Abstract. *Processes assessing the audit risk or fraud risk at company level, call on professional judgment and experience of auditors or anti-fraud managers considering as risk assessment procedure, the concentric circles technique, in assessing national economic environment, the industry and then the internal environment of the company. If for assessing risks in the industry we refer to the specific regulations and business practices and for reporting and internal environment of the organization, there is a wide range of internal control protocols that are verified and validated, for the national economic environment issues become more complicated. Most audit companies are using the perception indexes issued by Transparency International and World Bank Institute. This paper shows the limits of those indexes and presents an advanced econometric analysis for corruption level assessment. The paper demonstrates that using factor analysis by auditors becomes an instrument of major importance in determining accurate audit risk or fraud risk associated with national economic context*

Keywords: corruption, bribery, econometric analysis, audit risk, macro-tools for national economic context audit risk

CORRUPTION AND BRIBERY ASSESSMENT – ECONOMETRICS ALGORITHMS AND PERCEPTION INDEX

Elena Monica SABĂU
Romanian Academy, Iaşi
Bd. Carol I, no. 8, Iaşi, Romania
e-mail: emsabau@gmail.com

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1. Introduction

Visible and prevalent in emerging markets, corruption is not a social phenomenon that can be ignored by businesses; it is a first line threat, which directly affects the competitive economic environment. As a social phenomenon, corruption is seen as abuse of power to achieve a personal gain, taking various forms from bribery to misappropriation of funds.

Today the phenomenon of corruption is not tacitly tackled, managed only within the national boundaries of a country, but is subject to international anti-corruption movement involving many organizations and companies. International commitment against corruption is represented in the first line by the organization Transparency International (TI), the Organization for Economic Cooperation and Development (OECD), World Bank Institute (WBI) and the United Nations Convention against Corruption. Their collective action produces every year resources (in the form of study guides, indicators) that can be used by companies, public or official institutions to promote ethics and integrity policies, to condemn corruption and to build integrated systems for the prevention and detection of fraud acts.

Several studies (Pontelli, 2007, 2010, 2011; Ackerman, 2011; Cressy, 2011) refer to the measurement, macro-micro-economic implications and causes, using econometrics and public perception. Although popular, the Corruption Perceptions Index and Bribe Payers Barometer (IT) do not use mathematical basis, the relevance being challenged them (Duncan, 2006; Lambsdorff, 2006; Donchev, 2007; Urra, 2007).

Scientific economic analysis uses econometric models formalizing four categories of factors of influence: political and legal, historical, socio-cultural and economic factors, each emphasizing a specific model factor. The main studies are classified according to the factors considered and addressed economic sector: economic growth (Abed and Davoodi, 2000), specific risks (Bishop, 2009; Loughman, 2011), the decentralization process (Shah, 2006), the military sector (Gupta, 2001), public policies (Ackerman, 2005), and investment efficiency (Kaufman, 2008). Mathematical formalization using linear regression, VAR, co-integrated series analysis, model mimics and simultaneous equations systems (Andrew, 2008). Local research considers exogenous variables, endogenous and temporal trends, using the method of least squares and method of moments (Matthew, 2008; Andrei, 2008, 2009).

Corruption, approached initially only by formal institutions of a state, is now embedded by multinational companies in anti-fraud strategies and risk management process, being considered as a potential factor influencing business fraud risk and a trigger for the type of employee behavior.

Starting from the premise that the third pillar of fraud – justification (rationalization) is grounded in psychological behavior of an individual, external environmental factors influencing his life, the research study analyses the influence of macroeconomic factors on corruption.

Using econometric analysis, the countries from the European Union and Turkey will be grouped according determinants of corruption, and then the results will

be compared with the Transparency International (TI) ranking. Knowing the scientific limits of Corruption Perceptions Index issued by TI, we will try to validate the results by determining the level of corruption in a country, having like variables the influencing factors as macroeconomic indicators.

Extrapolating at the macro level the "tone at the top" concept, we agree corruption level in a country strongly influences the social behavior of its citizens, the default attitude towards acts of fraud. A healthy economic system is based of course on the main factors of economic growth and monetary stability, but we cannot neglect aspects of business security, fairness, market players, equal opportunities, the regulatory and economic protection against illegalities; issues that influence a country's credibility as a potential investment market.

Processes assessing the audit risk or fraud risk at company level, call on professional judgment and experience of auditors or anti-fraud managers considering as risk assessment procedure, the concentric circles technique, in assessing national economic environment, the industry and then the internal environment of the company. If for assessing risks in the industry we refer to the specific regulations and business practices and for reporting and internal environment of the organization, there is a wide range of internal control protocols that are verified and validated, for the national economic environment issues become more complicated.

The national economic context at time T (risk assessment time) is supposed to be evaluated and implemented as value at risk, according to general economic factors, such as the general level of economic activity, interest rates, availability of financing, inflation, reevaluation of currency, monetary government policies, taxation, financial incentives, tariff and trade restrictions, currency and control the degree of corruption, the type of civilization, the economic culture, the list is not exhaustive. The degree of corruption in a country can be regarded as a function of these indicators, as each of them can be evaluated separately. Given, however, that the reason for assessing national economic context at time T, is determining audit risk (the risk of issuing an inappropriate audit opinion when the financial statements contain material misstatements) or the fraud, we agree to hypothesize that all these general economic factors must be evaluated according to their potential to cause or create illegal conduct that would adversely affect an entity's financial statements and auditor's opinion implicitly.

