle model. Calculated data of the model (which were obtained on the basis of theoretically grounded determinants) are compared with the actual empirical data, and the difference indicates the scale of non-observed economy – see e.g. Roca, Moreno, Sánchez (2001), Birinci and Elgin (2013), Gomis-Porqueras, Peralta-Alva, Waller (2011).

We will not concentrate on all methods of measurement of shadow economy. These methods are described in the literature and different statistical manuals. In this research we concentrate on studying of relationship between shadow economy and various socio-economic indicators. These studies are based on the use of econometric models. Estimation by means of the model method is done both for certain countries in international comparison, and for regions within a country (such models are relatively infrequent).

A variety of factors can be used for modeling. A large group of studies is devoted to investigating the effect of institutional factors, democracy, and control on shadow economy (Table 1).

Table 1. Institutional factors affecting the size of shadow economy in MIMIC models.

Investigating factors	Examples of researches
Quality of institutions and public sector services	Johnson, S., Kaufmann, D., Zoido-Lobatón, P., 1998. Regulatory discretion and the unofficial economy, American Economic Review, Papers and Proceedings 88 (2), 387-392.
	Johnson, S., Kaufmann, D., Zoido-Lobatón, P., 1998. Corruption, public finances and the unofficial economy, World Bank Policy Research Working Paper Series No. 2169, The World Bank, Washington, D.C.
	Friedman, E., Johnson, S., Kaufmann, D., Zoido-Lobatón, P., 2000. Dodging the grabbing hand: the determinants of unofficial activity in 69 countries, Journal of Public Economics 76(4), 459-493.
	Buehn, A., Schneider, F., 2012. Shadow economies around the world: novel insights, accepted knowledge, and new estimates, International Tax and Public Finance 19, 139-171.
	Losby, J.L., Else, J.F., Kingslow, M.E., Edgcomb, E.L., Malm, E.T., Kao, V., 2002. Informal economy literature review. The Aspen Institute, Microenterprise Fund for Innovation, Effectiveness, Learning and Dissemination, Washington D.C., and ISED Consulting and Research, Newark DE.
	Schneider, F., Williams, C.C., 2013. The shadow economy. Institute of Economic Affairs, London.

«Property rights institutions» versus the relative role of «contracting institutions» (which support private contracts)	Acemoglu, D., Johnson, S., 2005. Unbundling institutions, Journal of Political Economy 113 (5), 949-995.
Labor market regulation	Kucera, D., Roncolato, L., 2008. Informal employment: two contested policy issues, International Labor Review 147(3), 321-348.
Quality of administration	Glaeser, E. L., Kessler, D. P., Piehl, A. M., 1998. What do prosecutors maximize? An analysis of drug offenders and concurrent jurisdiction (No. w6602). National Bureau of Economic Research.
Democratic system	Rivera-Batiz, F., 2002. Democracy, governance, and economic growth: theory and evidence. Review of Development Economics 6 (2), 225-247.
Elements of direct democracy	Torgler, B., 2005. Tax morale and direct democracy, European Journal of Political Economy 21, 525-531.
Participatory democracy	Torgler, B., Schneider, F., Schaltegger, C. A., 2010. Local autonomy, tax morale, and the shadow economy. Public Choice 144(1-2), 293-321.
Social capital / trust	D'Hernoncourt, J., Méon, P. G., 2012. The not so dark side of trust: Does trust increase the size of the shadow economy? Journal of economic behavior & organization 81(1), 97-121.
Punishment and controls	Becker, G., 1968. Crime and punishment: an economic approach, Journal of Political Economy 76, 169-217.
Deterrence	Pedersen, S., 2003. The shadow economy in Germany, Great Britain and Scandinavia: a measurement based on questionnaire service, Study No. 10, The Rockwool Foundation Research Unit, Copenhagen.
Corruption	Johnson, S., Kaufmann D., Shleifer A., 1997. The unofficial economy in transition. Brookings Papers on Economic Activity 2, 159-239.

