Abstract
The present study assesses through quantitative methods the problems specific to consumer protection. We focused on the factors that influence the number of complaints at national level and the perception of consumers that they are protected by public authorities. Data used for the 27 countries of the European Union were collected by official institutions, such as Heritage Foundations, United Nations Development Programme and the European Commission. Two types of econometric tools were employed: Ordinary Least Squares Multiple Regression and Spatial Econometric methods, such as map analysis, Moran’s I test for spatial autocorrelation and spatial regression. The results are convincing in what regards the institutional factors. Other types of behavior, such as social factors and spatial neighborhood effects, could not be highlighted.

Keywords: consumer protection perception, quality of public institutions, confidence versus complaints, OLS regression, spatial econometrics.
1. Introduction

The consumers’ protection is a multidisciplinary topic in the academic literature. It has components of law, sociology, economy and public administration. The protection mechanisms imply behavioral factors as well as human and institutional ones. The economic and social development of a nation arouses the rights awareness among its population. This fact puts pressure on the public authorities to assure an institutional framework which protects the consumer correctly and efficiently. Our study on the 27 EU countries analyzes at national level the factors that significantly influence the protection of consumers’ legitimate rights.

Consumer protection refers to efforts to ensure that products purchased by consumers are safe to use, will meet all express or implied performance standards, that marketers are prevented from using fraudulent methods to sell their products and that they compete fairly in the marketplace. To achieve these objectives the laws, as a form of government regulation, are designated to protect the rights of consumers. The consumer, as a generator of needs and goods demand, plays an important role in the market mechanism (Sitnikov, 2012; Dinu, 2011; Grundey and Rimkiene, 2012). A consumer is defined as someone who acquires goods or services for direct use or ownership rather than for resale or use in production and manufacturing (West Encyclopedia, 2010). Consumer interests can be protected through consumer organizations which help consumers make better choices in the marketplace and get help with their complaints.

The framework of the term ‘consumer rights’ attributed to Kennedy in his 1962 address to the US Congress (Larsen and Lawson, 2013) has gradually expanded. According to Norcia (2010) ‘a consumer right is a claim to have one’s interests as a buyer in a market exchange respected by sellers and others. A right is a justified claim that others respect one’s interests, needs, and wants’. There exist eight principles defined by Consumers International (2009): right to safety, right to be informed, right to choose, right to be heard, right to satisfaction of basic needs, right to redress, right to consumer education and right to healthy and sustainable environment.

Adkins and Ozanne (2005) and Mascarenhas, Kesavan and Bernacchi (2008) have examined the right to information topic, while Laczniak and Kenedy (2011) studied the link to business ethics. The more access consumers have to accurate information, the more efficiently they can utilize it within an economic structure (Greenwald and Stiglitz, 1986). The appropriate information is even more important for e-consumers, which are more vulnerable as they cannot examine the product before purchasing it (Svantesson and Clarke, 2010). Delgadillo (2013) considers, referring to the right to consumer education, that an educated consumer will be advantaged in the marketplace.

The importance of the consumers’ right to choose is stated by Cherry (2010) and Averitt and Lande (1997). The last two authors consider that consumer protection laws have to ‘seek to protect the ability of consumers to make informed choices among competing options...[by] ensure[ing] that buyers are protected from coercion,
deception and other influences that are difficult to evade’ (pp. 716-717). The right to healthy and sustainable environment can be assured by state specialized institutions (Rădulescu, 2012), but also by companies through educating the consumer for improving ecosystems and developing eco-labeling programs (Rădulescu and Rădulescu, 2011).

The structure of this paper is organized as follows: Section 1 reviews previous studies on protection of the consumer rights, Section 2 describes the research hypotheses, methodology and data used in this paper, Section 3 reports the empirical findings of the study and Section 4 provides the conclusions.

2. Research hypotheses, methodology and data

2.1. Research hypotheses

Based on previous studies and on the personal empirical observations we have constructed the following working hypotheses:

**H1.** There is a positive correlation between the number of complaints registered at the public services for consumer protection and HDI (Human Development Index).

**H2.** There is a positive correlation between the number of complaints registered at the public services for consumer protection and Property Rights Index.

**H3.** There is a positive correlation between the number of complaints registered at the public services for consumer protection and Freedom from Corruption Index.