Considered as the first element in assessing economic context, the level of corruption in a country is subject to many research and empirical studies, including global indices released by Transparency International and the World Bank Institute (WBI).

Both sources have their limitations, most research referring to their bias (based on questionnaires, the respondents perceived the phenomenon of corruption and own experiences) and that neither assess the loss value because corruption - knowing that the risk is will determine the likelihood and impact. This research aims to examine the validity of the Corruption Perceptions Index issued by TI and WBI and propose alternative methods, scientific, determining audit risk due to national economic context.

2. Transparency International and World Bank Institute Perception Index

2.1. Study on Transparency International

Corruption Perceptions Index (CPI) ranks countries/territories based on the level to which corruption existence is perceived by the public sector. It is a composite index, a combination of surveys, based on data corruption specialist surveys conducted by several independent and reputable institutions. The CPI reflects views from around the world, including those of experts living and working in the countries evaluated. CPI has a value scale from 0 (high corruption) to 10 (high integrity), the score of a country (from 0 to 10) indicating the perceived level of corruption in a country, while ranking indicates the position its relative to the other countries included in the index.

Comparative analysis of CPI for 2009-2010 showed that Romania ranks 26 of 28 countries considered (27 EU and Turkey), with an index of 3.7, down 0.1 from 2009, outpacing only Bulgaria and Greece with CPI 3.6 and 3.5. The difference from 2009, when Romania was in last place, together with Bulgaria and Greece, is that the two countries fell more than Romania, and its position in the ranking above is obtained only on account higher deficiencies in other countries. Compared to the European average of 6.23, Romania is at a difference of 68%, up from 2009, when the difference was 65%.

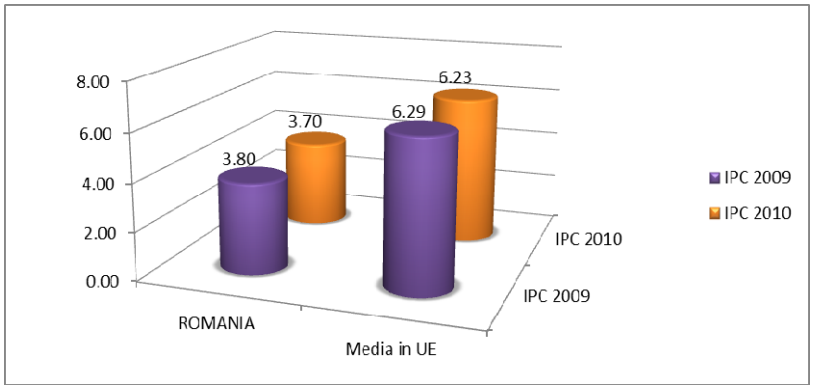


Figure 1. **CPI Evolution in Romania in 2009 and 2010**

Global Corruption Barometer (the Barometer) is the largest public opinion survey conducted every year worldwide to investigate how corruption affects the daily lives of ordinary people. Citizens interviewed for the study in 2010 considered that the level of corruption has increased alarmingly in the past three years, which should concern us because at the European Union level it is considered that corruption has grown by 73% of the respondents.

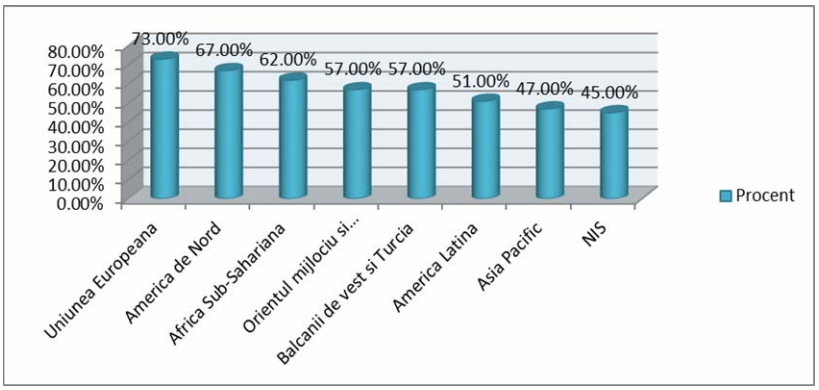


Figure 2. **Perception for corruption level growth**

Romanians' perception is that corruption has increased in the last three years, 87% of respondents considering this, while only 11% believe that it remains the same, and 2% that decreased perception placing Romania 14 percent above the European average.

TI analysis shows that in the last 12 months EU citizens said they had paid bribes in an average rate of 10.66%, amounts for the different state institutions. Romania is above the EU average of 17.34 per cent, 28% of respondents stating that they paid bribes to various government institutions in the last 12 months.