Source: compiled by the authors using Thießen, U. (2010).

There are studies devoted to investigating the effect of taxation on shadow economy (Table 2).

Table 2. Parameters of taxation affecting the size of shadow economy in MIMIC models.

Investigating factors	Examples of researches
Tax- and social security burden	Allingham, M. G., Sandmo A., 1972. Income tax evasion: a theoretical analysis. Journal of Public Economics 1, 323 – 338.
	Buehn, A., Schneider, F., 2012. Shadow economies around the world: novel insights, accepted knowledge, and new estimates. International Tax and Public Finance 19, 139-171.
Interaction with tax authorities	Akerlof, G. A., 1982. Labor contracts as partial gift exchange. Quarterly Journal of Economics 84(3), 488-500.
Tax morale	Alm J., Torgler, B., 2006. Culture differences and tax morale in the United States and in Europe. Journal of economic psychology 27(2), 224-246.
	Torgler, B., Schneider F., 2007. The impact of tax morale and institutional quality on the shadow economy. CESIFO working paper No. 1899
	Torgler, B., Schneider F., Schaltegger C. A., 2010. Local autonomy, tax morale, and the shadow economy. Public Choice 144(1/2), 293-321.
	Feld, L.P., Schneider F., 2010. Survey on the shadow economy and undeclared earnings in OECD countries, German Economic Review 11(2), 109-149.

Source: compiled by the authors using Thießen, U. (2010).

There are also a lot of studies linking shadow economy and certain components of life quality, such as personal incomes, employment, inequality of distribution, environmental pollution (see Table 3).

Table 3. Components of life quality related to shadow economy in MIMIC models.

Investigating factors	Examples of researches
Development of the official economy	Schneider, F., Williams, C.C., 2013. The shadow economy. Institute of Economic Affairs, London.
	Feld, L.P., Schneider, F., 2010. Survey on the shadow economy and undeclared earnings in OECD countries. German Economic Review 11(2), 109-149.
Unemployment / under-employment	Chong, A., Gradstein, M., 2007. Inequality and informality, Journal of Public Economics 91, 159-179.

Inequality of the income distribution	Amendola, A., Dell'Anno, R., 2010. Institutions and human development in the Latin America shadow economy. Estudios en Derecho y Gobierno 3(1), 9-25.
	Valentini, E., 2007. Inequality and underground economy: a not so easy relationship. Universita Politecnica Delle Marche, Quaderni Di Ricerca 283.
	Rosser Jr, J. B., Rosser, M. V., 2001. Another failure of the Washington Consensus on transition countries. Challenge 44(2), 39-50.
	Kar, S., Saha S., 2012. Corruption, shadow economy and income inequality: Evidence from Asia. IZA Discussion Paper No. 7106.
	Mishra, A., Ray R., 2010. Informality, corruption, and inequality. Working Paper. Bath, U. K.: Department of Economics, University of Bath. (Bath Economics Research Working Papers; 13/10)
Environmental pollution	Elgin C., Oztunali O., 2014. Pollution and informal economy. Economic Systems 38, 333–349.
	Biswas, A.K., Farzanegan, M. R., Thum, M., 2012. Pollution, shadow economy and corruption: Theory and evidence. Ecological Economics 75, 114–125.
	Goel, R. K., Herrala, R., Mazhar, U., 2013. Institutional quality and environmental pollution: MENA countries versus the rest of the world. Economic Systems 37(4), 508-521.

Source: compiled by the authors using Thießen, U. (2010).

Thus, there are different models to determine the size of the shadow economy. Some of them demonstrate the link with the separate indicators of life quality. However, in these models, the quality of life is the casual variable, which changes leads to the changes in the latent variable (the shadow economy). Our task is to determine the reverse effect – the shadow economy on the quality of life.

3. Testing the hypothesis about the impact of shadow economy on the quality of life

To verify our hypothesis we try to compare quality of life and shadow economy indicators in different countries of the world.