**H4.** There is a positive correlation between the consumers’ confidence degree in the public authorities’ capacity to protect them and HDI (Human Development Index).

**H5.** There is a positive correlation between the consumers’ confidence degree in the public authorities’ capacity to protect them and Property Rights Index.

**H6.** There is a positive correlation between the consumers’ confidence degree in the public authorities’ capacity to protect them and Freedom from Corruption Index.

Space and neighbors are equally important. The globalization process has increased the phenomena of contagion and diffusion. Consequently, we have also constructed some hypotheses to be tested for the EU countries in order to see how much they influence each other in terms of consumer protection issues and whether their positioning is significant or random:

**H7.** There is a clustering process taking place in the European Union for the number of complaints registered by consumer protection authorities in each country.

**H8.** European Union member states group in respect to the trust of the citizens in the ability of authorities to protect consumers.

**H9.** Both the number of complaints and the level of trust are significantly affected by spatial distribution.

**H10.** The level of trust influences the number of complaints registered in a positive manner.
2.2. Methodology

For the purpose of our research we have employed OLS regressions for a cross-section of countries, with COMPLAINTS and CONFIDENCE as endogenous variables:

\[ y_i = b_0 + b_1 x_{1i} + b_2 x_{2i} + \ldots + b_k x_{ki} + \varepsilon_i \]

\[ \hat{b} = (X'X)^{-1}X'Y \]

The classic regression models were built to test hypotheses 1 to 6.

For hypotheses 7 to 10, spatial econometric procedures were used. Maps are the simplest tool to assess spatial features. In this research we have used:

- the quartile map – it shows the grouping of the spatial units in 4 equal groups based on the values of the variable;
- the standard deviation map – it groups spatial units based on the standard deviation units. It also presents the average of the variable for the sample.
- the box map – is the spatial equivalent of the box plot, emphasizing outliers.

As evaluation tools were used the global autocorrelation Moran’s I statistic and plot, with randomization procedures and the spatial regression. In this study, spatial regression follows the classic OLS model, with longitude and latitude used as exogenous variables. The validation tests show that this is the best suited model for the present analysis.

Global spatial autocorrelation can be positive or negative whether the Moran’s I statistic is larger/smaller than \( E(I) = -1/(n-1) \). The coefficient is computed as \( I_i = \frac{z_i'Wz_i}{z_i'z_i} \) (where \( t \) is the year, \( z \) the observation vector in year \( t \) seen as a deviation from the average and \( W \) is the standardized weights matrix) and it comes together with the diagram. The randomization procedure is used to test the stability of the Moran’s I statistic. It is an inference procedure, based on permutation that generates random simulated spatial data sets. The result is a histogram in which \( I_i \) is the gray bar. It presents the number of permutations made, the pseudo p-value (pseudo significance level), the theoretical mean, the average and the standard deviation of the reference distribution (\( E(I) \), Mean and Sd).

2.3. Data, variables and models

The data consists in the values made public by some international institutions. For the institutional factors we have used the Index of Economic Freedom (IEF) published by Heritage Foundations and the Wall Street, United Nations Development Programme. Data on the number of complaints registered in each country was taken from The Consumer Markets Scoreboard – Making Markets Work for Consumers (European Commission, 2011a). The evolution of the percentage of citizens in each country that are confident in the authorities’ capacity to protect consumers was taken from Flash Eurobarometer no. 299 (European Commission, 2011a). Data is for the 27
member states of the European Union. The variables are presented below:

**COMPLAINTS**$_i$ = the number of reclamations registered in country $i$ related to 1,000 inhabitants. For the phenomenon measured by this variable there exists an imitation effect. A registered and positively solved reclamation produces an increase of the subsequent registered reclamations. The distribution of the variable is log-normal therefore we will use in regressions the square root of the indicator.

**CONFIDENCE**$_i$ = the share of population that is confident in the public authorities’ capacity to protect consumers. The source of data is the Flash Eurobarometer no. 299 (European Commission, 2011b). It is a survey requested by the Directorate-General for Health and Consumers that presents, among other issues related to consumer protection, the proportion of respondents that agreed that they trusted public authorities to protect their rights as consumers. The survey was organized in each of the 27 EU member states. It varies significantly from year to year, for each country, probably due to small volume samples. Therefore, we will use in the analysis the average of the annual values for the 2006-2010 period.