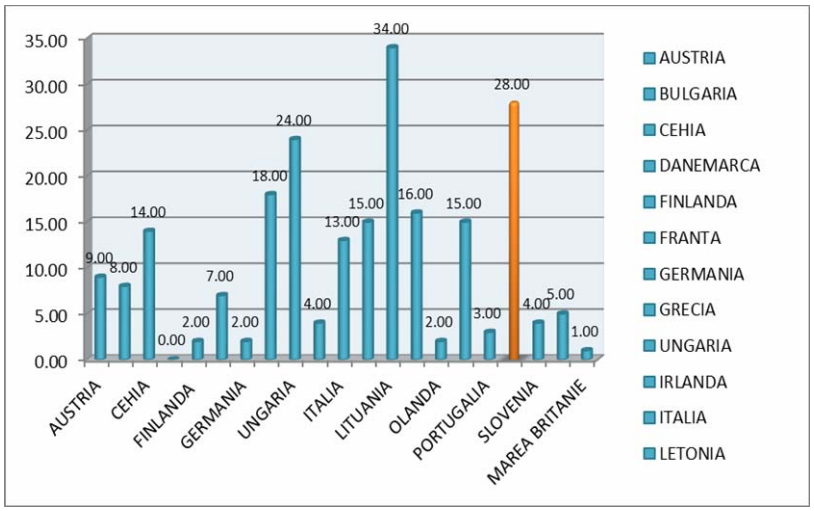


Figure 3. **Bribery payment - Romania - EU**

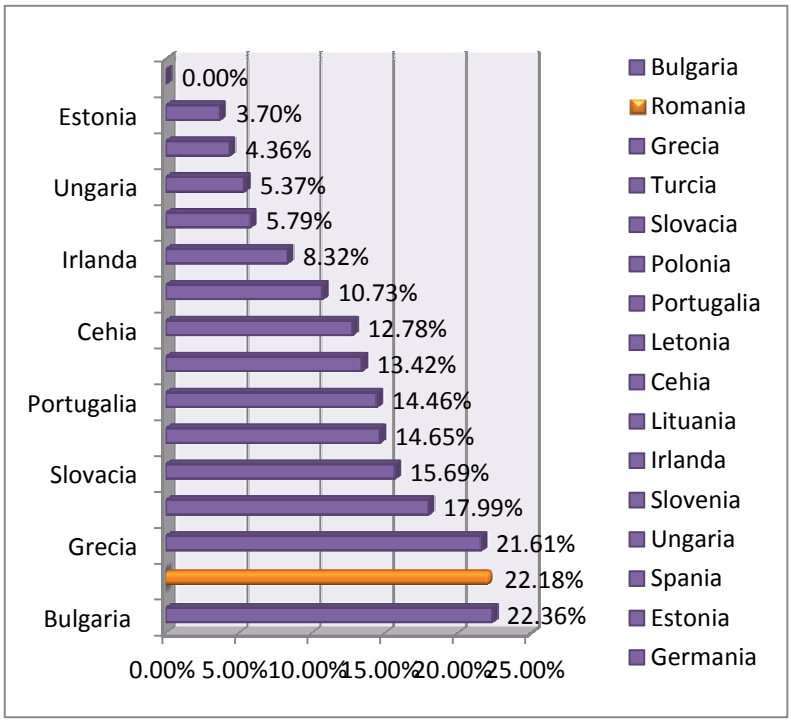
Regarding the perception of sectors/industries most affected by corruption perception identifies Romania again above the European average. The private sector in Romania is seen as corrupt, and the population does not have confidence in the business environment to which Romanians granted only 2% share of the private trust. We can observe the general acceptance of the phenomenon of corruption and that people are trying to adapt the fact that public confidence in institutions, whether domestic or foreign, public, private or NGO, is below the European general population. During the same period, European perceptions are ranked average of 17% and international bodies like the IMF and the World Bank by almost 11%.

2.2. Study on the World Bank Institute

As indicators of the World Bank Institute on corruption and the possibility of committing acts of fraud were identified: Graft index, business constraints, the average annual number of meetings required with the tax office, the average time needed to prepare financial reports tax and the average number of days required to obtain a work permit or a license, facility index and index of business access to finance.

Graft Index is a composite index of corruption, reflecting the prevalence of bribery in 125 countries, the percentage of companies that were required or which are expected bribes in transactions with various state institutions. The set of indicators components include: average number of cases where companies were required gifts in meetings with tax official of the state and the average number of cases where companies were asked to sign a contract gifts with the state (or as a percentage of the contract value).

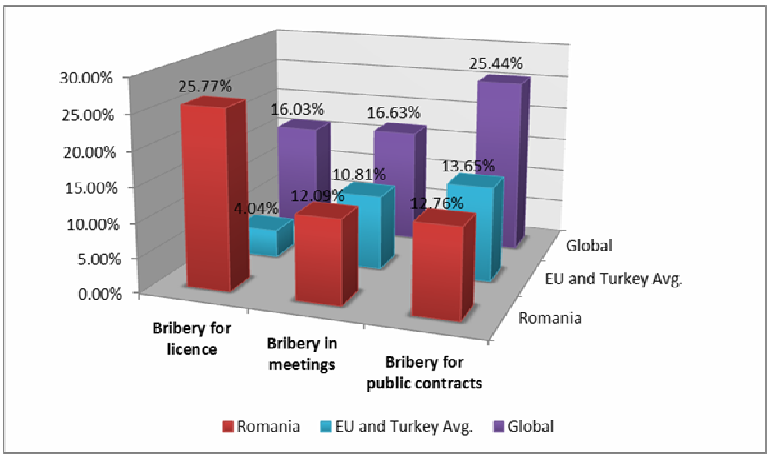
The 15 EU countries and Turkey for which the index is available have values within a range of 0-23% for the number of companies that would pay a bribe public officials to solve problems. Romania has a share of 22.18%, the upper limit analyzed in global average 5.74 percent, exceeded only by Bulgaria that record a rate of 22.36%. The gap between groups of countries is high. Using separation into groups of countries analyzed outlines three major groups ranges 0-10%, 10-20% and 20-30%, Romania hovering above in group clearly at a distance of 4.19 percent for Turkey, the last country in the group 2-a and 6.49 percent over Slovakia, the second country in this group.