The most extensive measurement of the shadow economy in different parts of the world gives Schneider, (2010). His data covers a significant number of countries (more than 150).

One of the generally accepted indexes used for international comparisons of quality of life is Human Development Index. HDI focuses on quality of life measuring based on statistics. HDI is an integral index: which summarizes the index reflects a long and healthy life, access to knowledge and level of income. Three corresponding indexes are calculated for each area:

- The index of life expectancy: measured as life expectancy at birth.
- The index of education: measured by average school life expectancy of children of school age and mean years of schooling of the adult population.
- The index of gross national income: measured as value of the gross national income per capita.

For our purposes, we cannot use complete HDI index, (because it includes income, but we can use its corresponding indexes reflecting the quality of life.

- GDP per capita growth (annual %)[2]
- Population growth (annual %)[3]
- Unemployment, total (% of total labor force) (modeled ILO estimate)[4]
- Life expectancy at birth, total (years)[5]

_____

[2] http://data.worldbank.org/indicator/NY.GDP.PCAP.KD.ZG
[3] http://data.worldbank.org/indicator/SP.POP.GROW
[4] http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS
[5] http://data.worldbank.org/indicator/SP.DYN.LE00.IN

- Out-of-school rate for children of primary school age (%). Total[6]

We try to find quality of life data for the period comparable with Schneider's measurement of the shadow economy. To fulfill this condition, we need quality of life indicators for 1999-2007.

Indicator «Life expectancy at birth» (that directly used to assess life quality) fully meets these requirements. However indicator «Mean years of schooling (of adults) (years)» is absent in statistics for some years of this period. Based the database of World Bank (section «Education»), we choose an indicator for testing our hypothesis; this indicator should meet the following requirements:

- the availability of data for each year during this period, and later till the current time (in order to further prediction);
- indicator points at the development of education for the population as a whole (both for male and for female);
- the availability of an indicator for the maximum possible number of countries, where data on shadow economy are available;
- indicator describes the enrolment in primary education.

Considering these requirements, we chose indicator «Out-of-school rate for children of primary school age (%). Total» to test our hypothesis.

We do calculations using SPSS.

The total sample includes data on 150 countries that are very heterogeneous in selected indicators. At the initial stage of our analysis, we divide the original sample into 5 groups, thereby providing visible results. We do clusterization of complete sample according indicator «Shadow economy». We specify following condition of clustering: to divide complete sample into 5 clusters. This condition stems from the fact that such division is often used in various international rankings. The result of clustering is represented in the Table 4.

Table 4. Composition of clusters.

Clusters – by size of shadow economy	Number of countries	Specific weight of each cluster	Countries
Minimal shadow economy	36	24%	Australia, Austria, Bahrain, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Hong Kong (China), Iceland, Indonesia, Iran (Islamic Rep.), Ireland, Japan, Jordan, Kuwait, Luxembourg, Macao (China), Mongolia, Netherlands, New Zealand, Norway, Oman, Qatar, Saudi Arabia, Singapore, Slovak Republic, Sweden, Switzerland, Syrian Arab Republic, United Kingdom, United States, Vietnam
Shadow economy below the average	25	17%	Argentina, The Bahamas, Belgium, Bhutan, Costa Rica, Cyprus, Greece, Hungary, India, Israel, Italy, Korea (Rep.), Lao PDR, Latvia, Maldives, Malta, Mauritius, Mexico, Poland, Portugal, Slovenia, South Africa, Spain, United Arab Emirates, Yemen (Rep.)
Middle shadow economy	43	29%	Albania, Algeria, Bangladesh, Bosnia & Herzegovina, Botswana, Brazil, Brunei Darussalam, Bulgaria, Cameroon, Cape Verde, Colombia, Comoros, Croatia, Dominican Republic, Ecuador, Egypt (Arab Rep.), Equatorial Guinea, Estonia, Ethiopia, Fiji, Guinea, Guyana, Jamaica, Kenya, Lebanon, Lesotho, Libyan Arab Jamahiriya, Lithuania, Macedonia (FYR), Malaysia, Morocco, Namibia, Nepal, Pakistan, Papua New Guinea, Paraguay, Romania, Solomon Islands, Suriname, Trinidad and Tobago , Tunisia, Turkey, Venezuela (RB)