**HDI**$_i$ = Human Development Index is a composite statistic of life expectancy, education, and income indices published by the United Nations Development Programme (2013). We use data from 2010.

**PROPERTY**$_i$ = Property rights. The property rights component is an assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. The property rights score for each country is a number between 0 and 100, the more certain the legal protection of property, the higher the score of a country is.

**CORRUPTION**$_i$ = Freedom from corruption. Freedom from corruption is based on a scale of 0 to 100 in which a score of 100 indicates very little corruption and a score of 0 indicates a very corrupt Government. The higher the level of corruption the lower the score of the country is.

**XCTRDi** = the longitude of the centroid of each spatial unit, i.e. country.

**YCTRDi** = the latitude of the centroid of each spatial unit, i.e. country.

To test H1-H6 hypotheses we chose eight linear specifications:

\[ \text{COMPLAINTS}_i = f(HDI_i) + \varepsilon_i \]  
\text{equation 1 (eq. 1)}

\[ \text{COMPLAINTS}_i = f(\text{PROPERTY}_i) + \varepsilon_i \]  
\text{equation 2 (eq. 2)}

\[ \text{COMPLAINTS}_i = f(\text{CORRUPTION}_i) + \varepsilon_i \]  
\text{equation 3 (eq. 3)}

\[ \text{COMPLAINTS}_i = f(HDI_i, \text{PROPERTY}_i, \text{CORRUPTION}_i) + \varepsilon_i \]  
\text{equation 4 (eq. 4)}

\[ \text{CONFIDENCE}_i = f(HDI_i) + \varepsilon_i \]  
\text{equation 5 (eq. 5)}

\[ \text{CONFIDENCE}_i = f(\text{PROPERTY}_i) + \varepsilon_i \]  
\text{equation 6 (eq. 6)}

\[ \text{CONFIDENCE}_i = f(\text{CORRUPTION}_i) + \varepsilon_i \]  
\text{equation 7 (eq. 7)}

\[ \text{CONFIDENCE}_i = f(HDI_i, \text{PROPERTY}_i, \text{CORRUPTION}_i) + \varepsilon_i \]  
\text{equation 8 (eq. 8)}
For hypotheses H9 and H10, the following spatial regressions were built:

\[ \text{COMPLAINTS}_i = f(\text{CONFIDENCE}_i) + \epsilon_i \]  
(eq. 9)

\[ \text{COMPLAINTS}_i = f(\text{XCTR}_i, \text{YCTR}_i) + \epsilon_i \]  
(eq. 10)

\[ \text{CONFIDENCE}_i = f(\text{XCTR}_i, \text{YCTR}_i) + \epsilon_i \]  
(eq. 11)

\[ \text{COMPLAINTS}_i = f(\text{CONFIDENCE}_i, \text{XCTR}_i, \text{YCTR}_i) + \epsilon_i \]  
(eq. 12)

The error term \( \epsilon_i \) is assumed to have the standard classical properties.

3. Results and discussions

The behavioral hypotheses formulated can be grouped in order to be tested simultaneously through the same methodology in each group.

3.1. Testing H1, H2 and H3 hypotheses

All three hypotheses are tested through OLS econometric models, using the endogenous variable COMPLAINTS.

Table 1: The impact of HDI, PROPERTY and CORRUPTION on COMPLAINTS  
(OLS coefficients and p-values)

<table>
<thead>
<tr>
<th></th>
<th>Equation 1</th>
<th>Equation 2</th>
<th>Equation 3</th>
<th>Equation 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDI</td>
<td>4.999 (0.570)</td>
<td>-</td>
<td>-</td>
<td>-16.75 (0.228)</td>
</tr>
<tr>
<td>PROPERTY</td>
<td>-</td>
<td>0.036* (0.073)</td>
<td>-</td>
<td>0.088 (0.109)</td>
</tr>
<tr>
<td>CORRUPTION</td>
<td>-</td>
<td>-</td>
<td>0.029 (0.170)</td>
<td>-0.021 (0.687)</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.103 (0.880)</td>
<td>0.409 (0.781)</td>
<td>1.201 (0.387)</td>
<td>12.09 (0.219)</td>
</tr>
</tbody>
</table>

\( R^2 \) = 0.013  
N = 27  
\( R^2 \) = 0.123  
N = 27  
\( R^2 \) = 0.074  
N = 27  
\( R^2 \) = 0.195  
N = 27

***, **, *: significant at 1%, 5% and 10% levels

Source: Own calculations using STATA 9.1 software

The main results in firm the H1, H2 and H3 hypotheses. We used different specifications of the equations. The explanatory variables were introduced in the model simultaneously or consecutively, for avoiding possible multicollinearity problems. It seems that the number of complaints is a very complex phenomenon. It depends in a small extent or not at all on the development of society in general (HDI) or on institutions’ quality (PROPERTY and CORRUPTION).