Source: author's computations according to the www.enterprisesurvey.com

Figure 4. **The top 15 countries in the EU and Turkey on the basis of willingness to pay bribe to public officials**

Ranking is maintained for the other indicators making up the index Graft for the indicator on willingness to pay bribes to obtain a license or permit, Romania has a share of 25.77%, being the top ranking, followed by Bulgaria at a significant distance from 9%, hovering above the European average of 21.72 percent and 9.74 percent above the global average. Romanians are however reluctant to bribe meetings with state officials, placing 4th position (Greece – 55.91%, Portugal – 52.14% and Spain – 14.64%) and accounted for only 9.12% above the European average by 1.28 percent, but below the 4.54 percent global. Indicator of bribes paid to obtain a contract with public funds, placing Romania on the 8th position in the ranking with 12.76% below the EU average of 0.88 percent and 12.68 percent in the aggregate.



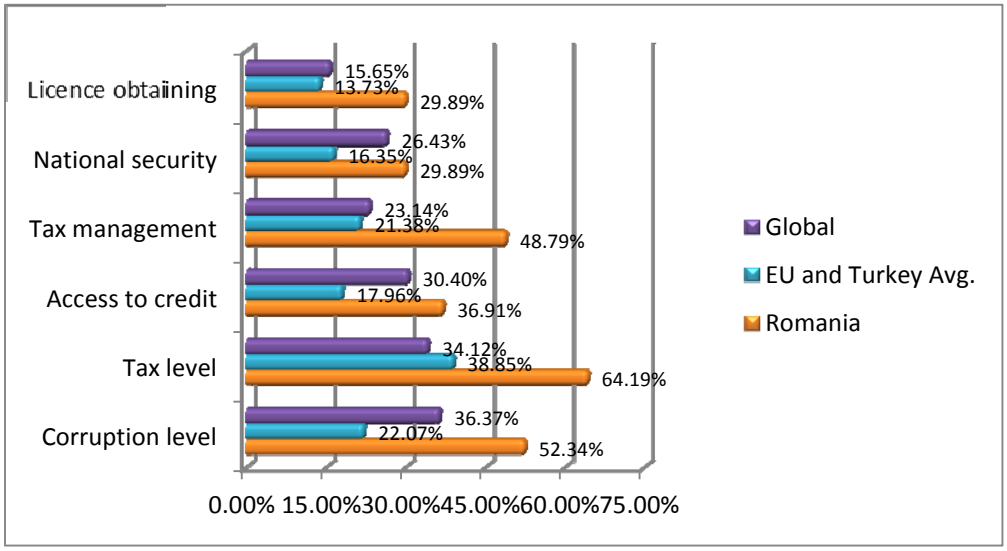
Source: author's computations based on www.enterprisesurvey.com

Figure 5. **Romania, Turkey and EU average – positioning on willingness to pay bribes to public officials**

Business constraints reflect the views of professionals, staff or managers running a business in a particular country. They identify and achieve a ranking of 10 restrictions perceived choosing between: corruption, tax level, access to finance, political instability, fiscal management, infrastructure, security level, licenses and permits informal business practices and inadequate labor qualified.

The main constraints identified are: the level of corruption, the level of taxation, access to finance, tax administration, national security and authorizations or licenses.

All these constraints can lead to corruption or fraud because businesses will adapt to the conditions, the business environment trying to overcome obstacles by any means. Romania exceeds the global average and the EU average, which fires a warning on the justifications they can find managers or employees to commit fraud and the existing pressures. The biggest constraint identified is the tax level, which leads sooner or later to financial statements fraud for the accounting result and hence distorting tax, in order to establish the lowest possible taxes. General perception that businesses do not go too harsh because of tax regulations, will implement the working environment of companies, they find an excuse for distorting profits or to implement creative accounting and taxation practices. Bribe is the most frequent fraud type, 48.79% of companies identify tax administration as a constraint, they are forced to fend for "faster, better" with public officials to conduct relations with the state. The corruption level is on the second position in the ranking made by the Romanian managers, 52.34% considering that adversely affect business, well above the EU average of 22.07% or 36.37% over the overall.



Source: author's own computations based on www.enterprisesurvey.com

Figure 6. **Constraints imposed by the business environment**

Average annual number of meetings of managers with a tax official, necessary for an opinion or to support a control, reflects the degree of state interference in private business conduct.

Runaway leader is Romania with an average number of mandatory meetings 3.53/an, followed by Bulgaria and Czech, long distance (76.5%) from EU average of 2 visits / year, and the global average of 3.22 visits / year. Frequent visits from tax officials demonstrates interference in private business, creating an propitious environment for bribery by managers harassment or by conflicts of interest within the civil service.