---

[6] http://data.worldbank.org/data-catalog/ed-stats

Shadow economy above the average	39	26%	Angola, Armenia, Belarus, Belize, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Congo (Dem. Rep.), Congo (Rep.), Cote d'Ivoire, El Salvador, Eritrea , Gabon, The Gambia, Ghana, Guatemala, Guinea-Bissau, Honduras, Kazakhstan, Kyrgyz Republic, Liberia, Madagascar, Malawi, Mali, Nicaragua, Philippines, Russian Federation, Senegal, Sierra Leone, Sri Lanka, Tajikistan, Thailand, Uganda, Ukraine, Uruguay, Zambia
Maximal shadow economy	7	5%	Azerbaijan, Bolivia, Georgia, Haiti, Peru, Tanzania, Zimbabwe
Total	150		

Source: Authors' calculation

Clustering results demonstrate uneven distribution of countries into clusters. The largest number of countries has an average value of the indicator of shadow economy. Cluster having maximal shadow economy is very different from the others: it has a very small size. There are two post-soviet countries in this cluster: Azerbaijan and Georgia.

Next, for each cluster, we calculated the average values of each indicator (Table 5).

Table 5. Average value of indicators.

	Shadow economy	GDP per capita growth	Population growth	Unemployment	Life expectancy	Out-of-school rate
Minimal shadow economy	15,56	2,82	1,40	6,35	76,58	2,25
Shadow economy below the average	26,27	2,68	1,32	8,59	72,95	4,52
Middle shadow economy	34,48	3,03	1,34	11,61	66,57	8,29
Shadow economy above the average	44,79	2,92	2,01	7,69	59,13	13,13
Maximal shadow economy	60,69	2,81	1,22	6,89	61,33	8,29
Total	32,31	3,06	1,54	8,48	68,01	7,24

Source: Authors' calculation

The obtained results let to reveal a tendency: the more the share of shadow economy, the less the value of life expectancy, and the more the «Out-of-school rate» (simultaneously). After analyzing the data of Azerbaijan and Georgia (which have been mentioned previously), it is clear that the values of the data for these countries is strongly affected on mean of whole this cluster because of its small size.

Post-soviet origin of these countries could largely explain the values of such indicators as «Life expectancy» and «Out-of-school rate». These indicators evaluated at the level of other countries, which are former Soviet republics (i.e. approaching to the values of the most developed countries of the world). Therefore, in our opinion, average value of these indicators in this cluster does not disprove general trend.

Next, we determine a regression equation for each cluster and for general sample. For this purpose we use averages for each indicator for the period under review. The developed models do not include a constant. (Argument «pro» model without constant - see Dell'Anno (2007))

Characteristics of each model are following (Table 6):

Table 6. Model Summary.

	R	R Square	Adjusted R Square	Std. Error of the Estimate
Minimal shadow economy	0,984	0,969	0,966	2,93109
Shadow economy below the average	0,993	0,985	0,984	3,35253
Middle shadow economy	0,997	0,993	0,993	2,92593
Shadow economy above the average	0,993	0,987	0,986	5,25795
Maximal shadow economy	0,988	0,976	0,972	10,18772
Total	0,933	0,87	0,867	12,73549

Source: Authors' calculation

Values of R-square for each model are close to 1.0. Cluster with middle shadow economy provides model with best quality. The coefficients of the models and data about levels of their significance are presented in Table 7.

Table 7. Model coefficients.

Coefficients	Minimal shadow economy		Shadow economy below the average		Middle shadow economy		Shadow economy above the average		Maximal shadow economy		Total	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Shadow economy	1,023	0,002										
Unemployment	0,601	0									0,472	0,014
Life expectancy	0,134	0	0,335	0	0,458	0	0,654	0	0,958	0	0,317	0
Out-of-school rate			0,259	0,002	0,302	0	0,193	0			0,519	0

Source: Authors' calculation

B – unstandardized coefficients

Sig – significance of a regression coefficient (p-value)

As a result of regression analysis, we found that «life expectancy at birth» is significant for each cluster and for the entire set of countries as a whole. It is noteworthy that the regression coefficient increases with the growth of the shadow economy. Negative interrelationship between shadow economy and life expectancy at birth is graphically represented by diagram (Fig. 1).
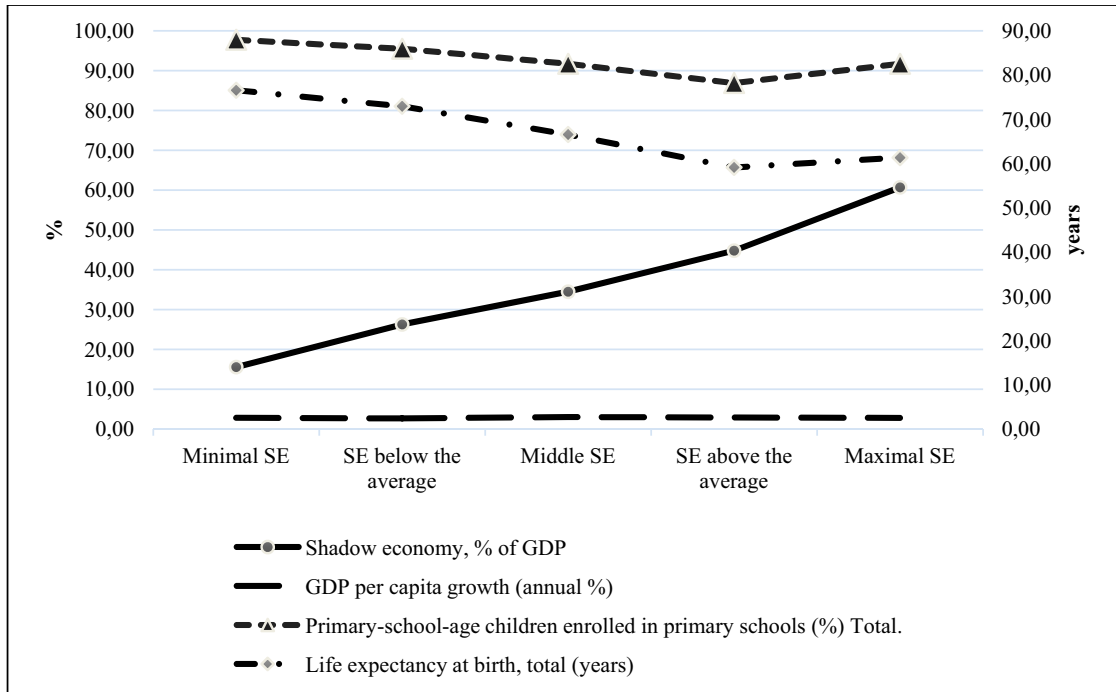

Fig.1. Interrelationship between shadow economy and life quality indicators.

The interrelationship between the indicator of shadow economy and the growth rate of GDP per capita is not so clearly marked.

Thus, our results support the hypothesis concerning interrelationship between shadow economy and life quality (excluding income component).

4. Conclusion

The impact of the shadow economy on the quality of life of the population is currently not sufficiently investigated.

It was suggested that the shadow economy has variable effects on the level and quality of life. It effects positively on the level of life (as shadow income increased total revenues). But it can impact negatively on the quality of life (quality of working life, health, safety, etc.).

Determination of the shadow economy is complicated by several factors: complexity assessments, multiplicity of shadow activity. Also, different methods provide overstated or understated results. In this research we concentrate on studying of relationship between shadow economy and various socio-economic indicators. Different models allow estimating the size of the shadow economy. Some of them demonstrate the link with the separate indicators of life quality. However, in these models, the quality of life is the casual variable, which changes leads to the changes in the latent variable (the shadow economy). Our task was to determine the reverse effect - the shadow economy on the quality of life.

To verify our hypothesis we try to compare quality of life and shadow economy indicators in different countries of the world and World Bank data about GDP per capita growth, Population growth, Unemployment, Life expectancy at birth, Out-of-school rate for children. After clustering complete sample according to indicator «Shadow economy» we determine a regression equation for each cluster and for general sample. As a result of regression analysis, we found that «life expectancy at birth» is significant for each cluster and for the entire set of countries as a whole. It is noteworthy that the regression coefficient increases with the growth of the shadow economy. Our results demonstrate the correctness of the hypothesis about interrelationship between shadow economy and life quality (excluding income component).

Acknowledgement

References

Alm, J., Embaye, A., 2013. Using dynamic panel methods to estimate shadow economies around the world, 1984–2006. Public Finance Review 41(5), 510-543.

Birinci, S., Elgin, C., 2013. Shadow economy over the business cycle: how do formal and informal cycles interact? Unpublished manuscript.

Buehn, A., Schneider, F., 2009. Corruption and the shadow economy: a structural equation model approach (No. 4182). IZA discussion papers.

Colombo, E., Onnis, L., Tirelli, P., 2013. Shadow economies at times of banking crises: empirics and theory. University of Milan Bicocca Department of Economics, Management and Statistics Working Paper 234.

Dell'Anno, R., 2007. The shadow economy in Portugal: an analysis with the MIMIC approach. Journal of Applied Economics 10(2), 253-277.

Georgiou, G. M., 2007. Measuring the size of the informal economy: a critical review, Central Bank of Cyprus, Working Paper 2007-1.

Gomis-Porqueras, P., Peralta-Alva, A., Waller, C. J., 2011. Quantifying the shadow economy: measurement with theory. Federal Reserve Bank of St. Louis, Working Paper Series 2011-015.

Johnson, S., Kaufmann D., Shleifer, A., 1997. Politics and entrepreneurship in transition economies. Working paper series, No. 50. The William Davidson Institute, University of Michigan.

Kaufmann, D., Kaliberda, A., 1996. Integrating the unofficial economy into the dynamics of post-socialist economies. Economic transition in Russia and the new states of Eurasia 8, 81.

Lackó, M., 2000. Hidden economy–an unknown quantity? Comparative analysis of hidden economies in transition countries, 1989–95. Economics of Transition 8(1), 117-149.

Orsi, R., Raggi, D., Turino, F., 2012. Estimating the size of the underground economy: A DSGE Approach.

Orsi, R., Raggi, D., Turino, F., 2014. Size, trend, and policy implications of the underground economy. Review of Economic Dynamics 17 (2014) 417–436.

Quintano, C., Mazzocchi, P., 2013. The shadow economy beyond European public governance. Economic Systems 37(4), 650-670.

Roca, J. C. C., Moreno, C. D., Sánchez, J. E. G., 2001. Underground economy and aggregate fluctuations. Spanish Economic Review 3(1), 41-53.

Ruge, M., 2010. Determinants and size of the shadow economy. An empirical Structural Equation Model with latent variables. Unpublished manuscript.

Schneider, F., Buehn A., Montenegro, C. E. 2010. Shadow economies all over the world: new estimates for 162 countries from 1999 to 2007. World Bank Policy Research Working Paper Series.

Thießen, U., 2010. The shadow economy in international comparison: options for economic policy derived from an OECD panel analysis. International Economic Journal 24(4), 481-509.

Williams, C. C., 2004. Cash-in-hand work [Electronic book]: the underground sector and the hidden economy of favours. – Palgrave Macmillan.