3.2. Testing H4, H5 and H6 hypotheses

All three hypotheses will be tested through OLS econometric models, using the endogenous variable CONFIDENCE.

The H4, H5 and H6 hypotheses were confirmed. The explanatory variables are very significant statistically. In equation 8, the inconclusive p-values appeared because of a statistical multicollinearity problem. The confidence in public authorities’ capacity to protect the consumer depends in a major extent on the development of society in general (HDI) and on the institutional quality (PROPERTY and CORRUPTION).
Table 2: The impact of HDI, PROPERTY and CORRUPTION on CONFIDENCE  
(OLS coefficients and p-values) 

<table>
<thead>
<tr>
<th></th>
<th>Equation 5</th>
<th>Equation 6</th>
<th>Equation 7</th>
<th>Equation 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDI</td>
<td>200.5*** (0.000)</td>
<td>-</td>
<td>-</td>
<td>-14.30 (0.794)</td>
</tr>
<tr>
<td>PROPERTY</td>
<td>-</td>
<td>0.618*** (0.000)</td>
<td>-</td>
<td>0.471** (0.036)</td>
</tr>
<tr>
<td>CORRUPTION</td>
<td>-</td>
<td>-</td>
<td>0.602*** (0.000)</td>
<td>0.190 (0.377)</td>
</tr>
<tr>
<td>Constant</td>
<td>-110.3*** (0.008)</td>
<td>12.39** (0.039)</td>
<td>18.02*** (0.004)</td>
<td>22.61 (0.560)</td>
</tr>
<tr>
<td></td>
<td>R² = 0.438 N = 27</td>
<td>R² = 0.723 N = 27</td>
<td>R² = 0.673 N = 27</td>
<td>R² = 0.732 N = 27</td>
</tr>
</tbody>
</table>

***, **, *: significant at 1%, 5% and 10% levels

Source: Own calculations using STATA 9.1 software

3.3. Testing H7-H10 hypotheses

In order to test hypotheses H7 to H10, we used Spatial Econometrics methods. Hypotheses H7 and H8 were assessed with the help of maps. Figure 1, showing the spatial distribution of the EU countries based on their standard deviations, emphasizes the existence of two upper outliers in the European Union in what regards the number of complaints made by consumers per 1,000 inhabitants. The two countries are Portugal (8.04) and Austria (7.87). Romania’s position is also highlighted. In the European Union, in 2010, on average there were registered 3.07 complaints per 1,000 inhabitants.

![Figure 1: Spatial distribution of the EU member states based on the number of complaints per 1,000 inhabitants – standard deviation map](source)

The quartile map was used to test H7 (Figure 2). The grouping of the states according to the specific value shows that there is no clustering process taking place in the EU when discussing about the number of complaints consumers made in 2010. The distribution seems rather random, as both developed and developing countries have both high and low levels of complaints registered related to their population. To confirm statistically this result, the Moran I test for spatial autocorrelation was used (Figure 3). The randomization procedure based on 999 permutations clearly shows that there is no significant spatial autocorrelation, i.e. member states are randomly
distributed based on the number of consumer complaints (the gray line is on the left side of the plot while the pseudo p-value = 0.239 > 0.05).

![Figure 2: Quartile map – Complaints/1,000 inhabitants for the EU member states](image)