The average time required to prepare financial reports and tax is an indicator measured in "hours" required to prepare financial reports and pay tax to the state budget and the budgets of special taxes owed by the company. Global trend is down from an average of 286.96 hours in 2009 to 282.15 hours in 2010 (down 1.67%), which revealed to the member states of the EU average time a decrease of 3.7% (from 230.38 hours in 2009 to 221.85 hours in 2010). Romania is above the European average in 2010 to 222 hours of work required for financial and tax reporting.

Romania is ranked in 2009 on the 14-th position among EU countries and Turkey with an average time spent for preparing financial reports and tax of 202 hours, placing it in 2010 was ranked 15th with 222 hours required. Compared to other countries that have decreased the time required for financial reporting and tax (some quite spectacular, such Netherlands – 18.29%, Poland – 17.72% and Hungary – 16.06%), Romania recorded the highest growth in the EU average time reporting,

9.9% as part of a group of five EU countries where there have been increases (Germany – 9.69%, Czech Republic – 9.13%, Lithuania – 5.42% and Latvia – 5.01%), the rest are stagnating or significant declines.

High time required to prepare financial reports and tax affects perceived as coercive tax administration system in the country, requiring a greater number of employees in the financial and accounting departments, with continually updated research-oriented reporting, tax rather than to use their knowledge in decision-making of companies. High costs for companies, which assumes a reporting system is not the only impediment thick (contracting companies will opt for specialized services for official reporting) State bodies will face difficulties in monitoring themselves running companies and control activities. A heavy tax and financial reporting creates long waiting times for issuing permits, bribery and financial statement fraud.

Average number of days required obtaining a permit or license activity is an indicator reflecting the average expectation time for a license, permit or business license (the day of deposit to day effective to obtain or release - the maximum legal). BM classifies this index in: days to obtain a business permit, days to obtain a building permit and days to obtain an import license.

At EU level data were available only for Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia, Slovakia, Romania and Turkey and we have made some comparisons, even if we cannot analyze the trend in Europe. Compared to the global average of 30.44 days to obtain a work permit, Romania is at a level of 23.71 days, 22.11% less, tendency maintained in case of import licenses (19.7 and Romania overall average 12.95 days). If building permits global average is 64.13 days, Romania has added 84.08% to an average of 118.05 days required to issue documents.

Index for business facility issued by the World Bank conducted a ranking of national economies - open business environment, with values from 1 to 183, depending on how easy it is running a business or not, and how "friendly" for investors is the legislative and economic environment of a country. The country receives a higher value, the more it will climb in the rankings. It is also an index composed of a set of 9 indicators which are given values: starting a business, building permits or business licenses, registering property, access to credit, investor protection, export capacity, labor market, closing a business. Tests of WB for the years 2009 and 2010 show a downward trend of 0.37% of the European average index of 37.5 in 2009 to 37.2 in 2010. Average decrease is attributed to the individual decreases indices of Czech national – 23.17%, France– 7.14%, Hungary –11.54%, Latvia – 11.11% and Sweden – 22.22% decrease which cannot be compensated with significant improvements in other countries, approximately between 2 and 8%. The largest increases in this index were recorded by Finland – 18.18% and Ireland – 12.5%, but they still hovering at the bottom of the league. In Romania, the index was 54 in 2009, and in 2010 there was an improvement of 3.7%, reaching a value of 56; Romania is ranked as number 6 between EU member states and Turkey.

Access to finance index for companies is determined by WB as taking values in the range 1-183. Thus, as this index is higher, the access to finance for businesses is easy, low values reflecting low levels of funding from credit institutions.

WB tests for the years 2009 and 2010 show a downward trend of 3.10% of the European average index of 41 in 2009 to 39.59 in 2010. Average decrease is attributable to decreases significant individual national indices of Greece – 76.15%, Latvia – 50.00%, Poland – 46.43% Estonia – 25.58%, Portugal – 18.35% decrease which canot be compensated with significant improvements for other countries approximately between 3.1 and 38%. In Romania, the index in 2009 was 12 and in 2010 there was an improvement of 25%, reaching a value of 15, Romania is ranked as number 2 between EU member states and Turkey.

Also the WB surveys shows that access to finance for companies is considered as a significant constraint by 36.91% of managers in Romania, compared to the global average of 30.4%, exceeding the 18.95 percent average. This raises the pressure pillar of fraud, companies being in fierce competition for investments funds. Limited access to financing creates scope for financial reporting fraud so that the financial statements accurately reflect the actions required by credit institutions. Another aspect to be considered is the occurrence of conflict of interest fraud or complicity in fraud, many companies being tempted to offer bribes to employees of credit institutions or to seek illegal advice from so the financial statements proposed to analysis being within target indicators for financing.

3. Econometrics algorithms on corruption

3.1. Brief presentation of the variables used in the model

Our approach in considering corruption level in a country for audit risk assessment and analysis is based on general economic factors affecting the level of corruption and the effects of corruption.

Variables considered for econometric modeling are divided into causes and indicators that reflects the economic dependence and influence of this phenomenon.

As causes were chosen for model: access to credit (1 -183 low high), open economy (% of imports in GDP) index of democracy (1 low - 10 high) facility index of business (1 low - 183 high), education level (completed secondary education% of the population at age 20-24 years), the rate of tax (% of total revenue generated by a company).

a) access to credit – if is low it influence the degree of corruption by the pressure created by the economic agents to pimp financial statements to apparently meet financial ratios required by credit institutions;
b) open economy - higher the share of imports in GDP, the national economy has an influx of foreign capital (as money or property) and hence a new series of regulations harmonized with international law;
c) index of democracy - or political rights index was included because lack of political competition is associated with a high degree of corruption;

d) the facility index of business – if the investors will find easy ways to conduct business, the opportunity to bribe and pressure will be lower;
e) level of education - lack of funds to education sector is a characteristic of countries with high levels of corruption (in this case the pointer indicates the proportion of the population aged 20-24 years with complete secondary school - high school total population of 20 - 24 years);
f) the level of taxation - in countries with a high level of taxation, businesses will find solutions for tax evasion or for bribing state officials to establish lower taxes.

Chosen indicators relate to: GDP / capita, rate of Foreign Direct Investments in GDP (%), unemployment, private sector lending, the collection of taxes (% of GDP).

a) GDP / capita – corruption generates a money transfer from the state to illegal destinations, thus depriving important sectors of the amounts due to and affecting the living standards of the population;
b) FDI (Foreign Direct Investments) to GDP ratio - the more corrupt a country is, the more it will be avoided by investors who do not want to expose financial and reputational;
c) Unemployment rate – directly related to the level of living, unemployment is a result of a corrupt system due the effect of diversion of necessary economic funds;
d) private sector lending rate - is influenced by corruption in two aspects: because of corrupt system that generates low standard of living and economic development (not a large number of applicants for funding) or existing credit institutions (more especially foreign ones) require international conditions for granting and monitoring of funding (difficult to achieve the national economic or population);
e) the collection of taxes rates – a corrupt system does not seek equitable collection of taxes, thus creating a justification for population and small and medium-sized agencies to find ways to evade the law.

The motivation for choosing these variables lies in their validity as a result or influence factors for corruption or underground economy, durability proven by numerous studies and research (Ades and Di Tella, 1997, Dreher et al., 2007, Gonzales et al., 2007, Buehn and Schneider, 2009, Ene and Ştefănescu, 2011.

3.2. Factor analysis on corruption phenomenon

For a good and detailed understanding of corruption level in each country, it is necessary to analyze the causal and the result factors of the phenomenon – factor analysis.

The used factor analysis is principal component analysis, its specific meaning being that the main factors will be identified according to which countries will be grouped for subsequent cluster analysis. Factor analysis also provides the correlation matrix between variables, thus meeting the need for information on the

developments of certain indicators and the influence of these developments on the corruption level.

Factors analyzed are those listed as causes and indicators in section 3.1: Access to credit (ACCES_CR), open economy (IMP_PIB) index of democracy (DEMO) index of business facility (FACIL_AF), education (EDU) level of taxation (R_TAX), GDP/capita (PIB_LOC), Foreign Investment to GDP ratio (R_INVEST_ST), unemployment (R_SOMAJ), private sector lending rate (R_CREDIT), the collection of taxes (R_C_TAX).

To achieve factorial analysis software package was used IBM SPSS Statistics, vers.19.0.0., doing normalize data procedures in the first. The application of controls Analyse – Dimension reduction – Z Factor Scores, based on data obtained from normalization, drives us for obtaining the correlation matrix between variables.

Table 1

Correlations matrix between variables - factors influencing the corruption level

Variables	ACCES_CR	IMP_PIB	DEMO	FACIL_AF	EDU	R_TAX
ACCES_CR	1	0.006	0.129	0.186	-0.313	0.114
IMP_PIB	0.006	1	-0.193	-0.064	0.157	0.013
DEMO	0.129	-0.193	1	-0.461	0.087	-0.041
FACIL_AF	0.186	-0.064	-0.461	1	-0.046	0.216
EDU	-0.313	0.157	0.087	-0.046	1	-0.026
R_TAX	0.114	0.013	-0.041	0.216	-0.026	1
PIB_LOC	-0.86	-0.273	0.784	-0.461	0.004	0.175
R_INVEST_ST	0.433	-0.51	0.209	0.049	-0.121	-0.422
R_SOMAJ	-0.112	0.203	-0.352	-0.019	-0.231	0.227
R_CREDIT	-0.34	-0.209	0.563	-0.444	-0.237	-0.412
R_C_TAX	0.43	-0.058	0.353	-0.236	-0.083	-0.311

Table 2

Correlations between variables - factors influencing the degree of corruption – continued

Variables	PIB_LOC	R_INVEST_ST	***R_SOMAJ***	R_CREDIT	***R_C_TAX***
ACCES_CR	-0.086	0.433	***-0.112***	-0.034	***0.043***
IMP_PIB	-0.273	-0.51	***0.203***	-0.209	***-0.058***
DEMO	0.784	0.209	***-0.352***	0.563	***0.353***
FACIL_AF	-0.461	0.049	***-0.019***	-0.444	***-0.236***
EDU	0.004	-0.121	***-0.231***	-0.237	***-0.083***
R_TAX	0.175	-0.422	***0.227***	-0.412	***-0.311***
PIB_LOC	1	-0.212	***-0.330***	0.548	***0.418***
R_INVEST_ST	-0.212	1	***-0.245***	0.212	***0.188***
R_SOMAJ	-0.330	-0.245	***1***	-0.181	***-0.589***
R_CREDIT	0.548	0.212	***-0.181***	1	***0.459***
R_C_TAX	0.418	0.188	***-0.589***	0.459	***1***

Bartlett sphericity test results reject the null hypothesis considered that the correlation matrix between variables is an identity matrix and the results of the test and the Kaiser-Meyer-Olkin (KMO) are higher than the minimum threshold of 0.5, thus showing that the method chosen is appropriate.

Analysis of the correlation matrix of the 11 variables considered, allows extracting a first set of information on causal factors result of the degree of corruption. Noticed that R_SOMAJ variable (unemployment rate) is *negatively correlated* with access to credit, the degree of democracy, business facility, education, GDP / capita, lending rate and the rate of tax collection, *being directly and positively related* to the openness of the economy and the level of taxation in a country. RC Tax variable rate (tax collection) is *positively related* to the access to credit, democracy index, the GDP/capita FDI rate and lending rate, and there *are negative correlations* in the unemployment rate, openness of the economy, facility index of business and tax rate.

Still we apply principal component analysis, which allows extracting a small number of factors, but which contain aggregated information to explain the corruption level as causal and outcome. Factors will be assigned a score that will be used in further analysis. To obtain factor scores have chosen Varimax method.

Eigenvalues of the correlation matrix shows that in further analysis will be retained only 5 main components with a cumulative variant of 80.975%, as shown in Table 3.

Table 3

Eigenvalues and explain alternative count data to analyze the corruption level

Components	Proper values	Variant (%)	Cumulative Variant (%)
1	3.297	29.975	29.975
2	1.854	16.854	46.829
3	1.433	13.031	59.860
4	1.292	11.742	71.602
5	1.031	9.373	80.975
6	0.823	7.479	88.454
7	0.433	3.935	92.389
8	0.323	2.936	95.325
9	0.250	2.277	97.602
10	0.189	1.718	99.319
11	0.750	0.681	100.000

It thus generates a space representation based on 5 factorial axes, the first axis covering 29.975% of the initial cloud of points representing its time vector associated with the first eigenvalue 1, the second axis covers 16.854% of inertia and is the vector one's own time associated eigenvalues second, third axis covers 13.031% of inertia

and its vector time is 1 associated eigenvalues third, fourth axis covers 11.742% of inertia and its vector time is 1 associated eigenvalues fourth and fifth axis covers 9.373% of inertia and its vector time is the fifth one associated eigenvalues. The main feature of variant-specific maximum obtained the 5 new variables that are uncorrelated, independent and are called principal components or principal factors analysis.

Association scores for factors obtained by matrix factor provide information on the correlation between variables initially taken into account (11) and drivers identified.

Table 4

Factor correlation matrix between variables and identify key factors in analyzing the degree of corruption

Variables	Factors				
	1	2	3	4	5
ACCES_CR	0.038	0.617	0.532	0.126	0.431
IMP_PIB	-0.295	-0.026	-0.385	-0.178	0.733
DEMO	0.819	-0.161	0.195	0.093	0.285
FACIL_AF	-0.556	0.370	0.185	0.455	-0.270
EDU	-0.043	-0.334	-0.604	0.523	0.207
R_TAX	-0.348	-0.457	0.635	0.323	0.233
PIB_LOC	0.772	-0.488	0.302	0.122	0.540
R_INVEST_ST	0.262	0.810	-0.076	-0.039	0.167
R_SOMAJ	-0.561	-0.241	0.196	-0.667	0.082
R_CREDIT	0.795	0.037	0.022	-0.404	-0.126
R_C_TAX	0.704	0.188	-0.164	0.166	-0.047

The identified five main factors are significantly correlated with initial variables considered for analysis of corruption level as causal and result and can be explained as follows:

Factor 1 – called social and tax education level is strongly positively correlated with tax collection rate, crediting rate, the democracy index, the GDP/capita and low correlated with unemployment rate, the tax rate and the education level;

Factor 2 – called holding operations by foreign capital is positively correlated with access to credit and foreign investment rate and negatively with the education level and GDP/capita;

Factor 3 – called tax vs. poor tax collection, is positively correlated with access to credit and the negative charge and the level of openness of the economy, the education level and the tax collection;

Factor 4 – called national entrepreneurship is positively correlated with the index of business facility, with access to credit, as well as incentives, the education level and negatively correlated with the rate of foreign investment, with the opening of the economy and unemployment rate;

Factor 5 – called strongly regulated economic openness, but bureaucratized, has positive correlation with economic openness and access to credit, to GDP/capita, and negative correlation with the index of business facility.

Principal components analysis allows determining the main factors scores for each object (country taken for analysis). This determination is made by multiplying the values of variables in the original data matrix normalized with the main factor scores coefficient values. To achieve a ranking of the main determinants or the result of corruption level, we decided to calculate a total score for each country. The operation was done by weighting each factor values with the percentage of participation in forming of cloud data. As follows: 29.795% * Factor 1 + 16.854% * Factor 2 + 13.031% * Factor 3 + 11.742% * Factor 4 + 9.373% * Factor 5.

Table 5

Scores corresponding to main 5 factors and total score for ranking

State	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Total score for ranking	Position in ranking
Austria	0.52476	-0.93870	0.15788	1.05098	-0.01760	0.14142	18
Belgium	0.37914	-0.66060	0.55730	0.74599	0.34010	0.19440	19
Bulgaria	-0.59480	0.50865	-1.54060	0.33338	-1.35690	-0.38134	4
Cyprus	1.02875	0.33158	-1.67020	-0.24750	-1.47370	-0.02059	15
Czech Rep.	-0.67450	-0.05880	-0.08140	1.43707	0.08643	-0.04585	13
Denmark	2.35655	-0.30370	-0.20240	-0.66000	-0.53180	0.50147	26
Estonia	-0.52920	-0.46740	-0.04260	-0.79640	0.08740	-0.32827	7
Finland	0.79035	-0.81210	0.05802	0.39752	0.47179	0.19850	20
France	-0.04520	-0.83880	0.95655	0.47201	0.45869	0.06814	17
Germany	0.13149	-0.76170	0.46632	-0.23580	-0.15340	-0.07026	12
Greece	-0.69300	0.18420	0.31244	1.24378	-0.97930	-0.08170	11
Hungary	-0.92650	-0.06230	-1.05770	0.10119	2.05156	-0.22188	10
Ireland	1.16663	-0.73960	-0.84800	-1.17440	-0.19590	-0.04172	14
Italy	-0.25890	0.28877	1.86254	1.49209	0.25164	0.41257	23
Latvia	-1.04960	-0.47810	-0.48870	-1.73220	-0.70030	-0.72792	1
Lithuania	-1.29270	-0.16440	-1.53830	-1.27140	2.92132	-0.49112	3
Luxemburg	1.21871	4.04739	-0.21090	-0.14940	0.97511	1.09383	27
Holland	1.38728	-0.10220	0.11538	0.43773	0.21503	0.48520	24
Poland	-1.01360	0.07504	-0.87470	1.09089	-0.89860	-0.36131	6
Portugal	0.23796	0.82581	1.43827	-1.20730	-0.07240	0.24939	21

State	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Total score for ranking	Position in ranking
Romania	-1.03430	0.32827	-0.52380	0.57134	-1.12930	-0.36173	5
Slovakia	-1.08890	-0.66420	-0.55590	0.29558	-0.16620	-0.49164	2
Slovenia	-0.07260	0.89266	0.08244	1.01821	0.61280	0.31643	22
Spain	-0.57040	-0.43640	2.11680	-2.12530	-0.22250	-0.23909	9
Sweden	1.02873	-0.70200	0.91977	0.65004	1.22779	0.50131	25
Turkey	-1.52150	1.29586	1.37353	-1.03240	-1.17840	-0.29036	8
Great Britain	1.11528	-0.58720	-0.78210	-0.70570	-0.62350	-0.00787	16

4. Conclusions

Research has demonstrated the validity of the CPI issued by Transparency International, rankings for EU countries and Turkey presenting approximately the same homogeneous class, highlighting some countries belonging to the same groups as those issued by TI. However, for a good and detailed understanding of the economic framework in which an audited company operates, auditors must use either econometric analysis or factor, to identify potential risk areas and to establish knowingly risk distortion due to the economic context.

Introducing factorial analysis of quantitative variables and qualitative macroeconomic statistics based on perception, in the assessment of audit risk of material misstatement, has positive aspects, represented by the possibility of independent analysis of each variable and its correlation with different types of fraud that could be committed.

Using single CPI would generate a result realistic risk assessment, but maximum reliability will be achieved only through clear interpretation based on a variety of aspects and national economic context variables. The econometrics permits obtaining independent and detailed images of the corruption risk that could generate fraud within companies, such as:

- High bureaucracy / low business facility - bribery risk;
- High tax level – tax evasion risk, creative accounting and fiscal risk;
- Low level of tax collection - risk of fraud by misrepresentation type / fictitious financial statements;
- Low access to credit and low lending rates – financial statement fraud risk (to achieve economic and financial indicators required by credit institutions);
- High unemployment and low education level - risk of fraud within companies (reporting fraud - increase revenues, decrease expenses) in

order to obtain performance indicators requested by the company and thus avoid any penalty or an employee dismissal;

- GDP/capita fell, democracy index decreased - risk of fraud within the company through embezzlement, theft, misappropriation of assets;
- Poor opening for economy, foreign investment rate low – financial statements fraud risk, bribery risks, distortions of information, due to the lack of a harmonized regulatory environment worldwide (with restrictions and mandatory audit).

Using factor analysis by auditors becomes an instrument of major importance in determining accurate audit risk or fraud risk associated with national economic context.

We recommend using formulas validated by econometric analysis, thus having access to determine the corruption level on macroeconomic, statistical indicators and not on public perception. Determined using econometric calculation formulas are following the requirements of international auditing standards on audit risk assessment based on general economic factors. Formulas can be integrated into computer applications audit modules, thereby generating an additional audit work quality and professional standards consideration.

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About the author

Elena Monica SABĂU is postdoctoral fellow for Romanian Academy Iaşi Branch. Research project coordinated refers to philosophy, epistemology and econometrics on economic crime and corruption. Teaching and research area at The Bucharest University of Economic Studies includes financial audit, anti-fraud governance, corruption risk assessment, ethics and malpractice, corruption culture, artificial intelligence in anti-fraud management.