**Source:** Own calculations using OpenGeoDa 1.0 software

Thus, H7 is rejected: no clustering process takes place at the level of the European Union based on the number of complaints made by consumers in each country. The results of the Moran I test also reject H9. The number of complaints is not affected by spatial distribution, countries are randomly distributed from this perspective and the sample is very heterogeneous. In what regards confidence, on average, 57.07% of the European Union consumers trust public authorities to protect their consumer interests (Figure 4). In the same time, the sample is more homogeneous, no significant outlier being evidenced in the box map distributions in Figure 5. Moreover they both show a possible clustering process in the way defined by the club type β-convergence. Thus, H8 is accepted.
The global spatial autocorrelation test shows that EU members are positively correlated when assessing the level of trust in public authorities. Figure 6 returns a value of 0.433 for the Moran I statistic. This value is significant at a 99% level (pseudo p-value = 0.004, the gray line is on the right side of the plot). The interpretation is that a country with a high level of trust bounds on countries that also have high levels of trust in the capacity of public authorities to protect consumers and vice-versa. The grey line in the far right part of the figure is Romania. Its positioning shows that Romania belongs to the group of countries with low levels of trust in public authorities, with neighbors of the same kind. In conclusion, both H8 and H9 are accepted when assessing trust.

H10 assesses the spatial relationship between confidence and the number of complaints. One would expect higher number of complaints in countries were citizens trust that public authorities are able to protect their interests as consumers. The analyses run show that there is no significant relationship between the two. The multivariate Moran I statistic is very low and is not significant (pseudo-p-value = 0.214). Moreover, when running the regression, the coefficients have probabilities much higher.
than 0.05, showing that there is no significant relationship between the two variables. Hypotheses H9 and H10 were also tested with the help of spatial regression models. Table 3 shows the results, enforcing the conclusions of the map and Moran analyses.

As it can be observed in Table 3, except for the constant term in equations 10 and 11, all other coefficients are not statistically significant. These results come, once again, to enforce the rejection of the existence of any relationship in space between the level of confidence and the number of complaints. Moreover, none of the two variables is influenced by the spatial distribution of the sample considered.
Table 3: Regression results for the spatial models

<table>
<thead>
<tr>
<th></th>
<th>Equation 9</th>
<th>Equation 10</th>
<th>Equation 11</th>
<th>Equation 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIDENCE</td>
<td>0.034 (0.489)</td>
<td>-</td>
<td>Endogenous</td>
<td>0.026 (0.394)</td>
</tr>
<tr>
<td>XCTRD</td>
<td>-0.051 (0.102)</td>
<td>-0.32 (0.135)</td>
<td>-0.043 (0.191)</td>
<td></td>
</tr>
<tr>
<td>YCTRD</td>
<td>-0.012 (0.796)</td>
<td>0.437 (0.181)</td>
<td>-0.024 (0.631)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.15 (0.242)</td>
<td>4.36* (0.071)</td>
<td>39.99** (0.017)</td>
<td>3.31 (0.218)</td>
</tr>
</tbody>
</table>

***, **, *: significant at 1%, 5% and 10% levels

Source: Own calculations using OpenGeoDa 1.0 software

Attention is drawn by the results for equation 11. Even though, at global level, both the map analysis and the global Moran autocorrelation coefficient have shown the existence of a clustering process within the European Union, the regression coefficients are not statistically significant. This can be explained with the help of the club β- convergence. There is not one global equilibrium status, but more equilibria relationships, for smaller groups of countries.

5. Conclusions

Our study assesses several quantitative aspects regarding consumer protection. Economic theory is abundant in this field, but the econometric modelling part is scarce. Using data for all the 27 EU member states, we have succeeded in emphasizing some interesting correlations. The consumer’s feeling that his or her rights are protected is influenced by two types of factors: institutional and sociological. For the institutional factors we have highlighted the importance of public institutions’ quality. At sociological level, the problem is much more complex. The regression results turned out to be irrelevant. Consequently, the issue is still under discussion.

Another group of working hypotheses was based on the fact that space division is very clear in the European Union. Member states are divided either on latitude (North versus South) or on longitude (West versus East). Considering this, we introduced space as a factor in the analysis. The results have demonstrated that consumer protection, seen through the number of complaints registered is not affected by spatial distribution. This is a very important result, showing that this aspect is not related to the level of economic development of a country. Member states are randomly distributed as values of this variable.

Regarding the level of population’s trust in the capacity of public authorities to protect them as consumers, the presence of club β- convergence was discovered. That is why the descriptive and Moran analyses have shown spatial influence, while the regression model has rejected it. Several spatial clusters exist, each with its own equilibrium.

In the end, we also tested whether the level of trust influences the number of complaints. We based our judgment on the presence of an imitation effect. A positively solved complaint would increase the number of future complaints, but also the percentage of population that trust public authorities to protect consumers. The regression results also demonstrate that there is no statistically significant relationship between the two.
References: