Manuela Tvaronavičienė, Virginija Grybaitė, Živilė Tunčikienė
GLOBALIZATION DRIVERS IN DEVELOPED AND LESS DEVELOPED COUNTRIES: IF CONSISTENT PATTERNS CAN BE TRACED 5

Gitana Dudzevičiūtė
THE RESEARCH OF THE ECONOMIC STRUCTURAL CHANGES: ENERGY CONSUMPTION ASPECT 13

Agnė Šimelytė, Jūratė Gintarė Antanavičienė
FOREIGN DIRECT INVESTMENT POLICY AS AN INSTRUMENT FOR SUSTAINABLE ECONOMIC GROWTH: A CASE OF IRELAND 25

M. Mercedes Galan – Ladero, Clementina Galera – Casquet, Victor Valero – Amaro, M. Jesus Barroso – Mendez
SUSTAINABLE, SOCIALLY RESPONSIBLE BUSINESS: THE CAUSE – RELATED MARKETING CASE. A REVIEW OF THE CONCEPTUAL FRAMEWORK 35

Vereskun Mikhail
LARGE CORPORATE ENTERPRISES’ INTANGIBLE ASSETS MANAGING AS A WAY TO SECURE A SUSTAINABLE DEVELOPMENT OF COMPETITIVE ADVANTAGES 47

Ravi Prakash
LOOKING BEYOND THE GDP: QUANTITATIVE EVALUATION OF THE “HOLISTIC PROGRESS INDEX” (HPI) 57

Raimonda Martinkutė-Kaulienė, Jelena Stankevičienė, Santautė Žinytė
OPTION PRICING USING MONTE CARLO SIMULATION 65
Foreword to the eighth issue of peer reviewed scientific Journal of Security and Sustainability Issues
The General Jonas Žemaitis Military Academy of Lithuania

Dear readers,

It is my pleasure to introduce a new issue (2013, Volume 2, Number 4) of the Journal of Security and Sustainability Issues to the interested audience, which, as it appears, is comprised of international academic community, political and governmental institutions, business practitioners and international organizations.

Vilnius Gediminas Technical University (VGTU), as a partner university to The General Jonas Žemaitis Military Academy of Lithuania and publishing partner to the journal, is deeply engaged in elaboration of increasingly urgent issues related to sustainable and secure economic growth. VGTU itself publishes 19 peer-reviewed research journals; 8 of them are indexed by Web of Science and other databases well-known to researchers and specialists. The university adopted a long-term strategy towards scientific activities, efficiency and openness. We encourage and support scientific research and are eager to contribute to the process of searching for efficient solutions and formulation of efficient policy recommendations.

The Journal of Security and Sustainability Issues represents one of the joint international platforms through which a wide range of contemporary intensively discussed research topics are being tackled. The journal embraces problems related to adopted conceptual approaches towards security and sustainability, globalization issues, measurement of development, consequences of economic growth, role of entrepreneurship and management in the condition of scarcely and dangerously diminishing natural resources. Insights formulated in the scientific discussions can provide the European Commission and local governments with novel policy implications. I wish the Journal of Security and Sustainability Issues would successfully continue its activity, consistently enhance its visibility and contribute to research and policymaking in such important area as secure and sustainable development of our economies.

Sincerely,

ALFONSAS DANIŪNAS
Rector of Vilnius Gediminas Technical University
JOURNAL OF SECURITY AND SUSTAINABILITY ISSUES

International Entrepreneurial Perspectives and Innovative Outcomes

2013
2(4)

Editors-in-Chief
Prof. Dr. Manuela Tvaronavičienė
Prof. Jay Mitra
Prof. Dr. Valdas Rakutis
The *Journal of Security and Sustainability Issues* is a peer-reviewed journal which publishes original research papers. It is the international journal published cooperating with the institutions indicated on the cover of the journal. It is published quarterly.

Areas of research include, but are not limited to, the following:

- Conceptual Approaches towards Security and Sustainability
- Globalization Processes and Social Security
- Defence and Security Technologies
- Innovations and Technological Development for Security and Sustainability
- Energy Security
- Regulation of the Security Industry
- Transition Issues and Secure Development
- Computer and Information Security
- Human and Environmental Security
- Biodiversity and Ecological Sustainability
- Economic Growth and Sustainable Development
- Economics of Sustainable Organizations and Industries
- Sustainable Entrepreneurship
- Intercultural Communication for Security and Sustainability
- Secure Development of Sector Economics
- Sustainable Finance and Investment
- Strategic Management for Sustainability
- Case Studies in the Process of Secure and Sustainable Development
- Evaluations of Security Measures

All papers published in the *Journal of Security and Sustainability Issues* are peer-reviewed by the members of the Editorial Board or by its appointed experts.

The papers published in *Journal of Security and Sustainability Issues* are indexed/abstracted by:

- Business Source Complete
- Sustainability Reference Center
- International Security & Counter Terrorism Reference Center

**EDITORIAL CORRESPONDENCE** including manuscripts and subscription

Prof. Dr. Manuela Tvaronavičienė
Tel.: +370 687 83 944
E-mail: manuela@vgtu.lt

**JOURNAL OF SECURITY AND SUSTAINABILITY ISSUES**

2013, 2(4)

http://www.lka.lt/index.php/lt/217057/

This work is licensed under a Creative Commons Attribution 3.0 License.
GLOBALIZATION DRIVERS IN DEVELOPED AND LESS DEVELOPED COUNTRIES: IF CONSISTENT PATTERNS CAN BE TRACED*

Manuela Tvaronavičienė¹, Virginija Grybaitė², Živilė Tunčikiene³

¹²³Vilnius Gediminas Technical University
Saulėtekio ave. 11, LT-10223 Vilnius, Lithuania

¹The General Jonas Žemaitis Military Academy of Lithuania, Šilo Str.5A, LT-10322 Vilnius, Lithuania
E-mails: ¹manuela@vgtu.lt; ²virgi@vgtu.lt; ³Zivile.Tuncikiene@vgtu.lt

Received 10 December 2012, accepted 20 March 2013

Abstract. Globalization processes are widely discussed in scientific literature. In our research we adopt an approach, according which globalization; especially in form of inward foreign direct investment (FDI) is one of sources of innovative technologies and proxy of sustainable development of industries and countries’ economies. In order to design efficient government policies in the field of FDI attraction, such globalization drivers have to be revealed and their importance evaluated. In presented paper we raise and verify hypotheses about importance of the following globalization drivers: tax burden, institutional performance and market consumptive capacity. Regression analysis tool, we believe, allows revealing if those drivers are equally important for developed and less developed countries (LDC). Economic interpretation and generalization of obtain results, we believe, would allow indicating if consistent patterns can be traced. If so, more efficient government policies, allowing attract innovative technologies, especially to LDC can be suggested.

Keywords: Globalization, Foreign Direct Investment, institutional environment.

Reference to this paper should be made as follows: Tvaronavičienė, M.; Grybaitė, V.; Tunčikiene, Ž. 2013. Globalization drivers in developed and less developed countries: if consistent patterns can be traced, Journal of Security and Sustainability Issues 2(4): 5–11. http://dx.doi.org/10.9770/jssi.2013.2.4(1)

JEL Classifications: O1, O19, O40, F63

1. Introduction

Globalization may be defined as the broadening and deepening linkages of national economies into a worldwide market for goods, services and especially capital. The current wave of globalization has seen Multinational Enterprises (MNEs) playing a leading role in shaping and driving cross-border integration through the transfer of production facilities, functions and/or technology across space (Baldwin and Martin, 1999; OECD, 2007). Globalization processes can obtain variety of forms. From countries economic development point of view the foreign trade and foreign direct investment (inward and outward) are seen as the most important ones. In this research inward FDI is in the focus. Inward FDI is seen as source of foreign capital, which enhance country’s capital saturation and plus serves as driver of innovative technologies into destination industries (Adekola et al. 2008; Tvaronavičius, Tvaronavičienė 2012). Before developing this research we need to admit, that role of inward FDI in sustainable economic development of countries in scientific literature is treated rather controversially (Tvaronavičienė, Grybaitė 2007; Tvaronavičienė, Kalašinskaitė 2010). Nonetheless, * Research prepared within framework of Long-term Economic Research Program, topic “Energetically secure and sustainable restructuring of Lithuanian industry sectors in the context of world economy development tendencies” confirmed by Research Council of Lithuania, (IEP-01/2012).
positive approach towards inflow of foreign capital prevails, and in this paper we assume, that inward FDI positively contributes to sustainable development of host countries (Lankauskiенé, Tvaronavičienё 2012).

In order to reveal drivers of globalization in form of inward FDI we will raise and verify four hypotheses. Eleven differently developed countries are selected. For our analysis we used the 6 developed countries: Austria, Belgium, Estonia, Netherlands, Slovakia and Slovenia and 5 LDC: Bulgaria, Hungary, Latvia, Lithuania, Romania data sources for analysis are taken from UNCTAD, World Bank and Euro stat for years mainly for 2000-2010 year period).

2. Hypotheses about driving forces

There is separate strand of literature devoted to FDI driving forces’ (e.g. Dunning 1997; Tvaronavičienё et al. 2008; Grybaitё, Tvaronavičienё 2008; Tvaronavičienё et al. 2009 etc.). With reference to various theories (e.g. Trade Theory, Theory of the Firm and Theory of Industrial Organization) the eclectic paradigm states that FDI emerges if a firm has an Ownership-advantage (e.g. a patent) combined with a Location-advantage (e.g. low production costs; large market size) and an Internalization-advantage (e.g. economies of interdependent activities). According e.g. Sahoo, all the determinants of FDI can be grouped under two categories (i) economic conditions and (ii) host country policies. Economic conditions include market size, growth prospect, rate of return, urbanization/industrialization, labor cost, human capital, physical infrastructure, and macro-economic fundamentals like inflation, tax regime, external debt, etc. Host country policies include the promotion of private ownership, efficient financial market; trade policies/free trade policy/regional trade agreements, FDI policies, and perception of country risk, legal framework, and quality of bureaucracy. Empirical research suggests that FDI is sensitive to the host country’s overall economic policies, including its tax policy (Sahoo 2006).

Our empirical analysis is based on a regression model, which tests hypotheses raised. The relationship between dependent variable Y (inward FDI) and independent variables X (indicated in hypotheses) can be estimated by simple linear regression model equation of the form $Y = a + b \times X$.

As it was indicated above, in scientific literature we can find variety of FDI driving factors (globalization drivers, as we call them). In our paper we will focus the following ones: tax burden (country policy), performance of institutions, market consumptive capacity (economic conditions). We will examine if distinguished driving forces demonstrate similar effect on inward FDI attraction in developed and LDC; i.e. if consistent patterns can be traced.

We formulate the following hypotheses:

**Hypothesis 1.** Low tax burden in the country attracts more FDI. Indicator of tax burden is calculated as ratio of total taxes and GDP, expressed in percentage terms. Regression analysis results are presented in Table 1.

<table>
<thead>
<tr>
<th>Country</th>
<th>Observations</th>
<th>$R^2$</th>
<th>$R^2_{adj}$</th>
<th>$F$</th>
<th>P-value</th>
<th>$t_{stat}$</th>
<th>$t_{table}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>10</td>
<td>0,51</td>
<td>0,45</td>
<td>8,39</td>
<td>0,02</td>
<td>-2,90</td>
<td>2,26</td>
</tr>
<tr>
<td>Belgium</td>
<td>10</td>
<td>0,64</td>
<td>0,60</td>
<td>14,48</td>
<td>0,01</td>
<td>-3,80</td>
<td>2,26</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>10</td>
<td>0,01</td>
<td>-0,11</td>
<td>0,11</td>
<td>0,75</td>
<td>0,33</td>
<td>2,26</td>
</tr>
<tr>
<td>Estonia</td>
<td>10</td>
<td>0,36</td>
<td>0,28</td>
<td>4,54</td>
<td>0,07</td>
<td>2,13</td>
<td>2,26</td>
</tr>
<tr>
<td>Hungary</td>
<td>10</td>
<td>0,21</td>
<td>0,11</td>
<td>2,07</td>
<td>0,19</td>
<td>1,44</td>
<td>2,26</td>
</tr>
<tr>
<td>Latvia</td>
<td>10</td>
<td>0,00</td>
<td>-0,12</td>
<td>0,004</td>
<td>0,95</td>
<td>0,06</td>
<td>2,26</td>
</tr>
<tr>
<td>Lithuania</td>
<td>10</td>
<td>0,23</td>
<td>0,13</td>
<td>2,33</td>
<td>0,17</td>
<td>1,53</td>
<td>2,26</td>
</tr>
<tr>
<td>Netherlands</td>
<td>10</td>
<td>0,00</td>
<td>-0,12</td>
<td>0,008</td>
<td>0,93</td>
<td>-0,09</td>
<td>2,26</td>
</tr>
<tr>
<td>Romania</td>
<td>10</td>
<td>0,07</td>
<td>-0,04</td>
<td>0,62</td>
<td>0,45</td>
<td>-0,79</td>
<td>2,26</td>
</tr>
<tr>
<td>Slovakia</td>
<td>10</td>
<td>0,92</td>
<td>0,91</td>
<td>89,34</td>
<td>1,29</td>
<td>-9,45</td>
<td>2,26</td>
</tr>
<tr>
<td>Slovenia</td>
<td>10</td>
<td>0,10</td>
<td>-0,01</td>
<td>0,93</td>
<td>0,36</td>
<td>-0,97</td>
<td>2,26</td>
</tr>
</tbody>
</table>
In order to interpret the obtained results economically, we should provide the countries’ characteristic in terms of level of tax burden. Hence, less developed countries (in our analysis Bulgaria, Hungary, Latvia, Lithuania and Romania) have lower tax burden compared to more developed countries. According advocates for lowering taxes in order to attract capital of foreign origin it would mean that those countries should display strong relationships between tax burden and inward FDI. Our sample of countries and the period during which the relationship is being investigated does not verify the statement. It means, the hypothesis about low tax burden attracting FDI has not been verified. We do not claim, that foreign investors do not take into account tax burden in countries into which investments are being channeled. What we claim is: tax burden does not play a crucial role in making the decision to invest or not to invest. Other factors outperform this important facet of institutional environment. Most likely, opportunities of another character make the heavier impact on choosing capital destination. This finding we consider as very important, since many countries, especially in the earlier stages of their development emphasize necessity of tax burden relieving, since there is rather strong belief among academicians, practitioners and politicians that diminished taxes would attract FDI. As we see, evidences about such relationship are lacking.

Developed countries (Austria, Belgium, Estonia, Netherlands, Slovakia and Slovenia in our case) have the higher tax burden compared to LDC. Obtained results of performed analysis indicate that higher tax burden does not hinder inflow of FDI: it appears that the highest coefficients of correlation have two developed heavily taxed countries – Austria and Belgium, and one developed moderately taxed country- Slovakia. To conclude, findings suggest, that lowering of tax burdens having purpose to attract FDI is not reasonable nor in developed neither in LDC.

**Hypothesis 2.** Countries with more favorable institutional environment attract more FDI.

In order to test this hypothesis we will employ two variables typically characterizing institutional performance: The Corruption Perceptions Index and The Index of Economic freedom. Regression analysis results are presented in Table 2 and Table 3.

### Table 2. Regression analysis results between FDI and The World Corruption Index (years 2000-2010)

<table>
<thead>
<tr>
<th></th>
<th>Observations</th>
<th>( R^2 )</th>
<th>( R^2_{adj} )</th>
<th>( F )</th>
<th>P-value</th>
<th>t stat</th>
<th>t table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>11</td>
<td>0.03</td>
<td>-0.08</td>
<td>0.29</td>
<td>0.60</td>
<td>0.54</td>
<td>2.23</td>
</tr>
<tr>
<td>Belgium</td>
<td>11</td>
<td>0.06</td>
<td>-0.05</td>
<td>0.56</td>
<td>0.47</td>
<td>0.75</td>
<td>2.23</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>11</td>
<td>0.07</td>
<td>-0.03</td>
<td>0.72</td>
<td>0.42</td>
<td>-0.85</td>
<td>2.23</td>
</tr>
<tr>
<td>Estonia</td>
<td>11</td>
<td>0.83</td>
<td>0.81</td>
<td>42.49</td>
<td>1.09</td>
<td>6.52</td>
<td>2.23</td>
</tr>
<tr>
<td>Hungary</td>
<td>11</td>
<td>0.38</td>
<td>-0.11</td>
<td>0.02</td>
<td>0.89</td>
<td>-0.15</td>
<td>2.23</td>
</tr>
<tr>
<td>Latvia</td>
<td>11</td>
<td>0.79</td>
<td>0.77</td>
<td>33.85</td>
<td>2.54</td>
<td>5.82</td>
<td>2.23</td>
</tr>
<tr>
<td>Lithuania</td>
<td>11</td>
<td>0.26</td>
<td>0.18</td>
<td>3.21</td>
<td>0.11</td>
<td>1.79</td>
<td>2.23</td>
</tr>
<tr>
<td>Netherlands</td>
<td>11</td>
<td>0.01</td>
<td>-0.10</td>
<td>0.08</td>
<td>0.79</td>
<td>0.27</td>
<td>2.23</td>
</tr>
<tr>
<td>Romania</td>
<td>11</td>
<td>0.94</td>
<td>0.83</td>
<td>136.94</td>
<td>9.54</td>
<td>11.70</td>
<td>2.23</td>
</tr>
<tr>
<td>Slovakia</td>
<td>11</td>
<td>0.74</td>
<td>0.72</td>
<td>26.22</td>
<td>6.30</td>
<td>5.12</td>
<td>2.23</td>
</tr>
<tr>
<td>Slovenia</td>
<td>11</td>
<td>0.83</td>
<td>0.81</td>
<td>43.17</td>
<td>1.03</td>
<td>6.57</td>
<td>2.23</td>
</tr>
</tbody>
</table>

Interpretation of obtained results requires an overview of prevailing opinions about this classical interrelation between corruption level and FDI. Almost unanimous belief exists that higher transparency leads to higher investments, especially from abroad. In our case, we get that in some countries, which are characterized by relatively high corruption index (e.g. Romania and Latvia) relationship between FDI and institutional environment is positive, but not negative, as expected. Recall, that expectations were expressed in hypothesis raised. Hence, despite expectation was that not transparent institutional environment and FDI flows had to display negative interrelation, we had not receive statistical evidences for supporting that expectation.
Again, we do not advocate for neglecting corruption. We claim that globalization drivers in contemporary world are rather different and outperform classical factors, captured by formal statistics.

**Table 3. Regression analysis results between FDI and The Index of Economic Freedom (years 2000-2010)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Observations</th>
<th>$R^2$</th>
<th>$R^2_{adj}$</th>
<th>F</th>
<th>P-value</th>
<th>$t_{stat}$</th>
<th>$t_{table}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>11</td>
<td>0.81</td>
<td>0.79</td>
<td>38.32</td>
<td>1.61</td>
<td>6.19</td>
<td>2.23</td>
</tr>
<tr>
<td>Belgium</td>
<td>11</td>
<td>0.39</td>
<td>0.33</td>
<td>5.87</td>
<td>0.04</td>
<td>2.42</td>
<td>2.23</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>11</td>
<td>0.56</td>
<td>0.51</td>
<td>11.43</td>
<td>0.01</td>
<td>3.38</td>
<td>2.23</td>
</tr>
<tr>
<td>Estonia</td>
<td>11</td>
<td>0.12</td>
<td>0.02</td>
<td>1.21</td>
<td>0.30</td>
<td>1.10</td>
<td>2.23</td>
</tr>
<tr>
<td>Hungary</td>
<td>11</td>
<td>0.23</td>
<td>0.15</td>
<td>2.74</td>
<td>0.13</td>
<td>1.66</td>
<td>2.23</td>
</tr>
<tr>
<td>Latvia</td>
<td>11</td>
<td>0.54</td>
<td>0.49</td>
<td>10.49</td>
<td>0.01</td>
<td>3.24</td>
<td>2.23</td>
</tr>
<tr>
<td>Lithuania</td>
<td>11</td>
<td>0.50</td>
<td>0.44</td>
<td>8.85</td>
<td>0.02</td>
<td>2.98</td>
<td>2.23</td>
</tr>
<tr>
<td>Netherlands</td>
<td>11</td>
<td>0.61</td>
<td>0.57</td>
<td>14.10</td>
<td>4.52</td>
<td>3.75</td>
<td>2.23</td>
</tr>
<tr>
<td>Romania</td>
<td>11</td>
<td>0.95</td>
<td>0.95</td>
<td>180.09</td>
<td>2.95</td>
<td>13.42</td>
<td>2.23</td>
</tr>
<tr>
<td>Slovakia</td>
<td>11</td>
<td>0.81</td>
<td>0.79</td>
<td>38.14</td>
<td>1.64</td>
<td>3.18</td>
<td>2.23</td>
</tr>
<tr>
<td>Slovenia</td>
<td>11</td>
<td>0.33</td>
<td>0.25</td>
<td>4.35</td>
<td>0.07</td>
<td>2.080</td>
<td>2.23</td>
</tr>
</tbody>
</table>

The second, the most important characteristics of institutional environment is economic freedom, formally statistically estimated by composite indicator of The Index of Economic Freedom. We do not go into composition of the index itself, as all indexes, which are composed in one way or another have their advantages and disadvantages. We adopt approach, that this formal and officially used index reflects quality of institutional environment (equally as we admitted that The World Corruption Index reflects lack of quality of institutional environment in separately taken country).

Obtained results indicate, that consistent patterns of some type of relationships in developed countries and LDCs are hardly traceable. We see that both, strong and weak relationships equally can be found in developed and less developed countries, generally characterized by lower economic freedom.

Obtained results are consistent with above provided results, when corruption facet of institutional environment was investigated. Once more we state, that globalization drivers in contemporary world are rather different and outperform classical factors, captured by formal statistics.

That insight has to be kept in mind when we try to estimate role of institutions. We do not deny importance and impact of institutional performance on globalization processes. Our insight is different: conventional indicators do not capture processes and do not provide straightforward evidences of rather classical hypotheses. More complicated institution performance methodologies have to be discussed and agreed on (Tvaronavičienė, Grybaitė 2012). This is an important area of investigation, which have not provided unanimously agreed answers yet.

**Hypothesis 3. Countries with higher market consumptive capacity are likely to receive larger amounts of FDI.**

For this hypothesis testing the following indicators will be taken: GDP and population size in respective chosen country. Regression analysis results are presented in Table 4 and Table 5.
Table 4. Regression analysis results between FDI and GDP (years 2000-2010)

<table>
<thead>
<tr>
<th>Country</th>
<th>Observations</th>
<th>$R^2$</th>
<th>$R^2_{adj}$</th>
<th>$F$</th>
<th>P-value</th>
<th>t stat</th>
<th>t lent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>11</td>
<td>0.93</td>
<td>0.92</td>
<td>116.91</td>
<td>1.86</td>
<td>10.81</td>
<td>2.23</td>
</tr>
<tr>
<td>Belgium</td>
<td>11</td>
<td>0.60</td>
<td>0.56</td>
<td>13.55</td>
<td>0.01</td>
<td>3.68</td>
<td>2.23</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>11</td>
<td>0.96</td>
<td>0.96</td>
<td>236.02</td>
<td>9.16</td>
<td>15.36</td>
<td>2.23</td>
</tr>
<tr>
<td>Estonia</td>
<td>11</td>
<td>0.95</td>
<td>0.94</td>
<td>167.22</td>
<td>4.06</td>
<td>12.93</td>
<td>2.23</td>
</tr>
<tr>
<td>Hungary</td>
<td>11</td>
<td>0.91</td>
<td>0.90</td>
<td>91.77</td>
<td>5.11</td>
<td>9.58</td>
<td>2.23</td>
</tr>
<tr>
<td>Latvia</td>
<td>11</td>
<td>0.91</td>
<td>0.90</td>
<td>158.75</td>
<td>5.08</td>
<td>12.60</td>
<td>2.23</td>
</tr>
<tr>
<td>Lithuania</td>
<td>11</td>
<td>0.92</td>
<td>0.91</td>
<td>97.05</td>
<td>4.05</td>
<td>9.85</td>
<td>2.23</td>
</tr>
<tr>
<td>Netherlands</td>
<td>11</td>
<td>0.89</td>
<td>0.88</td>
<td>74.07</td>
<td>1.23</td>
<td>8.61</td>
<td>2.23</td>
</tr>
<tr>
<td>Romania</td>
<td>11</td>
<td>0.95</td>
<td>0.94</td>
<td>166.71</td>
<td>4.12</td>
<td>12.91</td>
<td>2.23</td>
</tr>
<tr>
<td>Slovakia</td>
<td>11</td>
<td>0.99</td>
<td>0.99</td>
<td>717.39</td>
<td>6.82</td>
<td>26.78</td>
<td>2.23</td>
</tr>
<tr>
<td>Slovenia</td>
<td>11</td>
<td>0.96</td>
<td>0.96</td>
<td>223.40</td>
<td>1.16</td>
<td>14.95</td>
<td>2.23</td>
</tr>
</tbody>
</table>

Table 5. Regression analysis results between FDI and population size (years 1995-2010)

<table>
<thead>
<tr>
<th>Country</th>
<th>Observations</th>
<th>$R^2$</th>
<th>$R^2_{adj}$</th>
<th>$F$</th>
<th>P-value</th>
<th>t stat</th>
<th>t lent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>16</td>
<td>0.94</td>
<td>0.94</td>
<td>237.74</td>
<td>3.53</td>
<td>15.42</td>
<td>2.16</td>
</tr>
<tr>
<td>Belgium</td>
<td>16</td>
<td>0.71</td>
<td>0.69</td>
<td>3.43E</td>
<td>4.19</td>
<td>5.85</td>
<td>2.16</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>16</td>
<td>0.75</td>
<td>0.73</td>
<td>40.92</td>
<td>1.66</td>
<td>-6.40</td>
<td>2.16</td>
</tr>
<tr>
<td>Estonia</td>
<td>16</td>
<td>0.65</td>
<td>0.62</td>
<td>25.47</td>
<td>1.78</td>
<td>-5.05</td>
<td>2.16</td>
</tr>
<tr>
<td>Hungary</td>
<td>16</td>
<td>0.93</td>
<td>0.92</td>
<td>183.19</td>
<td>1.97</td>
<td>-13.53</td>
<td>2.16</td>
</tr>
<tr>
<td>Latvia</td>
<td>16</td>
<td>0.79</td>
<td>0.77</td>
<td>52.18</td>
<td>4.40</td>
<td>-7.22</td>
<td>2.16</td>
</tr>
<tr>
<td>Lithuania</td>
<td>16</td>
<td>0.86</td>
<td>0.85</td>
<td>83.93</td>
<td>2.73</td>
<td>-9.16</td>
<td>2.16</td>
</tr>
<tr>
<td>Netherlands</td>
<td>16</td>
<td>0.92</td>
<td>0.91</td>
<td>161.57</td>
<td>4.45</td>
<td>12.71</td>
<td>2.16</td>
</tr>
<tr>
<td>Romania</td>
<td>16</td>
<td>0.77</td>
<td>0.75</td>
<td>47.02</td>
<td>7.85</td>
<td>-6.86</td>
<td>2.16</td>
</tr>
<tr>
<td>Slovakia</td>
<td>16</td>
<td>0.85</td>
<td>0.84</td>
<td>81.67</td>
<td>3.22</td>
<td>9.04</td>
<td>2.16</td>
</tr>
<tr>
<td>Slovenia</td>
<td>16</td>
<td>0.90</td>
<td>0.90</td>
<td>129.86</td>
<td>1.81</td>
<td>11.40</td>
<td>2.16</td>
</tr>
</tbody>
</table>

The third hypothesis about interrelation of FDI and consumptive capacity of country was verified for all analyzed countries irrespective of their level of development. Economic interpretation of obtained results could be the following. Economic growth and increase in consumption capacity, caused by both, increase in earnings or increase in population is followed by capital movement. Globalization processes are very closely related to consumptive capacity in developed and less developed countries. The third hypothesis raised has been verified. We expect the tendency to by sustainable in long-term range.

Before final summary of the results, which will be provided below, we wanted to clarify an extent of the input of the insights into economic science and outline directions of the further research in the area of globalization drivers and prospects in separately taken countries.

Hence, this paper is devoted to elaboration of globalization processes, which are expressed in form of inward FDI. Besides outward FDI, foreign trade and, particularly, export extends globalization and supports sustainable development of each individually taken country (Lapinskiene, Tvaronaviciene 2009). It has to be pointed that a couple of decades ago globalization issues were seen in export-import processes. As relevant example of that approach Kobrin (1991) globalization index (GI) can be provided:
Globalization drivers in developed and less developed countries: if consistent patterns can be traced

\[ GI = 1 - \left( \frac{\left| X_{it} - M_{it} \right|}{X_{it} + M_{it}} \right) \]

where \( GI \) – globalization (global integration) index, branch of economics, t-year;
\( X_{it} \) – export; \( M_{it} \) – import;
\( \left| X_{it} - M_{it} \right| \) - absolute difference between export and import

Kobrin GI value can be between 0 and 1. Value, which is equal to 0 means that products within considered sector is purely imported or purely imported, and value added is created just in one country. If globalization index (Kobrin GI) is equal to 1, it means, that economy’s sector’s import is equal to its import. Intensive exchange among different countries reflects level of international integration, or level of globalization. Hence, exploration of countries’ abilities to export has to be taken into account when globalization processes are under elaboration. Here inevitably another, very much related and important strand of research related to globalization pace and mode has to be devoted to analysis of economic structures, i.e. identification which economic areas, i.e., branches of industry, services or agriculture are to be globalized in broader scope, and which would produce for inward consumption. Hence structural analysis of economics, evaluation of potential international competitiveness of separate branches of economics has to be undertaken.

As it was mentioned above aim of this paper is to focus on other drivers of globalization: we consider inward FDI, what from economic point of view is treated as nearest alternative to export-import activities (FDI origin country outward FDI is export alternative).

Since globalization processes inevitably will expand in short, and especially long-term, all globalization forms and driving forces have to be considered.

3. Conclusions about obtained results and insights about consistent patterns

Globalization process is seen through different economic processes, one of which is movement of capital and goods processes. Hence, globalization can be analyzed through lenses of movement of foreign direct investments (inward or outward) or trade activity (import and export). In this paper we target inflow of capital of foreign origin into selected, i.e. concentrate on processes of movement of inward FDI. Different countries attract rather different quantities of foreign capital inflows. Economic consequences of that attraction can be positive and, in some cases negative. In this paper we make an assumption that positive effects prevail, hence consider inward FDI as desirable from host countries economic development point. We raise hypotheses about inward FDI driving forces and test them by adopting classical statistical analysis method, in our case is regression analysis.

The first hypothesis about interrelation of low tax burden and inflow of FDI has not been verified.

The less developed countries (in our case Bulgaria, Hungary, Latvia, Lithuania and Romania) have the lower tax burden if to compare to developed countries (in our case Austria, Belgium, Estonia, Netherlands, Slovakia and Slovenia). It appeared that the highest coefficients of correlation have two developed heavily taxed countries – Austria and Belgium, and one developed moderately taxed country- Slovakia. It means that inward FDI are insensitive to lowering of tax burden. In its turn, findings suggest, that lowering of tax burdens having purpose to attract FDI is not reasonable nor in developed nether in LDC. The second hypothesis about impact of favorable institutional environment was verified for two developed countries: Slovenia and Slovakia. It appeared that LDCs with relatively high corruption indexes (Romania, Latvia, and Estonia) attract FDI more than developed countries with low corruption indexes. Interpretation of obtained results might be as follows: LDC attract is being globalized irrespective of their corruption index; i.e. other factors than good institutional performance attract foreign capital inflows.

On the contrary, index of economic freedom appears to be significant driver of globalization, especially in LDC (cases of Romania and Slovenia verifies the hypothesis). For developed countries index of economic freedom is of less importance in the field of FDI inflows.

The third hypothesis about interrelation of FDI and consumptive capacity of country was verified for all analyzed countries irrespective of their level of development.

To generalize, conventional globalization drivers, such as low tax burden, transparent and favorable institutional performance are not necessarily efficient...
drivers for LEC globalization. It seems that inward FDI are stipulated by more by market niches and unexploited opportunities rather than conventional factors of FDI. That conclusion we believe is valid for LDC located in the EU.

As concerns developed European countries, their globalization is conditioned by market consumptive capacity, mainly. Here we need to recall, that foreign trade, which is very significant globalizing process in this paper has not been elaborated. All insight provided above relates globalization through movement capital, but not goods or services. Inward FDI is seen as positive factor of globalization and economic development of host countries, which are attracted according specific consistent patterns partly revealed in this paper.

References


Sahoo, P. 2006. Foreign Direct Investment in South Asia: Policy, Trends, Impact and Determinants, ADB Institute Discussion paper No. 56.
The General Jonas Žemaitis Military Academy of Lithuania
Šilo Str. 5A, LT-10322 Vilnius, Lithuania
Vilnius Gediminas Technical University, Saulėtekio Av.11, LT-10223 Vilnius, Lithuania
E-mail: gitana.dudzeviciute@vgtu.lt

Received 26 January 2013; accepted 20 April 2013

Abstract. This study consists of two research aspects. First of all, the author analyses the relationship of energy consumption and economic growth in the context of 13 selected countries in the period of year between 1990 and 2010. Secondly, using statistical techniques the paper takes into account cross-sectoral dependence when analyzing the relationship between energy consumption and economic structures of the same countries. Based on the energy consumption, the countries are divided into three groups: low energy consumption group, middle energy consumption group, and high energy consumption one. Statistical methods, including correlation analysis are employed for the estimation of the structural changes of economy and relationship between energy consumption and economic structure in each of the three groups. In general, the results of this study indicate that energy consumption is closely related to all economic activities for all groups of countries; however the case of Lithuania reveals the absence of relationship between energy consumption and industrial sector. Moreover, in the context of comparative analysis, China, as a high energy consumption country, has a completely different picture of economic structure as well as relation between energy consumption and structural changes. Economic sectors, such as industry, services and agriculture depend on energy resources, but in different degree in these three groups of countries.

Keywords: Economic structure, structural changes, energy consumption, industry, services, agriculture.

Reference to this paper should be made as follows: Dudzevičiūtė, G. 2013. The research of the economic structural changes: energy consumption aspect, Journal of Security and Sustainability Issues 2(4): 13–23. http://dx.doi.org/10.9770/jssi.2013.2.4(2)

JEL Classifications: Q40, Q43, Q49, O13, O14

1. Introduction

The relationship between energy consumption and economic growth has attracted a lot of attention in academic research. Scientists discuss the causality between economic growth and structure and energy consumption – the question whether this relationship exists and what is its nature has been raised (Dudzevičiūtė 2012, Vosylius et al. 2013, Tvaronavičienė 2012). The studies on energy consumption and economic growth have proposed the four major hypotheses, such as growth, conservation, feedback and neutrality (Ozturk 2010; Georgantopoulos 2012). The growth hypothesis says that energy consumption is an essential component in economic growth (Tvaronavičienė 2012, Vosylius et al. 2013). The presence unidirectional causality from energy consumption to economic growth signals the economy is energy dependent (Apergisu aad Danulețiu 2012; Vosylius et al. 2013).
The analysis of eighty two countries revealed the absence of causality between energy consumption and real GDP per capita whereas unidirectional causality from real GDP per capita to energy consumption for the middle and high income countries Huang et al. (2008). Ozturk (2010) did research of 51 countries and confirmed that there was long-run causality running from GDP to energy consumption for low income countries and a bidirectional causality for middle income countries. Conservation hypothesis suggests that energy conservation policies may have little or no impact on economic growth (Apirgisu, Danuletiu 2012; Bobinaité et al. 2011). This hypothesis was confirmed by Huang et al. (2008), analyzing 19 low income countries. Feedback hypothesis states there is bidirectional causality between energy consumption and economic growth. It reflects the interdependence associated with energy consumption and economic growth. Mahadevan and Asafu-Adje (2007) in a study of energy exporting developing countries supported this hypothesis and bidirectional causality between energy consumption per capita and real GDP per capita. Shahbaz et al. (2011) analyzing causality relationships between electricity consumption, capital and economic growth for Romania, found the presence of bidirectional causality as well between electricity consumption and economic growth. Feedback hypothesis was supported in many scientific studies (Mishra and Sharma 2009; Lee, C. and Lee, J. 2010; Ozturk 2010; Constantin and Martini 2010; Belke et al. 2011).

Neutrality hypothesis supports the absence of causality between energy consumption and economic growth (Cheng-Lang et al. 2010; Chen et al. 2012). It implies that energy conservation policies will have an insignificant impact on economic growth (Apirgisu and Danuletiu 2012; Voslyius et al. 2013).

Paper problem is related to the continuing scientific debate over the establishment of interaction between energy consumption and economic growth and structure.

Research aim is related, on the one hand, to the economic structural changes of the selected countries; on the other hand, to analysis of relationships among energy consumption and different economic structures.

Research methods: overview of scientific literature, comparative analysis of statistical data applying statistical methods.


Economic growth in academic works is defined and described by the growth of the gross domestic product (GDP) or GDP per capita mostly. GDP is the most widely-spread global indicator which is used to determine the country's economic level of development (Grybaitė 2011; Smaliukienė et al. 2012; Lankauskienė, Tvaronavičienė 2012; Tvaronavičienė 2012, Lapinskiene, Tvaronavičienė 2009). On the basis of the scientists' considerations, GDP in this paper will be used as a synonym for economic growth.

Recently published studies on the relationship of energy consumption and economic growth have been carried out in two ways – some scientists (Ho and Siu 2007; Lee and Chiu 2011; Apiris and Payne 2012) examine the relationship between separate energy resources and economic growth, others (Mehrara 2007; Chontanawat et al. 2008; Narayan and Smyth 2008; Akinlo 2009; Payne 2010; Apirisu and Danuletiu 2012; Ozturk 2012; Voslyius et al. 2013) analyse the relationship between a total energy consumption and economic growth.

Mehrara (2007) examined the causality between energy consumption and economic growth for three oil-exporting countries: Iran, Kuwait and Saudi Arabia. Two different test methods are used to test for causality, namely, the error correction model and Toda-Yamamoto (1995) procedure. The results based on both approaches consistently show a unidirectional long-run causality from economic growth to energy consumption for Iran and Kuwait and unidirectional strong causality from energy consumption to economic growth for Saudi Arabia. The results support the neutrality hypothesis of energy consumption and economic growth for Iran and Kuwait and vice versa for Saudi Arabia. The findings reveal that increased GDP requires enormous energy consumption in Saudi Arabia. According to author, it seems misleading to recommend the same policy for different oil-exporting countries (Mehrara 2007). Ho and Siu (2007) report the following findings for Hong Kong: (1) there is a long run equilibrium relationship between real GDP and electricity consumption, (2) a one-way causal exists from electricity consumption to real GDP, (3) there exists possible structural change in the relationship between electricity consumption and economic activities in 1990s. Chontanawat et al. (2008) test for causality between energy and GDP us-
ing a consistent data set and methodology for over 100 countries. The empirical evidence shows that the causality from energy to GDP exists and it is more prevalent in the developed OECD countries compared to the developing non-OECD countries. The research of Narayan and Smyth (2008) examines the relationship between capital formation, energy consumption and real GDP in G7 countries using panel unit root, panel cointegration, Granger causality and long-run structural estimation. The authors find that capital formation, energy consumption and real GDP are cointegrated and that capital formation and energy consumption Granger cause real GDP positively in the long run. The study reveals that a 1% increase in energy consumption increases real GDP by 0.12-0.39%, while a 1% increase in capital formation increases real GDP by 0.1–0.28% (Narayan and Smyth 2008). In Chiou-Wei et al. (2009) study the relationship between energy consumption and economic growth is considered as an imperative issue in energy economics. In this research, both linear and nonlinear Granger causality tests are applied to examine the causal relationship between energy consumption and economic growth for Asian countries as well as the United States. The findings of the study support a neutrality hypothesis for the United States, Thailand, and South Korea while unidirectional causality running from Philippines and Singapore. Empirical evidence reveals that energy consumption may have affected economic growth for Taiwan, Hong Kong, Malaysia and Indonesia (Chiou-Wei et al. 2009). Payne (2010) in the investigation employs United States annual data from 1949 to 2006 to compare the causal relationship between renewable and non-renewable energy consumption and real GDP, respectively. Given the sample size of the study, the Toda-Yamamoto causality tests reveal the absence of Granger-causality between renewable or non-renewable energy consumption and real GDP which supports the neutrality hypothesis. Ozturk (2010) in the study uses the panel data of energy consumption and economic growth (GDP) for 51 countries from 1971 to 2005. Firstly, a relationship between energy consumption and economic growth is investigated by employing panel cointegration method. Secondly, panel causality test is applied to investigate the way of causality between the energy consumption and economic growth. Finally, the authors test whether there is a strong or weak relationship between these variables. The empirical results of this study reveals that energy consumption and GDP are cointegrated, however no strong relation is found between energy consumption and economic growth for all income groups countries. The panel causality test results reveal that there is long-run Granger causality running from GDP to energy consumption for low income countries and there is bidirectional causality between energy consumption and GDP for middle income countries. The findings of this study have important policy implications and it shows that this issue still deserves further attention in future research (Ozturk 2010). Lee and Chiu (2011) in the study apply panel data analysis to examine the short-run dynamics and long-run equilibrium relationships among nuclear energy consumption, oil prices, oil consumption, and economic growth for developed countries in the period of 1971-2006. According to the authors, the panel cointegration results show that in the long run, oil prices have a positive impact on nuclear energy consumption, suggesting the existence of the substitution relationship between nuclear energy and oil. Furthermore, the panel causality test results find evidence of unidirectional causality running from oil prices and economic growth to nuclear energy consumption in the long run, while there is no causality between nuclear energy consumption and economic growth in the short run (Lee and Chiu 2011). Apergis and Payne (2012) examine the relationship between renewable and non-renewable energy consumption and economic growth for 80 countries over the period of 1990–2007. The scientists confirm that the Pedroni heterogeneous panel cointegration test show a long-run equilibrium relationship between real GDP, renewable energy consumption, non-renewable energy consumption, real gross fixed capital formation, and the labor force with the respective coefficient estimates positive and statistically significant. Furthermore, the results from the panel error correction model reveal bidirectional causality between renewable and non-renewable energy consumption and economic growth in both the short- and long-run (Apergis and Payne 2012). The study carried out by Apergisu and Danuletii (2012) examines the relationship between energy consumption and economic growth for the economy of Romania over the period of 2000-2011. A cointegration and error correction model is employed to determine the causal relationship. Cointegration test reveals a long-run equilibrium relationship between real GDP, energy consumption, the labor force, and real gross fixed capital formation with the respective
coefficients positive and statistically significant. The Granger-causality results indicate both short-run and long-run causality from energy consumption to economic growth which supports the growth hypothesis (Apergisu and Danuletiu 2012). The results of the recent studies carried out by different scientists are summarized in the Table 1.

Table 1. Overview of studies on the energy consumption and economic growth

<table>
<thead>
<tr>
<th>Author/year</th>
<th>Methodology</th>
<th>Object of research</th>
<th>The hypothesis supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mehrara (2007)</td>
<td>Cointegration; Error correction model; Toda-Yamamoto procedure</td>
<td>Three oil-exporting countries: Iran, Kuwait and Saudi Arabia</td>
<td>+ +</td>
</tr>
<tr>
<td>Ho and Siu (2007)</td>
<td>Unit root test; Error correction model</td>
<td>Hong Kong</td>
<td>+</td>
</tr>
<tr>
<td>Chontanawat et al. (2008)</td>
<td>Hsiao procedure: Granger-causality, Akaike final prediction error.</td>
<td>30 OECD countries and 78 non-OECD countries</td>
<td>+ +</td>
</tr>
<tr>
<td>Chiou-Wei et al. (2009)</td>
<td>Linear and nonlinear Granger causality tests</td>
<td>Asian countries and the United States</td>
<td>+ +</td>
</tr>
<tr>
<td>Payne (2010)</td>
<td>Toda-Yamamoto causality tests; Granger-causality test</td>
<td>United States</td>
<td>+</td>
</tr>
<tr>
<td>Ozturk (2010)</td>
<td>Cointegration method; Granger-causality test</td>
<td>51 countries</td>
<td>+ +</td>
</tr>
<tr>
<td>Lee and Chiu (2011)</td>
<td>Cointegration method; Granger-causality test</td>
<td>Developed countries</td>
<td>+ + +</td>
</tr>
<tr>
<td>Apergis and Payne (2012)</td>
<td>Pedroni heterogeneous panel cointegration test; error correction model</td>
<td>80 countries</td>
<td>+ +</td>
</tr>
<tr>
<td>Apergisu and Danuletiu (2012)</td>
<td>Cointegration and error correction model; Granger-causality test.</td>
<td>Romania</td>
<td>+</td>
</tr>
</tbody>
</table>

Source: author’s

Considering the results of the previous studies, different hypotheses were tested; however the biggest part of empirical surveys supported the growth one. Taking into account the different methodologies used in the studies, it seems that different combinations of methods can be applied.

3. Research of energy consumption and economic structure dependence

3.1. Methodology

The research was guided by the prevailing theories in scientific literature (Mehrara 2007; Mishra and Sharma 2009; Lee and Lee 2010; Ozturk 2010; Constantini and Martini 2010; Belke et al. 2011; Georgantopoulos 2012; Apergisu and Danuletiu 2012; Vosylius et al. 2013) on the basis of which the hypothesis was formulated: there is a direct correlation between energy consumption and economic growth. In order to support or reject the hypothesis, the correlation analysis, which was carried out with Microsoft Excel programs, was used. Also this paper uses recently developed panel techniques that accommodate both structural breaks and cross-sectoral dependence simultaneously. Thirteen countries, including Lithuania, were selected for the research. From the perspective of Lithuania, the purpose was to select as many as possible different countries that have their own characteristics of development and distinguish by some economic indicators from others in global context. So, different criteria were applied for these countries selection; they are summarized in the Table 2. Section 3.2 tests the hypothesis associated with the energy consumption and economic growth, which is
presented by GDP per capita, while Section 3.3 reports an overview of the energy consumption and economic structure in different groups of countries.

Table 2. Criteria for the selection of countries

<table>
<thead>
<tr>
<th>Countries</th>
<th>Criteria Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>US, China, Japan</td>
<td>World Trade centers; about 30% of world trade: US-14%; China-11%; Japan-5%.</td>
</tr>
<tr>
<td>Germany, France, UK</td>
<td>Significant impact on EU economy and policy; about 40% of EU-27 export and about 50% of GDP.</td>
</tr>
<tr>
<td>Denmark, Sweden</td>
<td>Scandinavian countries that are characterized by successful development</td>
</tr>
<tr>
<td>Switzerland, Norway</td>
<td>They are involved in TOP10 of the world countries by economic and social welfare; GDP/capita makes 71 thou EUR in Norway and 61 thou EUR in Switzerland. The richest population of the world live in these countries.</td>
</tr>
<tr>
<td>Latvia, Poland</td>
<td>These countries are close neighbors of Lithuania and have similar economic structure. They have accessed to EU at the same time.</td>
</tr>
</tbody>
</table>

Source: World Bank, Eurostat

Based on the energy consumption, the countries are divided into three groups: low energy consumption group, middle energy consumption group and high energy consumption group. Concluding remarks are given in Section 4.

3.2. The research of relationship between energy consumption and economic growth

The statistics of different countries were used to determine the relationship between energy consumption (kg of oil equivalent) per USD 1000 GDP of particular years and GDP per capita in thou USD. The period of 1990-2010 is under examination (Fig. 1).

As the Figure 1 shows, average annual energy consumption in the period of 1990-2010 varies from the highest of 342 kg of oil equivalent per $1000 GDP in China to the lowest of 99 kg per $ 1000 GDP in Switzerland. By energy consumption the countries are divided into four groups: low energy consumption group, middle energy consumption group, and high energy consumption group (Table 3).
Table 3. The groups of countries based on energy consumption

<table>
<thead>
<tr>
<th>Groups based on energy consumption</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low energy consumption</td>
<td>Switzerland, Denmark, UK, Japan, Norway, Germany, France.</td>
</tr>
<tr>
<td>Middle energy consumption</td>
<td>Sweden, Latvia, US, Poland, Lithuania.</td>
</tr>
<tr>
<td>High energy consumption</td>
<td>China</td>
</tr>
</tbody>
</table>

Seven of 13 selected for research countries belong to low energy consumption group. These countries use from 99 kg to 145 kg of oil equivalent energy. Five countries belong to middle energy consumption group. Energy used per $1000 GDP in middle group countries varies from 170 kg to 212 kg of oil equivalent. The highest energy consumption rate is in China (over 340 kg of energy used per $1000 GDP).

Further, the relationship between energy consumption and GDP per capita is examined in selected countries (Table 4).

Table 4. Average energy consumption (kg of oil equivalent per $1000 GDP) and GDP per capita (USD)

<table>
<thead>
<tr>
<th>Year</th>
<th>Low energy consumption group's countries</th>
<th>Middle energy consumption group's countries</th>
<th>High energy consumption group's countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Energy consumption</td>
<td>GDP/capita, USD</td>
<td>Energy consumption</td>
</tr>
<tr>
<td>1990</td>
<td>145</td>
<td>27463</td>
<td>288</td>
</tr>
<tr>
<td>1995</td>
<td>140</td>
<td>29281</td>
<td>274</td>
</tr>
<tr>
<td>2000</td>
<td>127</td>
<td>32573</td>
<td>197</td>
</tr>
<tr>
<td>2001</td>
<td>129</td>
<td>32925</td>
<td>200</td>
</tr>
<tr>
<td>2002</td>
<td>125</td>
<td>33054</td>
<td>196</td>
</tr>
<tr>
<td>2003</td>
<td>127</td>
<td>33245</td>
<td>190</td>
</tr>
<tr>
<td>2004</td>
<td>124</td>
<td>33971</td>
<td>183</td>
</tr>
<tr>
<td>2005</td>
<td>121</td>
<td>34536</td>
<td>172</td>
</tr>
<tr>
<td>2006</td>
<td>119</td>
<td>35366</td>
<td>162</td>
</tr>
<tr>
<td>2007</td>
<td>114</td>
<td>36158</td>
<td>157</td>
</tr>
<tr>
<td>2008</td>
<td>115</td>
<td>35963</td>
<td>154</td>
</tr>
<tr>
<td>2009</td>
<td>115</td>
<td>34420</td>
<td>156</td>
</tr>
<tr>
<td>2010</td>
<td>116</td>
<td>35041</td>
<td>160</td>
</tr>
<tr>
<td>Correlation</td>
<td>-0.97</td>
<td>-0.93</td>
<td>-0.72</td>
</tr>
</tbody>
</table>

The results of the research show negative interrelationship between energy consumption and GDP per capita in every analyzed countries' group: as GDP per capita grows, energy consumption decreases. Taking into account 1990-2010 average data, it is notable that as the country consume less energy, as stronger relationship with GDP per capita exists. China has the highest energy consumption level, but the lowest interrelationship with GDP per capita. This analysis rejects formulated hypothesis in Section 3.1 that a direct correlation between energy consumption and economic growth exists.

3.3. Energy consumption and economic structures: the review of the selected countries

The research was guided by analyzing the average date of GDP structure and energy consumption for the period of 1990-2010 years. The analysis of the average data shows the biggest share of industry sector in economy of China, Norway and Poland. It makes from 35 to 46 percent of GDP (Fig. 2).
Lithuania with 31% of industry’s share in GDP belongs to the same group as Germany and Japan. Industry sector’s share in GDP varies from 27 to 29 percent in UK, Latvia, Switzerland and Sweden. France, US and Denmark have the least shares of industry. They make from 22-25 percent.

Service sector dominates the GDP in twelve selected countries except China, where industry takes bigger share of economy than services (Figure 2, 3).

Services sector makes from 69 to 75 percent in nine countries under examination. According to the average data of 1990-2010, Lithuania as well as Poland and Norway belong to the same group, where service sector produces from 58 to 62 percent of GDP. Agriculture sector took about 14 % in GDP in China for the period of 1990-2010. Lithuania, Latvia and Poland belong to the group of countries, where agriculture makes from 5 to 7 percent. The least importance (about 1%) of agriculture exists in Japan, US, Germany, UK. In France, Sweden, Denmark, Norway and Switzerland agriculture sector makes from 2 to 3 percent. In order to determine the relationship between energy consumption and economic structure of different countries, the correlation analysis is carried out. Referring to the previous examination, China distinguishes from the other countries for high energy consumption. Over a period of ten years, the energy consumption has decreased by 60% in China, but it remains the highest indicator all over the world. In the same period of time, industry’s share in GDP has increased by 6 percentage points, service sector’s share has grown by 11 percentage points, and agriculture’s share in GDP has gone down by 17 percentage points (Table 5).
The research of the economic structural changes: energy consumption aspect

Table 5. The relationships of energy consumption and economic structure in China

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy consumption (kg of oil equivalent)</th>
<th>Share of GDP, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Industry</td>
</tr>
<tr>
<td>1990</td>
<td>691</td>
<td>41</td>
</tr>
<tr>
<td>1995</td>
<td>470</td>
<td>47</td>
</tr>
<tr>
<td>2000</td>
<td>325</td>
<td>46</td>
</tr>
<tr>
<td>2001</td>
<td>299</td>
<td>45</td>
</tr>
<tr>
<td>2002</td>
<td>297</td>
<td>45</td>
</tr>
<tr>
<td>2003</td>
<td>307</td>
<td>46</td>
</tr>
<tr>
<td>2004</td>
<td>325</td>
<td>46</td>
</tr>
<tr>
<td>2005</td>
<td>316</td>
<td>47</td>
</tr>
<tr>
<td>2006</td>
<td>307</td>
<td>48</td>
</tr>
<tr>
<td>2007</td>
<td>284</td>
<td>47</td>
</tr>
<tr>
<td>2008</td>
<td>280</td>
<td>47</td>
</tr>
<tr>
<td>2009</td>
<td>273</td>
<td>46</td>
</tr>
<tr>
<td>2010</td>
<td>270</td>
<td>47</td>
</tr>
</tbody>
</table>

Correlation -0.72 -0.93 0.97

Source: World Bank, author’s

The correlation analysis indicates strong negative relationship between energy consumption and industry’s share of GDP (0.72) and very strong negative relationship (0.93) between energy consumption and services’ sector in China as well. It means that when industry’s share of GDP increases, energy consumption per $1000 GDP decreases in China. The stronger relationship of the same direction exists between energy consumption and services’ sector. The agriculture’s share of GDP decreased from 27% in 1990 to 10% in 2010 in China. Services’ sector increased from 32% to 43% in the same period of time. The analysis shows positive and very strong relationship (0.97) between energy consumption and agriculture’s share of GDP. As agriculture’s share of GDP decreases, energy consumption per $1000 GDP decreases too. The research of relationship between energy consumption and economic structure of the middle energy consumption group’s countries shows very strong positive relationships of energy consumption and industry’s (0.87) as well as agriculture’s sector (0.89). Energy consumption and services’ sector are negatively interrelated (Table 6).

Over a period of ten years, energy consumption has decreased by 44%, industry’s share in GDP has decreased by 12 percentage points, service sector’s share has grown by 21 percentage points, agriculture’s share in GDP has gone down by 10 percentage points in the middle energy consumption group’s countries.

Table 6. The relationships of energy consumption and economic structure

<table>
<thead>
<tr>
<th>Year</th>
<th>Average of energy consumption (kg of oil equivalent)</th>
<th>Share of GDP, %</th>
<th>Energy consumption (kg of oil equivalent)</th>
<th>Share of GDP, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Industry</td>
<td>Services</td>
<td>Agriculture</td>
</tr>
<tr>
<td>1990</td>
<td>288</td>
<td>37.2</td>
<td>50.2</td>
<td>12.6</td>
</tr>
<tr>
<td>1995</td>
<td>274</td>
<td>30.8</td>
<td>62.7</td>
<td>6.5</td>
</tr>
<tr>
<td>2000</td>
<td>197</td>
<td>27.5</td>
<td>68.7</td>
<td>3.8</td>
</tr>
<tr>
<td>2001</td>
<td>200</td>
<td>26.7</td>
<td>69.6</td>
<td>3.7</td>
</tr>
<tr>
<td>2002</td>
<td>196</td>
<td>26.2</td>
<td>70.3</td>
<td>3.5</td>
</tr>
<tr>
<td>2003</td>
<td>190</td>
<td>26.5</td>
<td>70.1</td>
<td>3.3</td>
</tr>
<tr>
<td>2004</td>
<td>183</td>
<td>27.2</td>
<td>69.3</td>
<td>3.5</td>
</tr>
<tr>
<td>2005</td>
<td>172</td>
<td>27.1</td>
<td>69.8</td>
<td>3.2</td>
</tr>
<tr>
<td>2006</td>
<td>162</td>
<td>25.3</td>
<td>71.8</td>
<td>2.9</td>
</tr>
<tr>
<td>2007</td>
<td>157</td>
<td>27.5</td>
<td>69.5</td>
<td>3.0</td>
</tr>
<tr>
<td>2008</td>
<td>154</td>
<td>26.8</td>
<td>70.5</td>
<td>2.7</td>
</tr>
<tr>
<td>2009</td>
<td>156</td>
<td>24.7</td>
<td>72.7</td>
<td>2.6</td>
</tr>
<tr>
<td>2010</td>
<td>160</td>
<td>25.6</td>
<td>71.6</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Correlation 0.87 -0.88 0.89 0.02 -0.81 0.85

Source: World Bank, author’s

The analysis shows as services’ sector share of GDP increases, energy consumption decreases and vice versa. The case of Lithuania shows the same interrelationships of energy consumption and service sector’s tendencies as well as agriculture sector’s as in the middle energy consumption countries, however, the relationship between energy consumption and industry’s is non-existent. In the low energy con-
sumption group’s countries energy consumption has decreased by 20% over a period of ten years. Economic structure’s tendencies are the same as in middle energy consumption group’s countries: industry’s share in GDP has decreased as well as agriculture’s sector; service’s sector share in economy has grown. The analysis shows that the strongest positive correlation of energy consumption can be observed in relation to the agriculture sector (correlation coefficient of 0.98), positive correlation also exists between energy consumption and industry’s (correlation coefficient of 0.82) (Table 7). Negative interrelationship has been determined between energy consumption and service’s sector (correlation coefficient of 0.87). Thus when service’s share in GDP increase, energy consumption amount tends to decreased, which indicates that the service’s sector is not energy-intensive in low energy consumption group of countries.

Table 7. The relationships of energy consumption and economic structure

<table>
<thead>
<tr>
<th>Year</th>
<th>Average of energy consumption (kg of oil equivalent)</th>
<th>Share of GDP, %</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Industry</td>
<td>Services</td>
</tr>
<tr>
<td>1990</td>
<td>145</td>
<td>32.5</td>
<td>64.6</td>
</tr>
<tr>
<td>1995</td>
<td>140</td>
<td>29.9</td>
<td>67.7</td>
</tr>
<tr>
<td>2000</td>
<td>127</td>
<td>29.7</td>
<td>68.5</td>
</tr>
<tr>
<td>2001</td>
<td>129</td>
<td>28.7</td>
<td>69.5</td>
</tr>
<tr>
<td>2002</td>
<td>125</td>
<td>28.1</td>
<td>70.3</td>
</tr>
<tr>
<td>2003</td>
<td>127</td>
<td>27.6</td>
<td>70.9</td>
</tr>
<tr>
<td>2004</td>
<td>124</td>
<td>27.7</td>
<td>70.8</td>
</tr>
<tr>
<td>2005</td>
<td>121</td>
<td>28.1</td>
<td>70.6</td>
</tr>
<tr>
<td>2006</td>
<td>119</td>
<td>28.5</td>
<td>70.2</td>
</tr>
<tr>
<td>2007</td>
<td>114</td>
<td>28.2</td>
<td>70.6</td>
</tr>
<tr>
<td>2008</td>
<td>115</td>
<td>28.3</td>
<td>70.5</td>
</tr>
<tr>
<td>2009</td>
<td>115</td>
<td>25.8</td>
<td>73.1</td>
</tr>
<tr>
<td>2010</td>
<td>116</td>
<td>26.5</td>
<td>72.3</td>
</tr>
</tbody>
</table>

Source: World Bank, author’s

All things considered, it seems that industry’s and agriculture sectors keep decreasing in all three groups of countries. Service sector’s share in the economy of the countries has increased over a period of ten years. Energy consumption has decreased in all groups of countries; however China remains the biggest consumer of energy for $1000 GDP among selected countries. Energy consumption correlates with economic structures of the countries in the same or opposite directions, although the case of Lithuania showed the absence of correlation between energy consumption and industry’s sector. It means that the industry share’s variation in GDP can not be predicted referring to the dynamics of energy consumption; and according to the tendencies of energy consumption, the assumption about industry’s sector could not be made as well.

Conclusions

- Recently published studies on the relationship of energy consumption and economic growth have been carried out in two ways – some scientists examine the relationship between separate energy resources and economic growth, others analyze the relationship between a total energy consumption and economic growth. The researches on energy consumption and economic growth have proposed the four major hypotheses, such as growth, conservation, feedback and neutrality. Most of the studies showed that there is a close correlation among these economic factors, but causality remains an open debate.

- Over a period of ten years, in China, as a high energy consumption country, energy consumption has decreased by 60%. The main structural changes of Chinese economy has associated with the decrease in agriculture sector’s share by 17 percentage points, while service and industry have grown by 11 and 7 percentage points respectively.

- In the middle energy consumption group countries, the average of energy consumption has decreased by 44 %. In the same period of time, middle energy consumption group has reported the structural changes in the economy, as follows: the shrinkage of industry and agriculture sector by 12 and 10 percentage points respectively, while the share of service sector has grown by 21 percentage points. The analysis revealed the same structural tendencies in Lithuanian economy as well.

- In the low energy consumption group, the average of energy consumption has fallen by 20 % over a period of ten years. Industry and agriculture sector have decreased by 6 and 2 percentage points respectively, while service sector has reported the growth of 8 percentage points in GDP.

- The research has discovered that in all three energy consumption groups of countries (low, middle and high), there exists close relationship between energy consumption and economic growth. Economic
growth leads energy consumption negatively. In the high energy consumption group, the relationship is not as strong as in the low and middle one.

- After further in-depth analysis of the energy consumption and economic structural variation related data, the results indicate the following aspects: (a) in the high energy consumption group, there is close and negative relationship between energy consumption and industry as well as service’s sector; and agricultural sector leads energy consumption positively; (b) in the middle energy consumption group, industry and agriculture leads energy consumption positively; energy consumption and service’s sector interrelates negatively; the case of Lithuania showed the absence of correlation between energy consumption and industry’s sector; (c) in the low energy consumption group, industry and agriculture leads energy consumption positively and services negatively.

- In this paper the author has overviewed the main tendencies of structural changes in the selected countries economy. However, further investigation is still needed to assess the robustness of these preliminary conclusions and to have a deeper understanding of structural development.

References


FOREIGN DIRECT INVESTMENT POLICY AS AN INSTRUMENT FOR SUSTAINABLE ECONOMIC GROWTH: A CASE OF IRELAND

Agnė Šimelytė1, Jūratė Gintarė Antanavičienė2

1,2Vilnius Gediminas Technical University, Faculty of Business Management, Saulėtekio ave. 11, LT-10223 Vilnius, Lithuania
Emails: 1agne.simelyte@vgtu.lt; 2jurate.antanaviciene@vgtu.lt

Received 30 January 2013; accepted 15 May 2013

Abstract. It is scientifically proved that foreign direct investments (FDI) are one of the life-forces for economic growth. Foreign investors use local labour, capital, and natural resources that are constantly running out and limited. However, global companies that translocate their production process often devastate the nature of the host country. Decline of natural resources and climate changes forces to think about how people could develop country's economy and social welfare, but at the same time save nature and its resources. Global companies are the main developers of economy and social welfare, but also, they are environment polluters. The value of sustainable development is quite obvious, but there is a lack of research about the relationship between FDI and sustainable development in the literature. The literature separately analyses the problem of sustainable development or FDI impact on economic development. Often, FDI is described by determining the effects, but it does not address the question of expedient foreign capital, which would provide the greatest benefit to the host country. The article analyses the influence of foreign direct investments (FDI) on sustainable development. It develops the concept of sustainable investment. It aims to find out whether the purposively formed foreign direct investment policy can ensure the sustainability of economic development. In this case, FDI can become an instrument for the implementation of sustainable development. This study is about Ireland case. The choice is not coincidental. Since this country applied FDI policy, it was able to transform the economy rapidly, and also it became one of the most developed countries in Europe. The authors of the research chose ten economic, social, and environmental factors that define sustainable growth. The analysis revealed the contact between the indicators of FDI and sustainable growth in different periods of the economic cycle.

Keywords: Foreign direct investment, sustainability, FDI policy, Ireland, economic growth.


JEL Classification: O1, O19, F63

1. Introduction

Industrialization and the scale of growing globalization determined vast use of natural resources. This problem became visible only at the end of 20th century, when production in all industrial countries started to destruct and devastate nature. Negative effects appeared in everyday of human life. Therefore, this problem became more relevant, people started to ask how to combine economic growth, social welfare, without destroying the harmony of animate and inanimate nature. The harmony of these two areas is understood as sustainability (Beretta 2012).

In a broad sense, sustainable growth is understood as a compromise between environmental and social...
goals of society, which provides possibilities to reach social welfare for the present and future generations within the permissible limits of environmental impact (National Sustainable Development Strategy of the Republic of Lithuania 2003).

Sustainable development is based on the general principles that are relevant to all nations. It helps to improve the quality of life for the present and future generations. Sustainable development helps to understand that the current lifestyle, globalization, and use of natural resources will influence the quality of the future generations. Sustainable world should ensure that human activities will not harm long-term productivity of ecosystems. Economics and society depend on nature, because it:

- Is natural resources necessary for energy production and services;
- During the process of production produces gases that causes greenhouse effect, and consumption waste devastates nature;
- Are resources necessary to create a comfortable human life, including stable climate and water.

Thus, scientific researches of sustainable development are naturally interdisciplinary; inevitably, they integrate different areas of life that reflects attitudes towards: social and economic development, technological advancement, environment protection, and changes in life of modern society (Melnikas 2010).

Since technologies are improving, the ambition of economic benefit with the help of reduced production costs is increasing, the companies were forced to translocate their production to less developed countries that have the advantage of cheap labour, i.e., to invest in a foreign country. Despite the fact that foreign direct investment is a catalyst for economic growth, in many cases, establishment of international companies and their development caused environmental problems. More and more often, sustainable development is recognized as a key to control the interdependence of economic and environmental protection. However, it is not a narrow concept or defined by a process, but it is a method, where:

- The use of resources;
- Deflection of investments;
- Focus on technological development;
- Institutional changes;

are combined with the current and future needs. Therefore, it involves difficult decisions that depend on political processes.

However, scientific literature lacks an analysis of connection between sustainable investment research and FDI and their points of connection. The authors' article about the problem of promoting foreign direct investment analyses FDI influence on the country’s sustainable development.

The goal of article – to analyze the implications of applying purposefully formed FDI policy in sustainable economic development based on the example of Ireland. The article uses the analysis and synthesis of scientific literature, methods of statistical data and correlation-regression analysis.

2. Foreign direct investment impact on the development of a country

In the scholarly literature, foreign direct investment impact on the development of a country is controversial; therefore, it is very hard to evaluate the FDI benefits of living standards and sustainable economic growth in developing countries and countries that are in transition. Around 1953, the relevance of foreign capital has increased, because the task of capital structure decisions was to determine rational structure of the capital based on the chosen goal. Contemporary researchers (Morton 1954) actively analyzed the common foreign capital influence of financial support and foreign direct investments on the economic development of a country, but they determined only a negative FDI impact on country’s economy, disadvantages of stability and reliability.

Moran (2005) distinguished two alternative concepts of FDI influence, based on which it is determined potential FDI impact on developing countries and countries in transition. The first concept provides a positive approach and notes that additional foreign investors increase the competition in the local market. The second one is not so optimistic. It emphasizes possible disturbing effects, when foreign investors can have imperfect internal market competitiveness from imperfect competitive market.

A positive approach defines foreign direct investments as an aid to developing countries and countries in transition in order to direct the development of economy towards development. It should be noted that since 1950, it was argued that foreign capital should flow from a developed country to developing country (Markusen 2013). In this case, the host country is understood as extremely poor country,
because it uses old production technologies, productivity level is low, so as a result the wages are also low (Eremina 2009). Low wages do not give an opportunity to the host country generate funds, therefore, it is impossible to create internal high level investments (Bora 2002). It suggests an assumption that developing countries and/or countries in transition do not have other options but to attract foreign capital. Hence, foreign direct investments supplement local funds by providing more effective management, marketing instruments, and technologies, thereby increasing the productivity of the country, which accepts the investments. However, national income depends on the flow of foreign capital and elasticity of capital demand (Dunning and Lundan 2009). In addition, local companies that take over new technologies and knowledge from MNCs, increase their productivity (Torrisi et al. 2008; Tvaronavičienė et al. 2009; Miškinis 2010, Tvaronavičienė, Lankaus- kienė 2011) and become sufficiently competitive (Falla et al. 2009), increase production volumes through FDI (Moran 2005; Groose 2005), increase the level of productivity (Saggi 2009), and this is how the host country increase the rate of economic growth (Durham 2004; Ruane 2008). Reinvestments earned from companies that were acquired by foreign investors during privatization, increase FDI flows related to the initial investment. Finally, the programs of privatization indirectly enhance favourable FDI climate; for example, by instructing to fulfil government’s obligations to execute the reforms in one or another public sector. During privatization raised FDI have a tendency to grow regularly (Nunnenkamp et al. 2007; Desai et al. 2004; Levi-Faur 2010). In this case, state’s incentives to attract FDI are fully justifiable.

On the other hand, potential negative effect of foreign capital investment should be also taken into account. According to the followers of Dependencia School (Chase-Dunn 1975; Boroshcier et al. 1978), benefit of FDI between foreign direct investor and the country, which accepts the investments, is inadequate, i.e., foreign investor exploits the country, which accepts the investments. According to the followers of Dependencia School, over time, a country, which stimulates FDI flows, becomes dependent on foreign investors, because MNCs are committed to invest in the country continually, reduce country’s level of political activity, and it makes informal alliances with international companies. International companies with the help of lobbying indirectly affect and stimulates the relationships between the governments in self-serving way. In subsequent literature, positive effect of MNCs skeptics (Pradhan 2008; Rugraff 2008; Karabay 2010) note that the activity of foreign investors can have negative effect on the existing legal system and harm the process of decision-making at the highest level in the country. However, in order to attract foreign capital, it is rarely talked about possible negative effect on environment protection, i.e., industrial pollution impact on environment and health.

It is necessary to highlight FDI impact on the country and country’s effect, because the movement of foreign capital is currently more intense. An investing company should have a certain, in fact monopolistic, advantage, which is achieved by using the disadvantages of the market. However, the question of foreign investment effect and intensive policy necessity in developing countries and countries in transition still remains.

It can be argued that FDI provides benefit and creates certain expenses as well as causes risks in the country, which accepts investments. The Governments seek to attract FDI and hope for a positive impact on economy, but FDI by them do not affect economy positively, because MNCs invest only if there is benefit for them. Thus, intensive FDI flows do not guarantee sustainable economic growth in the host country.

3. The concept of sustainable investment

Sustainable investment is a long-term investment, which is effective and fair to the present and future generations. The concept of sustainable investment promotes a long-term strategy of “in depth” and “in breadth” investments and this strategy should define investment goals and results for the current and future periods. A long-term strategy is focused on creating a value, which promotes the benefits in the near future without long-term period damage. Investments and economic support are provided not only to increase productivity of economic and ecologic production, but also to reduce negative impact on environment and ensure human health. Narula (2012) distinguished three approaches to the concept of sustainable investment:

- Sustainable investment is based on economic, social, and environmental risk faced by the modern world. According to this approach, economic,
social, and environmental factors are systematically integrated into financial analysis in assessing the created value. An investment decision is made based on obtained results. It is important to promote sustainable development of various branches by using legal and economic instruments in the field of economics.

- Environmental, social, and institutional factors are used in the capital markets in assessing behaviour of companies and determining their financial activity in the future.
- Sustainable and responsible investing has five investment styles: ethical, responsible, economic, social, sustainable, and green technology investment.

There is no doubt that foreign investments are beneficial, because it positively affects economic environment, create new jobs, and transfer technologies. Lankauskiene and Tvaronaviciene (2012) claim that foreign direct investment influences not only economic growth, but also sustainable development. However, benefits depend on applied FDI policy in the country. Although FDI has a direct connection with economic growth, but connections with sustainable development are not clear and not sufficiently examined, especially, when it comes to environmental factors. Very often, researchers avoid conducting such studies due to political reasons. While executing strategic foreign investment project, the impact on environment is not significantly important, because economic and environmental compatibility increases project costs and payback time of investments. While executing investment projects, Dapkus (2008) suggests assessing the impact on the environment by taking into account the following aspects:
- The impact of small projects or management schemes that do not require the assessment of environmental impact according to the requirements;
- Possible occurring effects, when one project promotes the development of the other;
- Synergistic effect, when the impact of a few projects on the environment exceeds the total all projects’ amount of environmental impact.
- Global effect, such as biodiversity and greenhouse gas emissions.

In case of strategic investment, the concept of sustainable development is irreparable in the countries occupied by bureaucracy, lobbying, and corruption. The concept of sustainable development is also violated, when a country applies an active competitive policy regarding FDI and by all means seeks to attract foreign capital. In the context of controlling FDI if there are no boundaries and there is a liberal FDI policy, countries destroy themselves economically and environmentally. While negotiating on FDI, host countries reduce standards for MNCs behaviour, safety requirements, and environmental restrictions.

Kumar (2009) researches show that FDI has positive relationship with sustainable development indicators, in case when international sustainable development standards are actively applied in respect of foreign capital. He also recommends following the approach of sustainable and responsible investment. Also, it includes adding environmental, social, and institutional tasks to the policy of attracting FDI that would lead to consistent and long-term economic growth. Thus, in accordance with the principles of sustainable investment, created FDI policy becomes an instrument to implement the goals of sustainable development.

While analysing sustainability indicators, Čiegis and Zeleniūtė (2008) divides them into five categories: environmental protection, economic, social, and cultural. Eurostat system classifies sustainability indicators into ten categories:
- Socio-economic (economic development; innovations, competitiveness and eco-effectiveness; employment);
- Sustainable consumption and production indicators (resources and waste; consumption; products);
- Social dependence (education; labour market; poverty and living conditions)
- Demographic changes (life expectancy; inequality of retirement age income; sustainability of public finances);
- Public health (mortality rate; index of toxic substance products);
- Climate changes and energy consumption (climate changes; energy dependency);
- Sustainable transport (transport and mobility; vehicle effects);
- Natural resources (biodiversity; pure water resources; sea ecosystem; use of land);
- Global partnerships (trade globalization; funding of sustainable development implementation; management of global resources);
– Good management (compatibility and effectiveness; openness and participation; economic instruments).

Based on the classification of the indicators, the authors’ article analyses the relationship of FDI in economic, social, and environmental indicator groups. Economic indicators include employment, GDP, which reflects the overall economic growth of the country, and which is measured in millions of Euros. The ratio of labour productivity was chosen, because it is one of the country’s economic competitiveness factors. Social welfare indicators include population and migration that indirectly show the population’s satisfaction with the current situation and income. In many countries, experience shows that deteriorating living conditions and declines of income forces people to migrate. Also, population rate determines the size of market and shows the change of population that is caused due to mortality and migration. The total energy consumption indicator was chosen in analyzing the relationship between MNCs activity and environment protection, because it is necessary for any industrial processes or services. The demand of energy services is determined by economic activity (Smaliukienė et al. 2012), therefore, the rate of gases that causes greenhouse effect is analysed as waste generated during the process of production. The relationship between energy consumption from renewable sources and FDI is analysed in order to check whether foreign capital promotes energy consumption from renewable sources. The authors seek to find out whether MNCs tend to invest sustainably. Provision of information and communication services shows country’s tendency to “green” economy, i.e., whether it is focused on industrial sectors that pollute the environment or service sectors that do not require a lot of natural resources. Sustainable development is greatly influenced by the installation of advanced technologies in production. By introducing advanced technologies in production, it is possible to create effective production without increasing the impact on environment.

4. Case analysis

In 1920, Ireland understood that foreign trade and foreign investments will help to restore the economy and was the first, which started to form FDI policy. After the First World War, increased unemployment and migration to the United State forced the government of Ireland to take certain measures. The first step was to move from strictly regulated regime, which was focused only on local business until 1920, to an open economy. In 1922-1932, foreigners were forbidden from establishing companies due to unstable politics and protectionism. Therefore, the policy of FDI promotion was stopped.

Only in 1949, Ireland established Irish Development Agency (IDA), which had the power to conduct both macro-economic and industrial policies. Since 1950, new companies of the country had to pay 10 percent income tax of profit obtained from export. Investments increased in the export-oriented sectors due to fiscal intensification.

Around 1970, Ireland started to conduct the second stage of FDI policy, and channelled FDI into production sectors. FDI supported not only new companies, but also the existing ones. Therefore, in order to develop local business and promote their relationships with foreign investors, clusters have been developed. While conducting the second stage of FDI, the dependency between FDI, GDP, and labour productivity started to become more visible (Table 1). During this period, the flows of foreign direct investments increased more than ten times (Fig. 1), and also influenced consistent growth of productivity ($r=0.898$).

Although in the middle of eighties sectors of pharmaceutical and electronics were supported, there is almost no relationship between FDI and sustainable development indicators. This can be explained by the fact that this purposeful attraction of FDI caused delayed effects. This type of investments was attracted in 1989-1995.
Ireland’s growth and transition from the periphery to the strong economic country took place only at the end of the nineties. During this period, strong and positive dependency of Ireland’s sustainable development indicators and FDI was emphasised. However, period of 1990-1999 does not show sustainable investment. Increasing productivity influences energy consumption ($r=0.886$) and emission of gas that causes greenhouse effect ($r=0.825$). Meanwhile, the relationship between FDI and energy consumption from renewable sources was weak ($r=0.286$).

During this period, the relationship with GDP ($r=0.848$), foreign trade ($r=0.863$), employment ($r=0.886$) and FDI have significantly increased.

Murphy (2000) raises a question, how a country with slow economic growth, huge debts that in 1987 reached 125 percent GDP, high unemployment rate: 18 percent, and emigration became the country with almost full employment and high level of immigration.

**Table 1.** Results of correlation-regression analysis between variables characterizing sustainable development and FDI. (compiled by the authors)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>0.898</td>
<td>0.028</td>
<td>0.742</td>
<td>-0.472</td>
<td>0.052</td>
<td>0.530</td>
</tr>
<tr>
<td>Population</td>
<td>0.889</td>
<td>-0.204</td>
<td>0.829</td>
<td>-0.463</td>
<td>-0.023</td>
<td>0.582</td>
</tr>
<tr>
<td>GDP</td>
<td>0.918</td>
<td>0.044</td>
<td>0.848</td>
<td>-0.461</td>
<td>-0.316</td>
<td>-0.907</td>
</tr>
<tr>
<td>Trade</td>
<td>N/A</td>
<td>0.270</td>
<td>0.863</td>
<td>-0.458</td>
<td>-0.303</td>
<td>-0.354</td>
</tr>
<tr>
<td>Employment</td>
<td>0.803</td>
<td>0.084</td>
<td>0.886</td>
<td>-0.455</td>
<td>-0.522</td>
<td>-0.755</td>
</tr>
<tr>
<td>Energy</td>
<td>N/A</td>
<td>N/A</td>
<td>0.894</td>
<td>-0.520</td>
<td>-0.504</td>
<td>-0.484</td>
</tr>
<tr>
<td>Migration</td>
<td>N/A</td>
<td>N/A</td>
<td>0.76</td>
<td>-0.124</td>
<td>-0.359</td>
<td>-0.875</td>
</tr>
<tr>
<td>GreenGas</td>
<td>N/A</td>
<td>N/A</td>
<td>0.825</td>
<td>-0.426</td>
<td>-0.397</td>
<td>-0.853</td>
</tr>
<tr>
<td>Electricity</td>
<td>N/A</td>
<td>N/A</td>
<td>0.286</td>
<td>-0.245</td>
<td>0.134</td>
<td>0.247</td>
</tr>
<tr>
<td>ICT</td>
<td>N/A</td>
<td>N/A</td>
<td>0.547</td>
<td>0.350</td>
<td>-0.029</td>
<td>-0.852</td>
</tr>
<tr>
<td>R</td>
<td>0.931</td>
<td>0.834</td>
<td>1.000</td>
<td>1.000</td>
<td>0.988</td>
<td>1.000</td>
</tr>
<tr>
<td>R square</td>
<td>0.867</td>
<td>0.695</td>
<td>1.000</td>
<td>1.000</td>
<td>0.975</td>
<td>1.000</td>
</tr>
<tr>
<td>F</td>
<td>12.995</td>
<td>2.853</td>
<td></td>
<td></td>
<td></td>
<td>13.207</td>
</tr>
</tbody>
</table>

Dependent Variable: FDI
Rios-Morales and Brennan (2009) explain that Irish success was a well-formed strategy of national economy, where in order to gain economic growth, there was an opportunity to exploit FDI and attract MNCs.

The model of Ireland’s internationalization defines two aspects (Bakker and Gulde 2010): developing favourable business climate for MNCs, especially in the sectors of high technology, when FDI policy is implemented in such way that FDI supply corresponds to demand, and the second aspect includes policies that would ensure the effectiveness of FDI and would operate as stimulating instrument of economy. It can be accomplished by determining long-term economic strategies linking them with the policies of different fields. This model, in particular, had to ensure the dynamism of FDI policy, its adaption to foreign capital demand, and create links between branches of global companies and local businesses.

However, the transformation of Ireland is not as much important as the speed of transformation. Ireland distinguished 10 steps of transformation in FDI attraction strategy:

- Promotion of transforming the companies;
- Attracting new FDI forms;
- Development of regional economy;
- Establishing IDA agencies abroad and access online;
- Promoting openness to innovations;
- Promoting the attractiveness of Ireland’s offers;
- Cooperation with partners;
- Focus on creating high quality jobs in the service sector.

Murphy (2000) notes, that Ireland solved its problems by attracting foreign capital. The main investors were MNCs from USA and EU. From 2000 to 2004 FDI income were more than 100 percent of country’s GDP. However, FDI that were attracted during this period have only a weak reverse relationship with analysed indicators of sustainable development.

However, Kirby (2010) suggests that Ireland’s FDI policy is not too attractive, because the country itself has become extremely dependent on MNCs. In the early beginning of the global economic crisis in 2008, Ireland experienced strong consequences if the crisis (Fig. 3): during one year, economy has shrunk by 2.95%, and in 2009, by 6.91%. In 2009, the country was standing at the edge of bankruptcy. When the government returned to the regulatory policy, after three years of declining GDP, during 2011, Ireland’s economy grew by 1.4%, and in 2012, it grew even further by 0.4%. It the short-term, it is forecast that...
there is a small, but strongly growing tendency.

During the critical period, almost all indicators of sustainable development have a reversed relationship with FDI. In 2009, energy consumption in all economy sectors has decreased, especially related to CO² emission. In 2010, during the downturn of economy, industrial energy consumption declined even more (Energy in Ireland 1990-2011). Strong and reversed relationship between FDI and GDP is observed through the indicators of employment, migration, and gas that cause greenhouse effect as well as ICT that provide services. The latter relationship can be explained by the fact that a lot of foreign companies have worked in these particular sectors. However, at the beginning of the economic crisis, foreign capital companies were forced to move out of Ireland market or run off the revenue to the countries of their origin.

The run off of the capital has begun before the critical period – in 2007. Thus, after correlation-regression analysis, it was proved that FDI has a strong relationship only during the period of the “peak” or depressive economy.

Kirby (2010) identifies a number of problems due to which FDI policy of Ireland did not work during the crisis, even though the country created a policy, which was dynamic and responsive to the needs of market. Firstly, the level of country’s regulation was too low: regulatory function was like given to the market participants.

Since 1997, Ireland’s government associated FDI with financial services. This system was based on principles by which the banks and financial companies should follow the codes of conduct. Another problem, which caused the collapse of Ireland’s economy, is the system of low taxes, which did not, left space for the government to control and manoeuvre during the crisis. Ireland is much more dependent on taxes collected from goods and service export, rather than other EU countries. It is one of regressive tax system’s features. Ireland sensitively reacted to the collapse of American corporations and withdrawal of foreign capital from the country, because the vast majority of investors were USA companies. The budget lost the main source of income: income tax of companies. The total percentage of Ireland’s taxes, such as GDP / GNP, dropped to 39.6%.

Is it true that sharp and quick jump influences sudden drop? Ireland’s failure was caused by two problems: failure to recognise international integration, very vulnerable sectors, and it attracted fierce criticism regarding the control of the government and inefficiency of Irish social partnership. The main business sectors of Ireland were dominated by MNCs, and FDI provided the basis for economic growth. At that time, it was thought that an intervention of economy would harm FDI attraction, and economic growth would decline.
It is obvious that in the presence of negative situation in the global arena, this statement was not proven. It may be concluded that while forming FDI promotion policy, it is necessary to integrate the instruments that would ensure consistent economic growth in the context of sustainable development.

**Conclusions**

Globalization, industrialization, and competition influenced companies need to reduce the costs of moving the production to a country of cheap labour, where growth of production volumes increased the use of natural resources and waste generation as well as greenhouse effect gases. The problem of sustainable development was raised when companies started to use natural resources recklessly and choose “cheap” production technologies that pollute the environment. However, after analysis of scientific literature, it was noted that there is insufficient number of research about the initial “environment destroyer’s” source, i.e., foreign investor and sustainable development. However, the literature defines the concept of sustainable investment, where FDI can be an instrument of implementing sustainable development. Empirical research showed that in separate economic cycles, the indicators of FDI and sustainable development can differ. The strongest relationship is visible only during the periods of peak and economic depression. Ireland's successful economic growth was influenced by purposefully formed FDI policy. The first implementation period showed strong relationship between FDI, GDP, and productivity. However, when the situation has changed, in 1980-1990, relationship between FDI and analysed indicators was almost gone. At that time, the country's debt was as high as 125 percent of GDP, and the rate of unemployment was 18%. After liberalization of FDI policy, Ireland’s economy started to grow rapidly. At the same time, relationship between FDI and analysed indicators started to appear once again. Nevertheless, the growth of GDP and productivity increased energy consumption, but relationship between the indicator of energy consumption from renewable sources and FDI was very weak. It shows that investors, who invest in Ireland, do not tend to follow the principles of sustainable investment. Despite of Ireland's FDI policy disadvantages, the study showed that if FDI policy was integrated with the principles of sustainable investment, FDI could be an instrument for implementing sustainable development.

**References**


Foreign direct investment policy as an instrument for sustainable economic growth: a case of Ireland

Agnė Šimelytė, Jūratė Gintarė Antanavičienė


Kumar, S. 2009. *Is India on a Sustainable Development Path? Yokohama National University, Yokohama, Japan & TERI University, New Delhi, India.*


SUSTAINABLE, SOCIAL RESPONSIBILITY BUSINESS:
THE CAUSE – RELATED MARKETING CASE.
A REVIEW OF THE CONCEPTUAL FRAMEWORK

M. Mercedes Galan – Ladero¹, Clementina Galera – Casquet², Victor Valero – Amaro³, M. Jesus Barroso – Mendez⁴

University of Extremadura, Spain
E-mails: ¹mgalan@unex.es; ²cgalera@unex.es; ³vvalero@unex.es; ⁴mjbarroso@unex.es

Received 16 October 2012; accepted 20 February 2013

Abstract. Issues of sustainable development and socially responsible business currently have been discussed a lot. Nevertheless there are no many evidences about causal relationships between social responsibility and profit. But it appears that companies begin to have strong stimuli to pursue social responsibility as a driver of value added in monetary terms. In this context, cause-related marketing obtains higher importance and can be employed for directing activities of profit seeking companies towards socially responsible activity. The presented paper is devoted to analyze Cause-Related Marketing (CRM). Numerous authors have tried to define Cause-Related Marketing concept to realize its field and to differentiate it from others terms. However, there is still no general agreement about the definition, content and scope of CRM, especially in countries such as Spain, where there is a higher conceptual confusion accentuated by translation errors. In this sense, the main objective of this paper is to review and complete the conceptual framework where the theoretical development of CRM is based.

Keywords: Sustainability, Cause-Related Marketing (CRM), Corporate Social Responsibility (CSR).

http://dx.doi.org/10.9770/jssi.2013.2.4(4)

JEL Classifications: M14, M3

1. Introduction

Cause-Related Marketing (CRM) can affect various areas of SMEs functioning and successfully lead to sustainable and socially responsible business oriented to innovations (e.g. Dudzevičiūtė, Tvaronavičienė 2011; Laužikas, Dailydaitė 2013). Cause-Related Marketing (CRM) has been defined by numerous authors to realize its field and to differentiate it from others terms (e.g. Varadarajan and Menon, 1988; Barnes 1992; Andreasen 1996; Guardia 1998; Adkins 1999; Pringle and Thompson 1999; Cone and Roper 1999; García – Izquierdo 2000; Ballesteros 2000; Gibaja et al. 2001; Kotler and Lee, 2005; Gonçalves and Alves, 2011). However, there is still no general agreement about the definition, content and scope of CRM, especially in countries such as Spain, where there is a higher conceptual confusion accentuated by translation errors. In this sense, the main objective of this paper is to review and complete the conceptual framework where the theoretical development of CRM is based. For this reason, we analyze CRM concept: its origin and evolution, its content and scope, as well as various well-known definitions. We also separate CRM concept from other related or similar terms, and we describe different types of CRM campaigns. Finally, we present the most relevant conclusions.
2. Conceptual framework

The conceptual framework where the theoretical development of CRM is based focuses on three aspects. First, the evolution of marketing concept toward the social perspective, that has been a key aspect in the origin of CRM. In addition, the holistic marketing concept, the emergence of nonprofit marketing, social marketing, and social responsibility of marketing, form the CRM basis. Second, Corporate Social Responsibility (CSR), as a corporate culture based on ethical management, which serves to improve competitiveness and company reputation, and it can be a source of competitive advantage. And third, cause-related marketing. This concept was originated in the U.S.A. in the eighties. Over the years, it has expanded to other countries, evolving into a longer-term strategy, incorporating the social action into the company mission, focusing on the stakeholders, and reaching virtually all sectors.

2.1. The evolution of marketing concept toward the social perspective

Traditionally, marketing had been only linked to business activities. However, in the sixties, a process of broadening in marketing took place, according to two dimensions (Santesmases 1999), (Figure 1).

(1) The conceptual broadening: it was based, on the one hand, on the inclusion of ideas as a product type (giving rise to social marketing) and, on the other hand, on the social responsibility of marketing (with this new approach, the organization’s interests must be subordinated to society’s ones). Accordingly, achieving customer satisfaction (in the short and / or the long term) is not sufficient, but the company must also consider the society’s general interests in which it is framed. Thus, the social dimension of marketing is established, which will be a key aspect in the development of cause-related marketing.

(2) The scope broadening: there is a discussion about what activities are likely to apply marketing tools, going as far as organizations that are not strictly businesses. Thus the non-business marketing arises, in which, in turn, different types can be distinguished:

- **Non-Profit Marketing**: its purpose is to improve the exchange activities of all non-profit institutions, although, with more restrictive criteria, that designation is reserved for private nonprofit organizations (NPOs) or non-governmental organizations (NGOs). This marketing type will be crucial in the development of cause-related marketing.

- **Public Marketing**: it is referred to exchange activities of public agencies or civil services; i.e. it is especially referred to the services provided by Public Agencies to satisfy social needs (e.g. health, education, civil protection, etc.).

- **Political Marketing**: it focuses on activities to influence the citizens’ behavior. It is developed by political parties to get support for their ideas, programs and candidates, and get the electors’ vote.

---

![Fig.1. Broadening process of marketing and its relation to CRM](image-url)
Later, new paradigms from marketing management appear: the focus of the field changes from corporations to customers, from products (goods and services) to benefits, from transactions to relationships, from manufacturing to value co-creation with business partners and customers, and from physical resources and work to knowledge resources and company position in the value chain (Webster 2005: 125).

Thus, from the late eighties and early nineties there are two streams of research that have experienced an important development: relationship marketing and market orientation. These tendencies affect the practical application of the marketing concept and its approach, and, again, they represent an expansion of its boundaries. They are considered different lines of research but with convergent approaches (Galera 2002: 99): seeking the creation and delivery of superior customer value, drawing management attention to the satisfaction of consumer needs, involving the entire organization (not just the marketing department) and focusing attention on the long term. Market orientation and relationship marketing are two key tendencies in the origin and development of cause-related marketing (Galan 2002: 25). On the one hand, market orientation is a new understanding of the marketing activity, identifying, among other things, values and social causes. On the other hand, relationship marketing basically seeks greater complicity between the company and the customer, so that the latter feels more identified with the organization to be able to interact with him/her differently than the simple act of buying products. Today marketing is characterized by a holistic marketing orientation (Kotler et al. 2006), i.e., it tries to identify previously the consumer needs and desires, and satisfy them, obtaining a profit. In addition, it also considers other stakeholders. Now even sustainability is also being considered (Hult 2011; Hunt 2011; Crittenden et al. 2011). For example, Hult (2011) points out that market-focused sustainability leads the efforts of market orientation beyond the ‘narrow’ focus on customers (and competitors, suppliers, etc.) to incorporate additional stakeholders and ‘triple bottom line’ issues at a strategic level. Thus, this author points out that market-focused sustainability equals market orientation plus multiple stakeholders plus corporate social responsibility. Meanwhile, Crittenden et al. (2011) also talk about market-oriented sustainability basing on the Resource – Advantage Theory (Hunt and Morgan 1995), which advocates the market orientation as an advantage of intangible resources that gives an equal or greater competitive advantage than tangible resources.

### 2.2. Corporate Social Responsibility (CSR)¹

Currently, expectations on businesses go beyond what is strictly required by law. Citizens are increasingly better informed and their values have evolved, increasing their environmental and social awareness, so that they require businesses ‘something more’ than mere efficient production of goods and services (Fuentes et al. 2005: 68). CSR, defined as ‘the voluntary integration, by enterprises, of social and environmental concerns in their business operations and their interaction with their stakeholders’ (Commission of the European Communities 2001: 7), can provide a differential competitive advantage, in which the consumer moves from a more rational choice to a choice based on criteria of greater emotional involvement (Lizcano and Nieto 2006: 19). CSR is a new way of thinking, a corporate culture based on ethical management and social responsibility as a channel to improve competitiveness and corporate reputation while covering society’s demands on these issues (Foretica 2002: 13). To actually get a competitive advantage, CSR should be integrated into the corporate culture, strategy and mission. In short, it requires the involvement of the entire company and, for this, the commitment of everyone in the organization, at all levels, is needed (Arenas 2006: 38–39). The increase in CSR initiatives has been caused by both companies (which increasingly recognize CSR as a key to success), as NPOs (which have increasing needs for resources). In this way, CSR is becoming an intangible resource, even more important than the rest of the organization’s assets. There are several theories that relate to CSR. Among them, two stand out: the Stakeholder Theory and the Resource – Advantage Theory. The Stakeholder Theory views the firm as a wide and complex network of relationships. The corporate management is directly linked to this network of relationships. The stakeholders’ harmonization of interests (which are often multiple, divergent and even opposite) would be an essential part of social strategy. The Stakeholder Theory has a pluralistic approach and

---

¹ Kotler y Lee. 2005: 2) include a variety of terms used as synonyms for Corporate Social Responsibility (CSR): Corporate Citizenship, Corporate Philanthropy, Corporate Giving, Corporate Community Involvement, Community Relations, Community Affairs, Community Development, Corporate Responsibility, Global Citizenship, Corporate Societal Marketing.
conceives the corporate legitimacy from the perspective of creating wealth for the whole of society and welfare for the different stakeholders. It is therefore a business model that combines efficiency and equity to support the total net wealth creation in the long term and sustainable manner (Lizcano 2006: 23). Moreover, the foundations of the Resource – Advantage Theory are that competitive advantage will come from companies that developed the best resources in a heterogeneous and changing environment. This theory assumes, for example, that companies can find socially responsible activities that also help to get the resource advantage (Ferrell 2010). Therefore, an application of the Resource – Advantage Theory may be the defense of business ethics and social responsibility (Ferrell 2010). Although many companies and their stakeholders see CSR as a voluntary activity that is not necessarily linked to obtaining a differential advantage and to increase the financial result, this potential benefit is a powerful incentive to encourage companies to be socially responsible. Thus, CSR could become an intangible resource embedded in the structure of organizational culture (Ferrell 2010).

From these and other theories, the theoretical framework of CSR has been developed. Currently, there are a variety of issues that fall under the CSR “umbrella”, but we can highlight 6 types of initiatives (Kotler and Lee 2005: 22–25 and 49–50): cause promotions, cause-related marketing, corporate social marketing, corporate philanthropy, community volunteering, and socially responsible business practices (Table 1).

### Table 1. Major CSR initiatives

<table>
<thead>
<tr>
<th>INITIATIVES</th>
<th>MAIN FOCUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause Promotions</td>
<td>Persuasive communications, to raise awareness or interest for a social cause. Emphasis on promotional strategies (focus on external communications). Target audiences, outside the organization.</td>
</tr>
<tr>
<td>Cause-Related Marketing</td>
<td>Contributions and support, linked to sales of company’s specific products. It depends on the action or consumer’s response. It includes more communication (mainly advertising).</td>
</tr>
<tr>
<td>Corporate Social Marketing</td>
<td>Influence individual’s behavior changes (focus on behavior change).</td>
</tr>
<tr>
<td>Corporate Philanthropy</td>
<td>‘Extending a check’. Direct contributions to a cause or a charity (cash donations and / or in kind). It is the most traditional of all corporate social initiatives.</td>
</tr>
<tr>
<td>Community Volunteering</td>
<td>Corporate volunteering service in the community (employees donate their time and talent).</td>
</tr>
<tr>
<td>Socially Responsible Business Practices</td>
<td>Discretionary business practices and investments that support social causes to improve the community’s welfare and to protect the environment.</td>
</tr>
</tbody>
</table>

*Source: Adapted from Kotler and Lee (2005)*

### 2.3. Cause-Related Marketing

The origin of cause-related marketing stands at the U.S.A. Although some authors argue that CRM programs already existed in the first half of the twentieth century in that country (Pringle and Thompson 1999; Kiger 2002), it is not until the eighties when there is rapid growth in CRM, for the convergence of social, economic, and political pressures (Austin 2000: 69), reflected in several simultaneous or parallel situations in time (Galan et al. 2004: 53).

(1) Consumers became more ‘aware’ and started to demand more corporate responsible actions. In addition, they began to watch what companies were behind the products, affecting such observation, positively or negatively, to their purchase.

(2) Some companies realized their customers’ changing wants and expectations, and began to create their own philanthropic foundations, experiencing evident improvements in their image and getting an emotional differentiation (based on values) in a saturated market, to associate the company with a cause. At the same time, they noted that their participation in society, seeking ways to benefit it while also promoting business goals, was profitable because it ensured the community’s welfare in which they were selling their products.
In Spain, it came in the nineties. (Austin 2000: 69), new forms of financing to raise funds, because of cuts to financial aid from the U.S. government and the reduction of government support, as well as the decline of corporate and individual philanthropy. The rising number of NPOs increased “competition” between them to get funding, and costs (both monetary - e.g. postal items - and time - e.g. the “door-to-door”, that caused the need for more volunteers - Chaney and Dolly 2001). In addition, the broadening of the marketing concept, the call to corporate social responsibility, and the need for a ‘public initiative’ as it was seen by the U.S. government, created an opportunity for profit and nonprofit organizations to undertake a radical change from traditional means of corporate philanthropy and fundraising to a new concept to support the objectives of both types of organizations: cause-related marketing (Suter 1995: 2), capturing synergies derived from complementarities. Subsequently, the use of CRM in other countries was triggered by similar situations. The American Express campaign in the early eighties to restore the Statue of Liberty is regarded, by virtually all authors, as the starting point of CRM, besides being the first to be called this way. After the success of this campaign, other U.S. companies copied it. Later, it jumped to other countries (especially Anglo-Saxon, such as the UK, Canada or Australia, but also to other Europeans ones3). Today, these campaigns have become a common marketing tool, used in many countries around the world (Fries et al. 2009) for their numerous advantages (Table 2).

Table 2. Summary of the main CRM advantages

<table>
<thead>
<tr>
<th>Companies</th>
<th>NPOs</th>
<th>Consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>· Tax incentives.</td>
<td>· Diversification of funding sources.</td>
<td>· Value added to the product: new values.</td>
</tr>
<tr>
<td>· Purchase motivation: sales and market share are increased.</td>
<td>· Funding and logistical support are grown. Increased effectiveness of programs.</td>
<td>· Ability to participate in charitable causes.</td>
</tr>
<tr>
<td>· Product and / or brand promotion.</td>
<td>· It is made known, spreading their cause or mission.</td>
<td>· Knowledge about the situation of certain groups and populations from other countries.</td>
</tr>
<tr>
<td>· New values to consumers. A growing number of customers. Purchase repeated. Loyalty. Relationship improvement.</td>
<td>· Access to the media. Free advertising. Visibility.</td>
<td>· They become more aware of their purchase.</td>
</tr>
<tr>
<td>· Employee motivation. Productivity, loyalty, commitment and team spirit are increased. Low turnover. A corporate culture is promoted.</td>
<td>· Their image and participation in society are enhanced.</td>
<td>· They feel good when purchasing (added dimension to the buying decision).</td>
</tr>
<tr>
<td>· Organizational image and reputation are improved.</td>
<td>· The number of partners, donors and volunteers is increased.</td>
<td></td>
</tr>
<tr>
<td>· Brand and / or company recognition. Positioning is improved.</td>
<td>· Learning from the company (management, for example). Greater professionalism.</td>
<td></td>
</tr>
<tr>
<td>· Competitive advantage: differentiation from competition (based on ethical and social dimensions).</td>
<td>· Education on values. Awareness.</td>
<td></td>
</tr>
<tr>
<td>· Access (and in better conditions) to the media. Free advertising. Visibility.</td>
<td>· Improvement of relations with society.</td>
<td></td>
</tr>
<tr>
<td>· Added value to the product.</td>
<td>· Relationships with stakeholders are improved.</td>
<td></td>
</tr>
<tr>
<td>· Possible acceptance of price increases (by customer).</td>
<td>· Attracting good investors. Their contribution is encouraged and financial benefits are provided.</td>
<td></td>
</tr>
<tr>
<td>· Attracting good investors. Their contribution is encouraged and financial benefits are provided.</td>
<td>· Support for market entry (in new market segments and new geographic markets). The customer base is expanded.</td>
<td></td>
</tr>
<tr>
<td>· Support for market entry (in new market segments and new geographic markets). The customer base is expanded.</td>
<td>· Relationships with stakeholders are improved.</td>
<td></td>
</tr>
<tr>
<td>· Relationships with stakeholders are improved.</td>
<td>· Greater transparency.</td>
<td></td>
</tr>
<tr>
<td>· Sympathy is generated.</td>
<td>· Increased return on marketing investment.</td>
<td></td>
</tr>
<tr>
<td>· Greater transparency.</td>
<td>· A healthier and stronger society’s economy.</td>
<td></td>
</tr>
</tbody>
</table>


3 In Spain, it came in the nineties.
Throughout these years, cause-related marketing has evolved (Kropp et al. 1999: 71; Bennett et al. 2008): first, CRM was identified as a type of sales promotion; later, CRM was described as an element of corporate philanthropy linking marketing strategy; and, subsequently, CRM was recognized as a separate marketing phenomenon, deserving a more complete investigation. At present, it is considered a CSR initiative (Kotler and Lee 2005). The degree of CRM incorporation to business strategy has also evolved: from applying it to usual products, to modify the product linked to the campaign to be socially responsible, and even changing the corporate culture so that the cause (support to cause) is integrated in it. CRM has also moved from simple campaigns focused on a particular period of time, to becoming in strategies with a longer term time horizon, integrating social action in the corporate mission, and orienting not only on customers but also to stakeholders in general (Galan et al. 2004: 57). It has undergone an extension virtually all sectors: financial, communications, food, toys, cosmetics, cars, etc. Its popularity and volume have grown substantially since the nineties (Wulfson 2001: 141). Many authors have proposed various key criteria for CRM. Perhaps Business in the Community’s (BITC)’s principles are the best known and accepted worldwide: integrity, transparency, sincerity, mutual respect, partnership and mutual benefit. At the academic level there are two main paths of CRM analysis, and another third has been added: the first one, it is centered on the conceptual dimension; the second one, on the consumer reaction; and, finally, the third one, it is focused on the experience from the NPO’s perspective (Table 3). This work is integrated into the first stream.

Table 3. Main research streams in CRM

<table>
<thead>
<tr>
<th>STREAMS</th>
<th>MAIN AUTHORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPO perspective</td>
<td>Runte et al. (2009)</td>
</tr>
</tbody>
</table>

See, for example, Galan et al (2004), a study about CRM situation in Spain (including the sectors with more CRM campaigns). Business in the Community (BITC) is a nonprofit organization dedicated to corporate social responsibility since 1982. It is participated by 850 companies from different sectors and sizes.
3. Scope and Content of CRM

3.1. Delimitation of the concept

In the case of CRM, there are many misconceptions that have arisen and continue to be raised in relation to its title, scope and content. The most often used term to name this strategy is *Cause-Related Marketing*, but also used other as a *Joint Venture Marketing*, *Cause Branding*, *Passion Branding*, *Win-Win-Win Marketing*, *Cause Promotion*, *Cause Related Promotion*, *Social Responsibility Marketing*, *Strategic Donation* or *Pragmatic Altruism*, *Cross-sector Collaborations*, *Corporate Societal Marketing*, *Corporate Issues Promotions*, or *Social Issues Marketing*. Analyzing some of the different and numerous definitions that exist, most of them (belonging mainly to the Anglo-Saxon context) consider it as a commercial activity, a marketing mix tool, a marketing strategy and, therefore, with a for-profit character (*the motivation of CRM programs is within the business scope*, according to Seitanidi and Ryan 2007). However, there is no a unanimous criterion. The result has been a great conceptual confusion enhanced by translation errors in various countries, which continues nowadays, leading to many misunderstandings about its definition, scope and content. The most crucial aspect of the CRM definition is that the donation is contingent upon the sales of a certain product, the link between donation and product sale is what most distinguishes this initiative (Kotler and Lee 2005: 82); i.e. corporate contribution levels depend on the consumer action (that is its most distinctive feature). CRM was innovative at the beginning, because it was a strategic option linking the profit and nonprofit organizations, sharing both targets and results. In essence, it represents a joint venture between a profit organization and a nonprofit organization (Chaney and Dolly 2001: 157) whose main objective is therefore positively affect consumer attitudes and buying behavior (Fries et al. 2009). The power of CRM over the more traditional forms of marketing is that both rational and emotional consumer commitment can be gotten. It engages both the consumer heart and mind, and also has the potential to build a much stronger and more durable relationship (Adkins 1999). Table 4 summarizes the main issues contained in the CRM definitions analyzed.

Table 4. Main topics included in CRM definitions analyzed

<table>
<thead>
<tr>
<th>DEFINITIONS</th>
<th>AUTHORS (by years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is a part of marketing – mix</td>
<td>File and Prince (1998) Adkins (1999)</td>
</tr>
</tbody>
</table>

6 Some of these terms are not really synonymous, so sometimes they lead to confusion.
However, as above and based especially on Kotler and Lee (2005)’s and Santesmases (1999)’s definitions, we conclude that cause-related marketing is lucrative (companies seek an economic purpose, but also have social interests), it is included in the corporate marketing mix, and it is not synonymous with social marketing, so we propose the following definition: “Cause-Related Marketing is a CSR activity. It is an agreement between a company and a NPO to collaborate on a social cause and obtain, in this way, a mutual benefit. The company commitment is focused on contributing (financially or in kind) to the cause in terms of sales (the donation will depend, therefore, on consumer behavior). Normally, the campaign is conducted for a certain product, for a specific period, and with a particular NPO.

3.2. Cause-Related Marketing and other related concepts

The disparity and the terminological confusion discussed above lead us to differentiate the concept of cause-related marketing from other related terms (but they are not exactly synonymous). Because of its importance, we highlight the following concepts (Table 5).

Table 5. Main differences between CRM and other related concepts

<table>
<thead>
<tr>
<th>OTHER CONCEPTS</th>
<th>DIFFERENCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cause Marketing, Cause Promotions</td>
<td>In CRM, contributions and corporate support are based on consumer response, they are linked to sales of specific corporate products (in cause promotions, they are not).</td>
</tr>
<tr>
<td>Fair Trade</td>
<td>In CRM, products are not usually from the so-called “fair trade”. A product linked to a CRM campaign can be any commercial product (good or service)</td>
</tr>
<tr>
<td>Corporate Philanthropy</td>
<td>In CRM, a return is expected, there is a lucrative objective behind (in philanthropy, there is not; and it is not related to sales). Moreover, money usually comes from corporate marketing or advertising budgets (and not from corporate philanthropy, community relations, or corporate foundation budgets).</td>
</tr>
<tr>
<td>Relationship Marketing</td>
<td>In Anglo-Saxon literature, the use of acronyms is frequent. Cause-related marketing is usually identified with the CRM acronym, the same one that is used for Customer Relationship Marketing and Customer Relationship Management. This can be sometimes misleading.</td>
</tr>
<tr>
<td>Nonprofit Marketing</td>
<td>CRM is developed by enterprises, but NPOs also participate (only NPOs take part in Nonprofit Marketing).</td>
</tr>
<tr>
<td>Corporate Social Marketing</td>
<td>In CRM, focus is not on behavior change (but it is in corporate social marketing).</td>
</tr>
<tr>
<td>Patronage</td>
<td>In CRM, profit objectives are pursued (however, the patronage just looks for a social evaluation of the corporate initiative in the community)</td>
</tr>
<tr>
<td>Sponsorship</td>
<td>CRM combines business objectives with social ones, and it is a post-purchase donation (sponsorship has a purely commercial purpose and it does not usually have a social objective; it is also a pre-purchase donation).</td>
</tr>
</tbody>
</table>

Source: adapted from Kotler and Lee (2005); Polonsky and Wood (2001); Andreasen (1996); Holmes (2002); Varadarajan and Menon (1988); Santesmases (1999)

3.3. Typology

CRM includes a wide range of activities, from simple agreements to donate a percentage of the purchase price of a particular item to a charity for a specific project, to wider and more complex arrangements. For this reason, CRM campaigns vary in scope and design, in types of nonprofit partners and in the nature of relationships between companies and their marketing partners. The most common CRM type is one in which a company donates a portion or percentage of every purchase made by its customers (transaction-based promotions) during a specific period of time, to the NPO. However, there are some variations in this and not all CRM campaigns channeled money into the NPO’s contributions in kind may also be: food, equipment, services, etc.). Furthermore, it is usual that there is a ‘ceiling’ (a maximum amount of donation by the company). Some examples about the types of product links and common contribution agreements are included in Table 6.

7 Andreasen (1996) considers that licenses (involving the transfer of the NPO’s names and logos to corporations in exchange for a fee or percentage of income) and promotions of joint issues (where a company and an NPO address a social problem through tactics such as distribution of products, and promotional materials or advertising) are other types of alliances. However, authors such as Varadarajan and Menon (1988) do not consider them strictly as CRM programs.
Table 6. The most common types of product links and contribution agreements

<table>
<thead>
<tr>
<th>TYPES</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>According to the donation type</td>
<td>A specific amount of money for each product sold</td>
</tr>
<tr>
<td></td>
<td>A specific amount for each application</td>
</tr>
<tr>
<td></td>
<td>A percentage of a product sales or transaction is donated to the NPO</td>
</tr>
<tr>
<td></td>
<td>A portion of an item sale will be donated to a charity (without specifying the amount)</td>
</tr>
<tr>
<td></td>
<td>The company adjusts the consumer contributions relating to the product</td>
</tr>
<tr>
<td>According to number of products</td>
<td>A company’s specific product</td>
</tr>
<tr>
<td>involved</td>
<td>Some company’s products</td>
</tr>
<tr>
<td></td>
<td>All company’s products</td>
</tr>
<tr>
<td>According to the duration of the campaign</td>
<td>A specific period of time</td>
</tr>
<tr>
<td></td>
<td>For an indefinite period</td>
</tr>
<tr>
<td>According to the chosen cause</td>
<td>Health</td>
</tr>
<tr>
<td></td>
<td>Childhood</td>
</tr>
<tr>
<td></td>
<td>Basic needs (e.g. combating hunger)</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
</tr>
<tr>
<td></td>
<td>Other causes</td>
</tr>
<tr>
<td>According to the number of NPOs</td>
<td>A NPO</td>
</tr>
<tr>
<td>involved</td>
<td>Some NPOs</td>
</tr>
<tr>
<td>According to who pays the cost</td>
<td>The company pays the cost</td>
</tr>
<tr>
<td>of the campaign</td>
<td>Consumer and company pay the cost</td>
</tr>
<tr>
<td></td>
<td>Consumer pays the cost</td>
</tr>
</tbody>
</table>

*Source: adapted from Kotler and Lee (2005: 83-84); Barone et al. (2000); Varadarajan and Menon (1988: 63-67)*

4. Conclusions and main theoretical contributions

Cause-related marketing is a relatively young area of study, where its conceptual framework and boundaries are not yet fully defined, and in which does not even exist yet unanimous agreement on the term that should be used to call it. This causes continuous errors in its definition, confusing CRM with other concepts. In addition, there are problems caused by errors of translation into different languages. Throughout this paper, we tried to reduce this confusion reviewing the most relevant existing CRM definitions, classifying them according to the main aspects they highlight, and selecting those that, we believe, reflect the real essence of CRM. Finally, we propose a definition. Although CRM has its roots in the social dimension of marketing, in the social responsibility derived from the marketing practice, it is also a commercial activity, a for-profit corporate strategy (firms pursue economic objectives). Its main feature is that the donation is contingent upon the product sale, it depends on the consumer action (there is a link between donation and product sale). Thus, its main objective is to positively affect consumer attitudes and buying behavior. Cause-related marketing is the result of the management and marketing convergen-

ce in the field of social causes. It lets bring together private donations for the benefit of certain social needs, getting a return (profit) for the company. That is, there is a synergy between the consumer’s social interests, corporate values and brand personality, the NPO’s objectives, and the real and tangible benefit to society (Galan et al. 2004: 62).

The peculiarity of CRM, as opposed to other more traditional forms of marketing, is that it can get a consumer commitment, both rational and emotional. This second aspect, the emotional one, is key to achieve a competitive advantage (based on differentiation by psychographic aspects, like consumer values). Moreover, the consumer sensitivity or interest toward CRM depends on who (the company or the consumer) assumes the cost. The higher the cost to the customer, the greater the information needed for

8 It can also be classified in short and long-term programs.

9 It can also be focused on one or more causes. Or according to the geographical scope (e.g. local, regional, national, international, or global causes).

10 In this situation, there is a higher interest in receiving information about the results. Consumer sensitivity depends on who (the consumer or the company) pays the cost. Information will have a positive effect on consumer behavior when consumer pays, at least, a part of the costs, and will avoid a post-purchase dissonance. Thus, information is decisive for message credibility.
the campaign credibility (for the message, in particular). Therefore, companies should provide more detailed information as possible about the CRM program. In consequence, CRM is an example of the current marketing approach: holistic marketing approach, assuming the corporate social responsibility and also considering sustainability.

CRM has grown quickly in just three decades. Programs have multiplied and have experienced great diversification, achieving virtually all sectors. An evolution in CRM is also seen. It has gone from a short-term approach to a long-term one (an extension of the commitment, avoiding specific campaigns); from a tactical approach to a more strategic one; from being a simple action to being integrated within the corporate mission; from focusing only on consumers, to focusing on stakeholders; from focusing on increasing sales to focusing on creating brand and reputation; and from being exclusive from the Marketing Department to involving the entire organization. As a major contribution of this work, we note a classification of definitions and comments of interest regarding the conceptual framework of CRM, with contributions to academic debate. As the main implication for companies, CRM should be considered by organizations for the many benefits it provides. If CRM can influence consumer attitudes and the subsequent behavior and buying habits, then it can become an essential marketing tool. If it can enhance corporate reputation, improve brand and / or corporate image, increase customer satisfaction and customer loyalty, increase sales and benefit the society at the same time, then, CRM should become an intrinsic part of the strategy marketing. Only companies that get adapted to new consumer wants and needs, and share values with them, may remain and grow in the current competitive environment. CRM can be a means to success.

References


Langen, N.; Grebitus, C.; Hartmann, M. 2010. Is there need for more transparency and efficiency in cause-related marketing?, in Fritz, M.; Rickert, U.; Schiefer, G. (Eds.). *Proceedings of the 4th International European Forum on System Dynamics and Innovat-
M. Mercedes Galan – Ladero, Clementina Galera – Casquet, Víctor Valero – Amaro, M. Jesus Barroso – Mendez

Sustainable, socially responsible business: the cause – related marketing case. A review of the conceptual framework


Large Corporate Enterprises’ Intangible Assets Managing as a Way to Secure a Sustainable Development of Competitive Advantages

Vereskun Mikhail

Priazovsky State Technical University, Universytet's’ka st.7, 87500 Mariupol, Ukraine
E-mail: miver1976@mail.ru

Received 15 September 2012; accepted 20 January 2013

Abstract. Mining and metals production sector (MMPS) of Ukraine is one of the basic for the state’s economy. The sector’s output, as well as the gradual increase in production, gives reason for taking a favorable view of its development prospects. Until the mid-90s MMPS of Ukraine key representatives were separate companies that operated as independent legal entities. However, during 1999-2004 the MMPS enterprises integration into the structure of major private transnational financial industrial groups took place. Large-scale consolidation of major enterprises that occurred in order to adapt to market conditions contributed to the emergence of business combination referred to as holding company. In the future, Ukrainian iron and steel companies’ competitiveness in the world market will be largely determined by the scope of their participation in the global consolidation processes. Their future directly depends on the rate of large corporations’ formation and restructuring, including changes in the mechanisms of corporate governance. This is one of the most important ways to improve the efficiency of the national iron and steel industry.

Keywords: Metallurgical Holding, Competitiveness, Intangible Assets, Mechanisms of Corporate Governance.

Reference to this paper should be made as follows: Vereskun, M. 2013. Large corporate enterprises’ intangible assets managing as a way to secure a sustainable development of competitive advantages, Journal of Security and Sustainability Issues 2(4): 47–56. http://dx.doi.org/10.9770/jssi.2013.2.4(5)

JEL Classifications: C12, C15, M21, L61 H0, H4, I2, I24, J16

1. Introduction

Mining and metals production sector plays a core role in the national economy and is one of the cornerstones of Ukrainian industry. Sustainability and competitiveness of countries’ economic growth is strongly related to development of key exporting industries (Balkytė, Tvaronavičienė 2010; Lapinskiene, Tvaronavičienė 2009; Travkina, Tvaronavičienė 2011; Grybaite 2011; Dudzevičiūtė 2012; Lankauskienė, Tvaronavičienė 2012; Smaliukienė et al. 2012). Iron and steel industry condition and its development trends are defined by a set of factors that can be summarized in three groups: economic, regulatory and corporate. In recent times the importance of the corporate aspect of iron and steel industry development is growing, as it is this area where a number of mining and metals production sector’s crucial problems lie. These problems hinder the economic and regulatory potential of the industry. Although market economy demands creating a competitive environment with multiple manufacturers, it is large-scale production that forms market demand and supply, determines the pricing conditions and regulates bulk investment programs in the modern economy. Only major producers are able to exercise significant R & D and introduce global production innovations. Therefore, the modern market economy is formed by large industrial enterprises which become the national pride of the leading countries.
Ukrainian corporate structures in the iron and steel sector are characterized by certain specific features and are still in the primary stage of institutional development (Vereskun et al. 2011). So, no unanimous approach to either their analysis or their effective functioning mechanisms development can be found in the domestic scientific literature.

2. Intangible assets management system and corporate enterprises’ sustainable development

The businesses’ ability to grow in the new economy is defined by the number and importance of competitive advantages that are closely related to the introduction of new production and management technologies. The basis for industrial enterprises’ competitiveness is formed by its potential, the technological, economic and competitive elements of which are able to provide an adequate, prompt and quick response to the challenges of the ever changing global environment. The mining and metals production business is characterized by the appearance of new trends, products and players that are able to provide a saturated market with competitive products and services, and to create and develop high-tech sectors that will determine the main paths of economic growth. The penetration of mining and metals production enterprises into such sectors is becoming a major mission of corporate management (Vereskun et al. 2011; Kolosok 2012).

The technological component of enterprise potential, which is characterized by effective implementation of new technologies into the production process, as well as the creation of high-tech products and services with an essential innovative component cause the change in the competitive forces. Furthermore, under these conditions, the competition strength undergoes significant impact of technological structure that is formed in the processes of globalization and the information revolution. Competition in the new economy necessitates the search for new reserves and ways to create, maintain and extend the wealth (capital) of an enterprise, which are in a great measure determined by the effective management of enterprise’s intangible assets. Intangible assets management are able to generate new structural sources of enterprise economic development through the use of proprietary and intellectual property rights, goodwill, the rights to use human resources, property, intellectual property objects, and scientific research results. To increase the effectiveness of corporate management the focusing of intangible assets (IA) management on investing the innovations into knowledge-intensive production technologies and management development technologies is needed. (Vereskun, Kolosok 2010.)

Intangible assets managing is a process of making decisions about how to create intangible assets and how to introduce them into competitive market commercial turnover in order to maximize profits. The process of IA managing includes economic, social, organizational, functional, and informational aspects. The economic aspect of IA managing process is defined by resource needs, resource allocation, available resources assessing, and their use. The social aspect of IA managing process deals with individuals’ role in its exercising. The organizational aspect of IA managing process includes regulation, rationing, instructing, and responsibility. The functional aspect of IA managing process is characterized by executing both general and specific functions. The informational aspect of IA managing process lies in information finding, collecting, processing, and transmitting (Slobodyanyuk 2009, 2010). On the basis of consistency principles and after the generalization of method guidelines on the economic systems management a conceptual system of industrial enterprises’ IA management has been developed in the study. This article provides the basic methodological characteristics of the further development of economic management system which has been adapted to the needs of IA management in large corporate enterprises and corporate groups. Thus, the structure of organizational and economic managerial mechanisms elements has been clarified and supplemented; the main content blocks that make up the presented system have been identified. The improved large corporate enterprise IA management system consists of four content blocks: management process informational provision block, process block, result block, management effectiveness analysis block. Within the management process informational provision block the information that is needed for the management process realization and serves as the input data (parameters) for it should be accumulated, processed, and transmitted. All these data are generally divided into two arrays: the feedback information array, which characterizes the current state of the management object, and the environment state information. The processed information is transmitted to the process block which consists of three elements: the management subject, the management
object, and the organizational and economic managerial mechanisms. The management subject affects the management object using an appropriate managerial mechanism. A management subject is connected with a management object by the means of information flow. Thus, the managing process lies in the relevant information collection, processing and transmission as well as in making appropriate management decisions in regard to a management object.

Intangible assets management subjects are represented by enterprises’ owners, managers and professionals at various levels depending on the management object. As a rule, effective long-term business activity in the rapidly changing competitive environment is secured by the economic and financial services of an enterprise. Management object is represented by intangibles assets of a large corporate enterprise divided into groups according to their material and cost structure:

I. Reflected in the balance sheet of an enterprise:

1) Intellectual property objects:
copyright and related rights (journalistic, scientific, and technical written works; computer programs; databases; musical works with or without a text; audiovisual works; illustrations, maps, plans, drawings, sketches, works relating to geography, geology, topography, engineering, architecture and other areas); industrial property objects (exclusive rights to the results of creative activity used in production, i.e. inventions, industrial designs, utility models, means of civilian circulation members and their products (services) individualization, i.e. brand names, trademarks, service marks);

2) Deferred costs of an enterprise – the IA costs born by an enterprise which are to bring the investment effect in the future:
organizational expenses of an enterprise, i.e. costs associated with legal support needed for an enterprise to begin its activity: the state duty for enterprise registration in a tax inspection; the services of a notary officer, who certifies the authenticity of statutory documents copies; enterprise seal making and registration of; opening a bank account.
R & D expenditures.

3) Goodwill – an intangible asset that is taken into account only in the case of an enterprise sale (purchase) as an integral property complex:
positive goodwill – a premium to the price paid by the acquirer in anticipation of future economic benefits;
negative goodwill – a discount on the price taking place if an enterprise is sold at a price below market value, i.e. when the profitability of an enterprise is below the average level in the industry.

4) The rights to use natural resources (mineral resources, forests, water, land, land leasehold); the rights to use property (tangible property, intellectual property); the rights to conduct any activity (permissions, licenses).

II. Not reflected in the balance sheet of an enterprise:

1. Trade secrets objects – the distinction between trade secrets and other intellectual property types lies in the unlimited protection term. The right to a trade secret is valid as long as the information it contains is secret, i.e. a holder of information keeps a virtual monopoly on it.

Trade secret is one of the most versatile types of intellectual property. The concept of trade secret may refer to a variety of information and knowledge of technical, organizational, or financial nature. For example, if an employer decided not to apply an invention deliberately keeping it secret, the invention may be regarded as a trade secret. This may also be an element of the invention deliberately excluded from the description applied (Kommercheskaya tayna 2010).

2. Intellectual potential of an enterprise:
human capital (knowledge, skills, qualifications, experience, education);
market capital (brand names, customer base, order portfolio);
structural capital (intellectual property rights, information resources, instructions and work methods, enterprise organization system, know-how).

A management subject influences a management object – large corporate enterprise intangible assets – by the means of appropriate organizational and economic mechanisms.

3. The characteristics of IA management mechanism elements

In the conceptual and categorical system of economics the concept “mechanism” is seen as “a sequence of states and processes that determine an action or a phenomenon” or “a system, a device that determines the order of any kind of activity” (Korsakienė et al. 2011). H. Culmann (1993) argues that "economic
mechanism is determined by either the nature of source phenomenon or the final result of a series of events” and specifies that “a source phenomenon and final phenomena as well as the whole process taking place between them are the constituent elements of a mechanism.” Summing up the above definition, we note that any organizational economic mechanism is a certain set or sequence of economic events. Such understanding of a mechanism is supported by most authors of works on economic theory. Today economics has no clear theoretical definition of intangible assets management mechanism which is accompanied by the lack of a single list of structural constituents. The author understands the organizational and economic mechanisms of industrial enterprise IA management as follows. The mechanism of IA management is a three-level set of principles, goals, objectives, approaches, methods, competitive behaviour strategies as well as the tools of IA management by which a management subject affects a management object in order to improve the efficiency of IA use. The signal for mechanism functioning beginning is the information that comes from a management subject. Then on the first, methodological level, the basic management principles are chosen and the competitive behaviour strategy is defined. On this basis the main IA management purpose is formed, and specific tasks are formed according to them. On the second, methodic level, the most effective management approaches and methods are chosen according to the tasks received. On the third, organizational (technological) level, the most effective tools of large corporate enterprises and corporate groups IA management are determined within the chosen approaches and methods. The result of the proposed mechanism functioning is reflected in administrative decisions by the means of which a management subject affects a management object. Below we are analyzing the proposed mechanism elements in more detail.

I. Management Principles. Management process realization system of large corporate enterprises IA bases on the main IA management principles. Under the principles of IA management in this case we understand the basic, original theoretical principles, organization conduct rules in different fields. The fuller and the more justified management principles are, the more likely it is to achieve positive results in the process of object management efficiency improving. The basic principles of large corporate enterprises IA management are as follows.

The principle of the legal regulation of management. Economic and legal regulation of the IA management process, compliance with international and national law, statute regulations and corporate rules of conduct, and reducing subjectivity are to ensure IA management legitimacy.

The principle of the social orientation of management. The ultimate goal of IA management is to improve the welfare and life quality of enterprise owners, employees and contractors, to secure the harmonious development of an individual, to disclose individuals’ capabilities to control IA objects.

The principle of management system scientific validity. In order to improve the stability and effectiveness of IA management in the process of IA management system formation and implementation the effect of objective economic laws and patterns, the laws of nature and society development, the laws of thinking should be taken into account; scientific approaches and modeling techniques should be used. In IA management systems developing and implementing the well-known approaches to IA management should be used if possible.

The principle of system approach to management. The principle considers viewing any business entity as a system. This allows to take into account all the important interconnections and interactions in the management system as well as to profoundly analyze the factors and to direct IA management mechanisms towards the achievement of the goals set.

The principle of innovation way of development orientation. The structural sources of the economic development of an enterprise are the production, investment and innovation factors. To improve the enterprise efficiency, IA management must be oriented towards innovational investment in high technologies and the development techniques of the management itself.

The principle of management objects ranking according to the degree of importance. The principle allows to determine the importance, the significance, and the rank of objects (problems, factors) according to their effectiveness, relevance, scale, degree of risk. As resources are always limited, they should be used to solve the most crucial problems.

The principle of management theory and practice unity. Any administrative decision should be taken accord-
ing to management logics, principles and methods, and it should also solve one of the practical problems.

The principle of management object competitive advantages maintenance and development. Figuring out the strengths and weaknesses of management object enables a subject to form a strategy based on forecasting and to achieve leadership in a particular field of activity or on a particular product market compared with competitors.

The principle of management processes organization. Ensuring a high level of IA management processes organization requires a constant analysis and improvement of proportionality, continuity, consistency, pace regularity, and automaticity of management processes.

The principle of rational communication of management forms. Depending on the peculiarities of a management object, its structure and management purposes IA management can be divided into corporate and entrepreneurial. Corporate management is characterized by strengthening the components integration on various stages of management objects life cycle and according to system adaptability, by providing a higher level of personnel culture and harmony, by achieving the synergy. Entrepreneurial management is characterized by a higher degree of management adaptability against the background of a higher uncertainty level as well as by a wider use of behavioral and situational approaches.

The principle of management decisions consistency. The alternative management decisions should be consistent in relation to the following eight factors: time, quality, scale, development level, inflation, risk and uncertainty, information obtaining method, the conditions of object exploitation (Ansoff 1999; Azgaldov 2006; Collins, Montgomery 2007; Culmann 1993; Demb 1997; Fathutdinov 2000; Meskon 1999; Mischenko 2004; Olhovskiy 2008; Porter 2005; Kolosok 2012; Korsakienë et al. 2011; Shipova 2003; Tvaronavičienė et al. 2008; Tvaronavičienė, Degutis 2008; Grybaitė, Tvaronavičienė 2008; Vereskun 2012; Travkina, Tvaronavičienė 2010; Saee, Tvaronavičienė 2009).

II. Competitive behavior strategies. Choosing a competitive behavior strategy of is the most essential component of intangible assets management cycle. It determines all the components of the proposed mechanism further operation as well as IA management in general. IA management strategy is developed and implemented within the overall enterprise management strategy.

Within the considered system of IA management the strategy objects are represented by enterprise intangible assets grouped by management objects: intellectual property; deferred expenses; goodwill; rights to use natural resources; complementary intangible assets – know-how, clientele, management techniques, etc.

Strategy is a detailed comprehensive and integrated plan to achieve the set goals.

As a rule four basic types of market subjects competitive behaviour strategies are distinguished, each of them focusing on particular economic environment conditions and particular competitive advantages available to the enterprise. A. Yudanov proposes to introduce the following understading of strategies (Il'enkova 2002):
- Violent (power) strategy,
- Patient (specialized) strategy,
- Commutation (adaptive) strategy,
- Explerent (experimental, breakthrough) strategy.

According to the strategies that are used four types of enterprises are distinguished: “violent”, “patient”, commutation-oriented and explerent enterprises.

The strategy of “violent enterprises”. “Violent enterprises” operate in large standard production of goods and services. Goods or services produced by “violent enterprises” are characterized by an average quality and relative cheapness. The source of “violent enterprises” strength is the ability to effectively produce standard products bearing lower costs comparing with releasing small quantities of goods that differ from each other. “Violent enterprises” are also characterized by extensive scientific research, developed sales network and large-scale advertising campaigns.

The strategy of “patient enterprises”. “Patient enterprises” operate in niche products field. They produce special unusual products for certain, quite narrow range of customers. “Patient enterprises” benefit from taking into account the special needs of consumers that do not fit into the framework of standard products. “Patient enterprises” are called “cunning foxes”. Domestic enterprises may adopt this strategy as a business philosophy. It searches not to fight directly with leading corporations, but to look for ac-
The strategy of commutation-oriented enterprises. Commutation-oriented enterprises are adapted to meet the local demand of any kind. The advantage of commutation-oriented enterprises is their flexibility, the ability to respond immediately to any changes in demand. Commutation-oriented enterprises are also called “gray mice” businesses (pharmacies, barbershops, gas stations, stores). For commutation-oriented enterprises to operate no big capital, production facilities, or patents are needed. However, the object of intellectual property which commutation-oriented enterprises need is a trademark.

The strategy of explerent enterprises (“the explorers enterprises”). Explerent enterprises are engaged in development and implementation of innovative technical ideas, which are based on completely new products. Such firms are called “first portents”. If an enterprise is able to create a fundamentally new product an extraordinary income due to breakaway from competitors is guaranteed. The introduction of breakthrough innovations is an extremely risky venture, but it is these new technical developments that provide structural shift for the economy and the humanity in general.

Having adopted this system of competitive strategies types, an enterprise needs to test their compliance with a particular strategy type according to some basic criteria: cost, products quality, range of products, marketing network availability and advertising scale. Costs and product quality are to be defined in relation to competitors’ costs and product quality (Fathudinov 2000).

According to the chosen competitive strategy management goal and tasks are chosen. They should aim at gaining a profit from the use of the created innovations, and that inevitably leads to the creation of new intellectual property. If the “violent” strategy is chosen, large-scale R & D for continuous development of a large number of improving innovations that are rapidly implemented in products is needed. If an enterprise has chosen the “patient” strategy, the choice of specialized niche is inevitable. The niche will require less intensive, but more specialized, narrowly targeted developments that will also be of an improving, adaptive nature. Both “violent” and “patient” strategies seek to provide a patent monopoly for created improvements. For commutation-oriented enterprises individualization techniques are needed more than for any other enterprise type. Such enterprises seek to ensure the patent monopoly on the level of trademarks, trade names, and appellations of origin of goods. If an enterprise claims to be explerent, the problem of a fundamentally new product creating funding is especially vital. These breakthrough inventions patenting is a priority for explerent enterprises. It should be noted that enterprises may go through all stages in their development – from “explerent” to “violent” enterprises and vice versa (Demb 1997). Therefore, choosing an IA strategy for an enterprise, the strategy of the whole organization development at a particular stage or future development direction of an enterprise in relation to any strategy must be defined.

III. The purpose of management: improving the efficiency of a management object operation as well as the overall owners’ welfare maximization in current and future periods, which is to be reflected in the corporate enterprise market value growth.

IV. Management tasks. The main tasks of enterprise’s IA management are correlated with the tasks of enterprise’s assets management and with the competitiveness in general. The enterprise IA management tasks are as follows: the formation of a sufficient amount of intangible assets, which is needed to secure the necessary growth rate of an enterprise. This is done by determining the overall demand in intangible assets for the financing of IA needed for an enterprise and by the formation of the optimal schemes of intangible assets financing according to particular sources; the optimization of the generated intangible assets fund distribution according to types of activity and fields of use. This is done by searching the opportunities to use IA in the most effective way in particular types of enterprise activity and business operations and by determining the proportions of IA future use for ensuring the attainment of the necessary conditions for their most effective use and market value growth; providing conditions to achieve a high profitability of intangible assets with the lowest level of financial risk. It should be borne in mind that a high level of IA profitability is achieved, as a rule, during a substantial increase in the level of financial risk associated with its formation, as there exists a direct connection between these two indicators; minimizing the financial risk associated with the use of intangible assets with the lowest level of its profitability. If the level of profitability generated by in-
tangible assets is given or planned in advance, it is necessary to reduce the financial risk of operations that are aimed at achieving the yield; ensuring the constant financial balance of an enterprise in the process of its development. Such balance is characterized by a high level of financial stability and solvency of the organization at all stages of its development and is ensured by the formation of an optimal capital structure and its allocation into the intangible assets in the required quantity; ensuring the adequate financial control over the organization by its owners. Such financial control is legally ensured by preserving the controlling stake in the hands of organization original founders; ensuring the sufficient financial flexibility of an enterprise. The financial flexibility reflects the organization’s ability to quickly generate the necessary amount of additional capital in the financial market when unexpected and highly efficient investment proposals for acquisition of intangible assets appear; intangible assets structure optimizing. Intangible assets structure optimizing is realized through various IA objects flow effective control during the individual cycles of their circulation within the organization as well as through ensuring the synchronization of different IA flow types formation connected with operational and investment activity; ensuring the prompt capital reinvesting in the most profitable intangible assets and operations that secure the necessary efficiency level of these objects use, the reinvesting being caused by changes in external economic environment conditions or in internal characteristics of a corporate enterprise or a corporate group operation.

V. Methods. Management method is a set of ways and techniques management subjects may use to influence a managed object by the means of their activities and in order to achieve their goal. The basic methods of intangible assets management include economic, organizational and administrative, and sociopsychological management techniques. Moreover, the set of enterprise’s IA management methods should be formed on the basis of documents arrays analysis, the methods being divided into five groups (Il’enkova 2002): the method of structural and morphological analysis; the method of publication activity analysis; the method based on identifying the patent documents groups with a set of high-power corresponding patents, or the corresponding patents method; the method of terminological and lexical analysis; the indicators method (Slobodyanyuk 2010).

VI. The basic tools of enterprise’s IA management are IA identification and inventory; undertaking a legal examination; intangible assets valuation, including assets on enterprise’s books and records; IA commercialization.

In carrying out IA identification and inventory under the proposed management system the results of intellectual activity are revealed, the categories of intangible assets objects are defined. One should also check whether the existing accounting units correspond to both own and purchased intellectual property and inspect the documents that certify the rights to these objects and prove the authenticity and legality of these rights exercise. The main goals of intangible assets inventory are:
to confirm the actual availability of intangible assets; to compare the actual availability of intangible assets with the accounting data; to check the books and records completeness.

When conducting IA legal expertise the legitimacy of asset ownership is established and the mode of IA objects protection is chosen; the latter may be copyright, patent law, or trade secret.

Intangible assets valuation and accounting is closely connected with the intellectual property (IP) legal protection and the legal regime related to it. For example, it is impossible to take into account the costs of an invention development as an intangible asset without receiving a patent for it; and the contract for intellectual property will be invalid unless checked by state. So, valuating the costs of intellectual rights acquired by the means of it would be meaningless pursuits (Azgaldov 2006).

Evaluation is a set of legal, economic, technical, organizational, and other kinds of techniques intended to establish the value of a valuation object as a commodity (Ansoff 1999; Aksenov 2007). The most common purposes of intangible assets valuation are as follows:
in the case of defining the cost of capital contribution; in the case of inventoring (accounting) the intellectual property and its introducing into commerce; to optimize property tax payments; in the case of issuing a loan secured by exclusive rights; to attract investors and secure transactions;
in the case of resolving intellectual property evaluation conflicts, including establishing the loss from a violation of exclusive rights to intangible assets; in the case of obtaining intellectual property rights and licenses to use them (Grishaev 2004; Fathutdinov 2000; Fomin 2007).

For intangible assets of an enterprise the same kinds of cost valuation are calculated as for other assets: acquisition, replacement, market, investment, mortgage, insurance, and taxable value. The basic methods of intellectual property and intangible assets valuation are discounted cash flow method, market method and cost method (Mischenko 2004; Olhovskiy 2008). The advantages of each particular approach depend on the availability of the necessary information, buyers or owners of intellectual property requirements, economic situation at the time of evaluation.

The ways of either IA evaluation method practical application vary. However, we believe that discounted cash flow approach is the best for both intellectual property objects sellers and buyers as it is based on an assessment of the potential benefits from intellectual property objects using. In the enterprise’s intangible assets management system proposed by the author the information about environment state is formed by the following data:

- the legislation in the field of intellectual property, including the legislation that regulates enterprise intangible assets accounting;
- the sources of IA and the ways they have been acquired by an enterprise;
- innovative activity of an enterprise;
- R & D;
- information about the active market of intellectual property state;
- the results of intangible assets analysis according to directions depending on the object of accounting and management, etc.

### 4. The results of IA management mechanism functioning for securing a sustainable development of competitive advantages

The eventual result of intangible assets management is a management decision that includes:
- goals developing and setting;
- problem study based on the information received;
- the selection and justification of the efficiency criteria (effectiveness criteria) and the possible consequences of the decision taken;
- discussing different options to solve a problem with experts;
- the optimal decision selection and formulation;
- taking a decision;
- decision specification for its performers.

Management decision is the result of analysis, forecasting, optimization, economic assessment and selecting alternatives from a variety of options in order to achieve a specific management system goal (Ansoff 1999; Porter 2005).

According to management technology a managerial decision is a process that consists of three stages: 1) decision preparation; 2) decision-making; 3) decisions implementation.

At the stage of the managerial decision preparation the economic analysis of the situation at micro and macro level is conducted. The analysis includes information search, collection and processing as well as finding the problems that need solving.

At the decision-making stage the development and assessment of alternative decisions and actions performed on the basis of various calculations is done, the criteria for choosing the optimal solution are selected, the best decision is taken and approved.

At the stage of decision implementation steps to specify the decision and to bring it to the performers are taken, the progress of its implementation is monitored, the necessary adjustments are made and the results of decision implementation are assessed. Each management decision has a certain result; that is why the goal of management is to find such forms, methods, tools and instruments that could help achieve the optimal results in specific conditions and circumstances (Vereskun et al. 2011; Kolosok et al. 2012).

### Conclusions

The new economy is accompanied by a new form of competition for profits and markets – not only between companies within the same state, but also between countries and transnational corporations. The development of corporate enterprises’ competitiveness in the new economy determines the importance of intangible assets effective management, which is a new reserve for enterprise wealth creation, preservation and growth.

Within the considered enterprise’s IA management
system the ultimate management decisions are concerned with:

- forming an effective structure of intangible assets;
- creating sustainable competitive advantages based on the IA owned by an enterprise;
- increasing the value of an industrial enterprise.

The approved management decision concerning enterprise’s intangible assets efficiency improvement is a subject to mandatory assessment.

The integrated conceptual system of IA management proposed by the author is an open subsystem of enterprise management and is characterized by operation continuity, cyclicity, emergence (integrity), the ability to adjust management purposes at any stage according to the adopted strategy of enterprise development.

Thus, on the basis of the conducted studies the author improved an integrated conceptual system of industrial enterprises’ intangible assets management, which consists of the following interconnected blocks: management process informational provision block, process block, result block, and management effectiveness analysis block. The blocks are connected by informational links and have a feedback channel that allows assessing the state of a managed object.

References


Sace, J.; Tvaronavičienė, M. 2009. Innovation and entrepreneurship in transition countries: An empirical study of innovative behaviour of Lithuanian entrepreneurs with reference to regional economic development, in Silver Kyaruzi, I.; Radovic...
Large corporate enterprises’ intangible assets managing as a way to secure a sustainable development of competitive advantages


ISSN 2029-7017 print/ISSN 2029-7025 online

http://dx.doi.org/10.9770/jssi.2013.2.4(6)

LOOKING BEYOND THE GDP: QUANTITATIVE EVALUATION OF THE “HOLISTIC PROGRESS INDEX” (HPI)

Ravi Prakash

Department of Mechanical Engineering,
Motilal Nehru National Institute of Technology, Allahabad (UP) – 211004, India
E-mail: rprakash234@gmail.com

Received 20 February 2013, accepted 25 April 2013

Abstract. As an alternative to the conventional GDP, a new “progressive” GDP termed as the “Holistic Progress Index” or the HPI has been proposed; and an original approach to its quantitative evaluation has been presented. The HPI integrates social, economic, ecological and political aspects of human progress. The rationale of HPI and its evaluation methodology are presented. As proposed, the HPI is based on three major parameters i.e. the Net GDP per capita, Socio-Ecological Progress Index and Socio-Political Progress Index representing Peaceful Development, Sustainability and Human Freedom respectively. The factors involved in the quantitative evaluation of HPI are GDP, military expenditure, health, education, carbon emission, poverty reduction, leisure, population growth, crime and human freedom. Hence the proposed HPI is much more comprehensive than the conventional GDP. Future actions / projects required to utilize the concept of HPI are also proposed and discussed. It is concluded that a pursuit of the growth in HPI (rather than a growth in GDP alone) will lead to Peaceful and Sustainable Development without curtailing Human Freedom.

Keywords: GDP, Holistic Progress, Sustainable Development.

Reference to this paper should be made as follows: Prakash, R. 2013. Looking beyond the GDP: quantitative evaluation of the “Holistic Progress Index” (HPI), Journal of Security and Sustainability Issues 2(4): 57–64.

JEL Classifications: O1, Q01

1. Introduction

Concerns about the inadequacy of the GDP (i.e. the Gross Domestic Product) as an indicator of human well-being have been expressed in many quarters. A special report (New Scientist 2008) clearly sets the tone in this regard: “Growth graphs are stark reminders of the crisis facing our planet. Consumption of resources is rising rapidly, biodiversity is plummeting and just about every measure shows humans affecting earth on a vast scale. Most of us accept the need for a more sustainable way to live, by reducing carbon emissions, developing renewable technology and increasing energy efficiency. But are these efforts to save the planet doomed?...Personal carbon virtue and collective environmentalism are futile as long as our economic system is built on the assumption of growth… If we are serious about saving earth, we must reshape our economy.”

More recently, Nobel Laureate Joseph Stiglitz (2009) pointed out the pitfalls of GDP fetishism. He linked the current economic recession to an undue focus on the GDP. Development of an alternative economic indicator (or a more “Progressive” GDP) which includes factors such as health, income distribution, environmental degradation etc, is the need of the hour. With this motivation, a model has been developed in this paper to evaluate a modified GDP indicator termed as the “Holistic Progress Index” (or HPI). The basis of HPI, its expression and evaluation methodology are presented in this paper. Many
Looking beyond the GDP: Quantitative Evaluation of the "Holistic Progress Index" (HPI)

Ravi Prakash

Indices of human welfare, which look beyond the GDP as an indicator of progress, have been developed in the past e.g. Human Development Index (HDI), Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), Sustainable Net Benefit Index (SNBI), Index of Economic Well-Being (IEWB), Happy Planet Index (HPI) etc (Lawn 2005; Koroneos and Rokos 2012). Besides mentioned variety approaches towards development in scientific literature could be found (Čepėnaitė, Kavaliūnaitė, S. 2013; Dudzevičiūtė 2012; Ercey 2012; Grybaite 2011; Korsakienė, Breivytytė; Wambaye 2011; Lankauskienė, Tvaronavičienė 2012; Lapinskienė, Tvaronavičienė 2009; Smaliukienė et al. 2012; Tvaronavičienė, Grybaite 2012; Tvaronavičienė, Lankauskienė 2011; Šileika, Bekerytė 2013; Tvaronavičienė, Lankauskienė 2013; Vosylius et al. 2013). Despite variety of researches in the indicated field, the author presents a fresh approach to evaluation development and introduces a new indicator termed above as the Holistic Progress Index (HPI). Compared to the previously developed indices having their own strengths and weaknesses, the index proposed in this paper is expected to be more comprehensive, less subjective, and simpler to evaluate.

2. Basis and Evaluation of HPI

The GDP (or the sum total of goods and services produced in an economy) is essentially an economic indicator. The GDP does not include other human development aspects belonging to social, ecological and political domains. From these (other than economic) domains, the following parameters may be considered as crucial to determining human survival, welfare and happiness:

1. Peace (absence of war)
2. Education
3. Health
4. Poverty reduction (or income-distribution)
5. Leisure
6. Climate Change
7. Population Growth
8. Crime
9. Freedom

The GDP / capita as an indicator of economic progress is important and perhaps irreplaceable. However, the above parameters are not reflected in the GDP values. Hence, the GDP needs to be modified or moderated by the above factors, in order to reflect the true or holistic progress made by human beings on a year-to-year basis. An effort has been made to incorporate all the above parameters in developing a new “Progressive” GDP, which has been called the Holistic Progress Index or the HPI.

It is proposed to evaluate the HPI by the following expression:

$$\text{HPI} = \text{Net GDP / capita} \times \text{SEPI} \times \text{SPPI}$$

All the above terms used in the expression of HPI are explained below. The terms SEPI and SPPI refer to SOCIO-ECOLOGICAL PROGRESS INDEX and SOCIO-POLITICAL PROGRESS INDEX respectively. The term Net GDP / capita is elaborated first:

2.1 Net GDP / capita:

The term Net GDP is meant to denote the GDP minus the military expenditure (on army, navy and air force) on a purchasing power parity basis.

Hence, Net GDP / capita = GDP / capita - Military Expenditure / capita

The Net GDP may also be called the “Civilized” GDP or the “Demilitarized” GDP or the “Peaceful” GDP. Large military expenditure not only threatens peace, but also diverts scarce material, energy and human resources to destructive activities, which could otherwise be used to improve the quality of life. Obviously, in order to improve HPI, military expenditure should be reduced and disarmament efforts need to be intensified.

That reduced military expenditure has a positive effect on GDP growth, is well argued by the noted economist John Kenneth Galbraith (1984):

“Through the decade of the 1970s we (Americans) used from 5 to 8% of our Gross National Product for military purposes. The Germans during this period used between 3 and 4% - in most years relatively about half as much as did we. The Japanese in these ten years devoted less than 1% of their Gross National Product annually to military use. In 1977, to take a fairly typical year, our military spending was $441 per capita, that of Germany was $252 per capita; the Japanese spent a mere $47 per capita. It was the capital so saved and invested in civilian capital improvement that brought Germany and Japan to the industrial eminence that now challenges so successfully our own. Again the figures are striking. Through the decade of the seventies, our investment...
in fixed non-military and non-residential investment ranged from 17% of Gross National Product to 19%.
That of Germany ranged from 21 to 27%. The Japanese range in these years was from 31% to a
towering 37%. The investment in improvement of
civilian plant was broadly the reciprocal of what went
for weapons. Out of ten industrial countries in the
years 1970–79, Japan, with its low military expendi-
tures, had by far the highest rate of growth in pro-
ductivity – an astonishing 8% annually. Germany
also had a highly favourable growth rate. The United
States and Britain, with the highest military expendi-
tures, had the lowest rate of productivity growth in
the non-socialist world. Any one looking at these
figures will have a more thoughtful view of the sug-
gestion that military expenditures have an economi-
cally positive effect.”

Hence, demilitarization will cause the ‘Net GDP’
to grow in two ways: (A) Military expenditure will
decrease, and (B) GDP will increase. Reduced mili-
tary expenditure will have yet another positive effect.
The authority of military dictatorships, in oppressive
states around the world, will decrease. They will tend
to be less tyrannical, allowing human freedom in
such states to flourish.

2.2 Socio - Ecological Progress Index (SEPI):

The Socio-Ecological Progress Index (SEPI) depends
upon seven factors (elaborated below). These are re-
lated to quality of life and happiness such as health,
education, leisure etc along with ecological factors
such as carbon emissions. This index can be evalu-
ated as:

$$\text{SEPI} = \frac{(\text{EF} \times \text{HF} \times \text{PRF} \times \text{LF} \times \text{CRF})}{(\text{PGF} \times \text{CF})}$$

The abbreviations used in the evaluation of the So-
cio - Ecological Progress Index (SEPI) are explained
below:

- EF = Education Factor
- HF = Health Factor
- PRF = Poverty Reduction Factor
- LF = Leisure Factor
- CRF = Carbon Reduction Factor
- PGF = Population Growth Factor
- CF = Crime Factor

A. Education Factor (EF):

The Education Factor can be represented by the per-
centage of population in a country that is literate
(preferably literate up to High School). For 100%
literacy, the value assigned for EF is 1. Literacy for
only 70% of the population in a country would
mean that EF is 0.7.

A literacy level of 10% or less may be assigned a
fixed value of 0.1.

B. Health Factor (HF):

This factor can be represented by the average life span
of the population in a country. For an average life
span of 80 years (or more), this factor may be con-
sidered as 1. For 60 years average life span, this factor
is 60/80 i.e. 0.75.

A higher average life span would indicate better
health of the population; which may be achieved by
providing clean drinking water, sanitation and prop-
er medical facilities etc.

To clarify a mathematical possibility, an average life
span of “0” for a country’s population is impossible;
as in such a case, the population and the country
vanishes from earth! However, to provide a mini-
mum limit of HF, for an average life span of 8 years
or below (a country without adults!), the value of HF
may be fixed at 0.1.

C. Poverty Reduction Factor (PRF):

This factor may be represented by the percentage of
the population that is above the poverty line. For a
country, without poor people, the value of PRF is
1. If 70% of the population for a country is above
the poverty line, the PRF for that country is 0.7. If,
for a country, the population above the poverty line
is only 10% or less, the PRF may be fixed at 0.1.

It is presumed that the income-distribution aspect is
somewhat included in the poverty reduction factor,
as poverty reduction demands better income-distribu-
tion. Further, common people are more concerned
about a basic dignified life than the excessive wealth
of a minority. Money is superfluous beyond a point!

D. Leisure Factor (LF):

This factor is positively related to happiness along
with reduction in mental and physical stress. Presently,
some people are over-worked; and some are
idle due to unemployment. Both the situations lead to stresses in life. The over-worked people need to be given more leisure time, and the unemployed need to be made employable through appropriate education and training. The Leisure Factor can be evaluated from the number of paid holidays (particularly in the private sector because of its strong profit motives). If in a year, there were two months paid holidays along with a 5-day week, the number of holidays per year would be about 140. This may be assigned a leisure factor 1. If in a country’s organised private sector, the number of paid holidays are only 70 per year, then the leisure factor is equal to 70 / 140 i.e. 0.5. If the paid holidays allowed are only 14 (i.e. 2 weeks) or less, the value of LF may be fixed at 0.1. Improvement in this factor would indicate a higher happiness level of the general population.

E. Carbon Reduction Factor (CRF):

Out of the several ecological factors, the key factor of carbon emission only has been considered because of its serious implications for global warming. As per the IPCC (Intergovernmental Panel on Climate Change) report, 2.3 tonnes per capita per year is considered as a safe limit for carbon emissions. This can be used as a basis to evaluate the carbon reduction factor. For USA, the carbon emission value is estimated to be 20 tonnes per capita per year. Hence the carbon reduction factor for USA is 2.3 / 20 i.e. 0.115. For India, the emissions are in the safe limit; hence, for India the CRF value is equal to 1. For carbon emission values less than 2.3 tonnes per capita per year, the CRF value may be fixed at 1. Reduction in carbon emissions (i.e. improvement in CRF) can be considered as a key indicator of ecological progress.

F. Population Growth Factor (PGF):

This factor can be evaluated as:

\[ \text{PGF} = (Np + 1) \]

Here, \( Np \) stands for population growth rate in a particular country. If population growth rate is zero (or negative), this factor is assigned a fixed value of 1. For India, this factor would be 3, because of about 2 % growth rate in the country’s population. Hence, the HPI would be reduced to its one-third value for India, as compared to a similar country with zero population growth.

The factor of \( \frac{1}{(Np + 1)} \) in the HPI expression is such that population growth has a punishing effect on HPI. This expression was deliberately chosen in this manner, because population growth causes congestion, over crowding, reduction in spaces of wilderness etc and therefore leads to a poor quality of life.

G. Crime Factor (CF):

Crime, of any nature, in a country leads to a poor quality of life for its citizens. This factor can be evaluated as:

\[ \text{CF} = (Nc + 1) \]

Here, \( Nc \) stands for the percentage of population directly or indirectly involved in any crime. The crime could be petty or less serious (e.g. disobedience of traffic rules, tax evasion or theft) or serious (e.g. rape, terrorism or murder). For a crime free society, the CF would be evaluated as 1. The definition of “CRIME” should be comprehensive in nature and scope. Tax evasion, disruption of communal harmony, female harassment, breaking traffic rules etc should all be included in the crime factor. Cyber crimes, child labour, racism, production of spurious drugs, and adulteration in foodstuffs are some more examples. One can go to the extent of including the production of films and video games promoting terror & violence as a crime. Some of it may be controversial, but a consensus may not be difficult. If for a country, the section of the population involved in any sort of crime (directly or indirectly) is, say, 10 %; then the Crime Factor (CF) is evaluated as 11. The HPI reduces by a factor of \( \frac{1}{11} \) compared to a similar but crime-free country. Again, the expression for CF is such that the effect of crime on HPI is punishing; and without doubt, it deserves to be so.

General Remarks:

The equation for evaluating the SEPI (and the HPI) is so framed that there should be significant punishment for negative factors (like population growth and crime) and significant reward for improving the positive factors (like higher literacy rate, reduction in carbon emission etc). By doing so, the idea of justice has been implemented here. This is one reason why product and division functions have been incorporated in the SEPI equation.

Another reason relates to the nature of the factors involved. Though apparently different, they are essentially intermingled (or fused) with each other. An
improvement in one factor will most likely lead to an improvement in other factor / factors. For example, an improvement in carbon reduction factor would demand more renewable energy programmes and therefore would lead to more creation of jobs, thereby improving the Poverty Reduction Factor. Improvement in Poverty Reduction Factor would reduce the Crime Factor. A higher Literacy Factor may also reduce the Crime Factor. Improvement in Literacy Factor would reduce Population Growth Factor and would lead to better health awareness. An improvement in the Leisure Factor would lead to a more stress-free society, which is likely to have a positive impact on the Health Factor. Such links can be seen in other factors also.

The product and division functions involved in the SEPI expression would act as an incentive for the governments to act in the right direction; because an appreciable increase in HPI is feasible by improving positive factors and simultaneously curbing negative factors.

**Numerical Range of SEPI:**

The range of numerical values of the various factors involved in SEPI is summarized below:

(i) EF varies between 0.1 and 1.
(ii) HF varies between 0.1 and 1.
(iii) PRF varies between 0.1 and 1.
(iv) LF varies between 0.1 and 1.
(v) CRF value lies in a range, such that $0 < CRF \leq 1$.
   Again, to clarify a mathematical possibility, a situation where $CRF = 0$ is impossible to arise, as it implies infinite carbon emissions!
(vi) PGF value can be equal to or greater than $1$.
   However, it is beyond human capability to increase the PGF to an infinite value!
(vii) CF value can be equal to or greater than 1. Its maximum value is 101, when the entire population of a country is criminalized!

Therefore, the quantitative value of SEPI lies in the range of 0 to 1, such that $0 < SEPI \leq 1$.

**2.3 Socio-Political Progress Index (SPPI):**

Essentially, human beings seek freedom in order to be happy. The level of freedom (an important parameter to assess “quality of life”) available to a citizen depends on political, legal, and social institutions existing in a country. Hence reforms are required if freedom level is to be up-graded. This is the basis of the Socio-Political Progress Index (SPPI).

The Socio-Political Progress Index (SPPI) can be evaluated by awarding credit points for the level of freedom existing in a country for its citizens. This level of freedom would depend upon the existence or non-existence of the following types of freedoms:

1. Freedom to choose the government.
2. Freedom of expression and communication.
3. Freedom of religious and spiritual pursuits.
4. Freedom of forming political groups, associations and trade unions.
5. Freedom to choose one’s educational stream.
6. Freedom to choose one’s profession.
7. Freedom for socio-cultural pursuits.
8. Freedom from social inequalities based on race, colour, caste, creed and gender.
10. Freedom to travel / migrate to any country.

If all the above types of freedom are available in a country to its citizens, the maximum credit points of 100 may be awarded. Each type of freedom may be assigned equal weight i.e. 10 credit points due to number of freedoms being 10. If four types of freedom only are available in any country, the credit points earned by that country would be 40. If no freedom exists in a country, that country may be assigned only 1 credit point. If a particular type of freedom is available only partially, one can assign the credit points (out of 10) by assessing what percentage of the population enjoys that freedom or to what level that freedom is available. Some uncertainty in the values assigned to partial freedom may always be there. However, an honest assessment can take us very close to the true value. It is not suggested here that the credit points be awarded for absolute freedom. Of course, any freedom needs constraints commensurate with public morality and welfare of fellow citizens. However, the credit point system for SPPI would discourage governments to curtail the freedom available to its citizens.

**Numerical Range of SPPI:**

The quantitative value of SPPI lies in the range of 1 to 100, such that $1 \leq SPPI \leq 100$.

**3. Results**

Annual evaluation of the HPI based on the three major parameters i.e. Net GDP / capita, SEPI, and SPPI
(a product function again because of the advantages cited in the General Remarks above), will provide a numerical value of HPI on a year-to-year basis. The trends in HPI growth/decay can then be observed and analysed.

From the HPI evaluation methodology, it can be observed that a growth in HPI will occur, if:

– GDP increases
– military expenditure reduces
– literacy level increases
– health factor improves
– poverty reduction (or income-distribution) factor improves
– leisure factor improves
– carbon reduction factor improves (i.e. carbon emission is reduced)
– population growth is reduced
– crime factor is reduced
– freedom level is improved

To summarize, it may be permitted to use the following analogy:

Net GDP / capita $\cong$ Peaceful Development $\cong$ Production of delicious cake (the bigger the better)
SEPI $\cong$ Sustainability $\cong$ Distribution of the cake with equity (to present and future generations)
SPPI $\cong$ Human Freedom $\cong$ Consumption of the cake with icing
HPI $\cong$ Peaceful and Sustainable Development without curtailing Human Freedom

Hence the goal of HPI is akin to building a delicious cake, distributing it to all, and enjoying it with a variety of icings!

4. Future actions/projects required:

The HPI, as proposed above, is much more comprehensive than the GDP. It is believed that it is a rational indicator of human well-being and that it indeed measures “holistic” progress made by a country’s citizens. The following actions/projects are proposed in order to utilize the concept of HPI:

A. Governments across the world need to be persuaded to adopt the proposed HPI as an indicator of well being of its citizens, in place of the GDP.

B. All the factors related to HPI need to be analysed on a country wise basis in order to evaluate the current level of HPI for each country, in order to grade the countries based on HPI. The countries having very high GDP values may not hold the crown based on HPI. Such countries will be forced to reorganize their affairs, in order to retain the lost glory.

C. Strategies need to be developed and formulated to improve the HPI for each country. Financial aid from the International Monetary Fund and the World Bank should be linked to projects designed for HPI improvement. In order to improve the HPI, the world’s focus and attention has to necessarily shift to:

– demilitarization
– literacy
– health care
– poverty reduction
– protection of leisure rights of working people (Get inspired from Bertrand Russell’s “In praise of Idleness” (Russell 1935)!
– energy conservation and renewable energy
– population stabilization
– crime prevention
– political, legal and social reforms

The role of the United Nations (along with individual states) will be crucial in HPI improvement. The United Nations, therefore, needs to be strengthened, both economically and politically, to contribute effectively in HPI improvement. A more democratic UN will be better equipped to handle HPI improvement.

D. The crucial link between energy and HPI needs to be examined and analysed, in order to formulate appropriate energy strategies. The positive impact of energy conservation and renewable energy on the HPI needs to be highlighted.

It is further suggested that the link between Net Energy and HPI needs to be explored. The term “Net Energy” means the energy available to society after subtracting that required to build the energy supply system. To be more specific, one can even explore the Net Exergy – HPI link; because only ‘exergy’ (i.e. the useful part of energy) can drive development.

E. Role of academic institutions in HPI improvement will be very important. A pro-active role of academic institutions in the area of sustainability is the need of the hour. One can consider the example of eco-friendly and decentralized energy technologies. By demonstration (through actual use on campuses), training, and extension of such technologies, the
academic institutions can act as role models for surrounding communities and catalysts in the process of sustainable development. The students will become more sensitive to the problems of the local surrounding communities. This will motivate them to take up appropriate and relevant projects for research and development.

Hence, in addition to teaching and research, the academic institutions need to act as “engines of regional development” as opposed to being ivory towers. The problems of global poverty and climate change demand that academic institutions act in this “third-dimension” as well. Some sample projects in this regard should be taken up urgently particularly in the developing world. A serious introspection into the goals of education needs to be made particularly in the developing countries. “Is education to be a ‘passport to privilege’ or is it something which people take upon themselves almost like a monastic vow, a sacred obligation to serve the people?” so aptly asked by E.F.Schumacher in his path-breaking book “Small is Beautiful” (Schumacher 1973: 173). The academic institutions particularly in developing countries need to embrace the spirit of what Schumacher said.

F. The role of the corporate sector in HPI improvement will also be very important. Corporate Social Responsibility should be considered neither a charity nor philanthropy, but a new way of doing business in a sustainable manner based on ‘Life Cycle Thinking’.

Conclusions and recommendations

The HPI as proposed above is a much more comprehensive indicator of progress as compared to the GDP. The HPI integrates social, economic, ecological and political aspects of human progress. Quantitative estimation of the HPI is simple and without ambiguity; and can be carried out for all countries across the world.

One can also observe that GDP growth does not necessarily ensure growth in HPI. HPI may actually decrease, while GDP grows if appropriate policies are not adopted and implemented. Hence, an obsession with GDP may be counter productive. The energy – HPI link needs to be examined and analysed in detail to formulate appropriate energy strategies.

Worldwide efforts are required to encourage national statistical agencies to adopt HPI as an indicator of their country’s progress, in place of the GDP. Further efforts are required in the direction of improving the HPI, both at the national and global levels. The United Nations needs to be strengthened, both economically and politically, to contribute effectively in HPI improvement. Academic institutions, across the world, need to play the role of a catalyst in the process of HPI improvement. Corporate Social Responsibility should become as much a core of business practice as profit-making in order to further improve the HPI.

The HPI model proposed in this paper may be improved or modified (if required) on the basis of the insight gained while practically evaluating the HPI. It can be observed that a pursuit of the growth in HPI (rather than a growth in GDP alone) will lead to Peaceful and Sustainable Development without curtailing Human Freedom.

That economic growth is not a sole pre-condition for a sustainable world, was rightly pointed out in the much-acclaimed book “Energy for a Sustainable World” (Goldemberg et al. 1988):

“The approach to a sustainable world involves economic growth as a necessary, but not a sufficient, condition. At the most fundamental level, the goals of society should be equity, economic efficiency, environmental harmony, long-term viability, self-reliance and peace. Energy production and use should be compatible with, and if possible contribute to, these societal goals. These goals are relevant to both developing countries (for which they define the objectives of development) and industrialized countries, as well as for the relationship between these countries and for the global community”.

More recently, Nobel Laureate Joseph Stiglitz gave a wake-up call to the world: “A fetish for GDP has to go! An undue focus on GDP has led to the current economic recession.”

The GDP has outlived its utility. A new era of HPI has to begin...This article is a humble attempt to change the world for the better. It seeks to promote Peaceful and Sustainable Development without curtailing Human Freedom. This article is dedicated to Mahatma Gandhi, an Apostle of Applied Human Ecology.
References


OPTION PRICING USING MONTE CARLO SIMULATION

Raimonda Martinkutė-Kaulienė¹, Jelena Stankevičienė², Santautė Žinytė³

¹,²,³Vilnius Gediminas Technical University, Saulėtekio al. 11, LT-10223 Vilnius, Lithuania
E-mails: ¹raimonda.martinkute@vgtu.lt (corresponding author); ²jelena.stankeviciene@vgtu.lt;
³santaute.zinyte@gmail.com

Received 11 September 2012; accepted 16 March 2013

Abstract. Special features that options include are the main reason of their growing amounts trading in the financial markets. Options can be used in many imaginative ways to create various attractive investment opportunities. Empirical researches all over the world illustrated that options incorporate an insurance element not available in any other security and because of that they can be used by investors to create return distributions unobtainable with the strategy of allocating funds between fixed income securities and stock portfolios. But investor must understand that one of the main aspects of profitable trading in derivative securities is their proper evaluation and pricing. As the exact valuation of options is quite difficult, the article deals with the theoretical and practical aspects of pricing of options. The purpose of the research is to adopt Monte Carlo simulation method to predict prices of plain vanilla options and to compare them to real option prices and option prices calculated using analytical Black-Scholes formula.

Keywords: option contract, price, stock price, call, put, Monte Carlo simulation, Black-Scholes model.


JEL Classification: G17.
However, when the number of dimensions in the problem is large, analytical models and numerical integrals become unavailable, the formulas exhibiting them are complicated, entail many restrictive assumptions and difficult to evaluate accurately by conventional methods. In these cases, simulation methods often give better results, because they have proved to be valuable and flexible computational tools to calculate the value of options with multiple sources of uncertainty or with complicated features. The main characteristic that makes simulation so attractive is its ability to cope with uncertainty in a very simple way. According to Cortazar (2000), the recent trend in modelling price uncertainty using multi-factor models is much easier to implement using standard simulation than using other numerical approaches. There are two most popular simulation methods: Monte Carlo simulation and Bootstrap experiment. The research will be based on Monte Carlo simulation.

Monte Carlo simulation is one of the most popular numerical method for pricing financial options and other derivative securities because of the availability of powerful workstations and recent advances in applying the tool (Charnes 2000; Tian et al. 2008). Moreover, Monte Carlo simulation is attractive relative to other numerical techniques because it is flexible, easy to implement and modify.

The aim of the article is to adapt Monte Carlo simulation method to predict prices of vanilla option contracts and compare them to real observed option prices and to prices calculated with an analytical Black – Scholes formula. The object of the research is pricing of option contacts.

Logical analysis and synthesis of scientific literature, comparative analysis and graphical modelling, simulation technique were used for the research.

2. Main concepts concerned with options

Different authors give the similar description of an option contract, all emphasizing the right to choose. An option can be described as an instrument giving its owner the right but not the obligation to buy or sell something at in advance fixed price. Options are available on a wide range of products, beginning from grain, raw materials and ending in financial assets, gold or real estate. In this article the main attention is paid on stock options.

There are two types of options – calls and puts. A call option gives the holder the right to buy specified quantity of the underlying asset at the strike price on or before expiration date. The writer of the option however, has the obligation to sell the underlying asset if the buyer of the call option decides to exercise his right to buy. A put option gives the holder the right to sell specified quantity of the underlying at the strike price on or before an expiry date (LIFFE 2004). The writer of a put option has the obligation to buy the agreed asset at the strike price if the buyer decides to exercise his right to sell. The option holder is the person who buys the right conveyed by the option. The option writer or seller is obliged to perform according to the terms of the option. Strike price or exercise price is the price at which the option holder has the right either to purchase or to sell the underlying asset. (Jarrow 1983)

There are three different terms for describing where an option is trading in relation to the price of the underlying asset. These terms are “at-the-money”, “in-the-money”, and “out-of-the-money”. At the money means that the current market value of the underlying asset is the same as the exercise price of the option. A call option is said to be in the money if the current market value of the underlying asset is above the exercise of the option. In the case of a put option current market value should be below the exercise price of the option. If the exercise price is above the current market value in the case of a call option and below in the case of a put option, the option is said to be out of the money. These options can be executed only at a lost. (Haugen 2001)

It is often useful to characterise an option in terms of its payoff to the purchaser of the option. The initial cost of the option is then not included in the calculation (Hull 2008).

If K is the strike price and S_T is the final price of the underlying asset, the payoff from a long position in a call option is

\[ \max (S_T - K, 0) \]  

This reflects the fact that the option will be exercised if \( S_T > K \) and will not be exercised if \( S_T \leq K \). The payoff to the holder of a short position in the Call option is

\[ \max (S_T - K, 0) = \min (K - S_T, 0) \]

The payoff to the holder of a long position in a Put
option is 
\[ \max (K - S_T, 0) \] (3)
And the payoff from a short position in a Put option is 
\[ \max (K - S_T, 0) = \min (S_T - K, 0) \] (4)
The style of an option refers to when that option is exercisable. According to Options Clearing Corporation (OCC) there may be three different styles of options: American style, European style and capped options. An American style option may be exercised at any time prior to its expiration. European style option may be exercised only during a specified period before the option expires. Usually such an option is exercised on its expiration day. Capped options are not traded in every exchange. Their trading conditions are individually depending on the exchange they are traded. A capped option will be automatically exercised prior to expiration if the options market on which the option is trading determines that the value of the agreed asset at a specified time on a trading day reached the cap price of the option (Friedentag 2000).

3. Main principles of option pricing

Because of the complex valuation of option contracts the main scientific studies are devoted to analyse separate methods of options pricing (Hull 2008; Jarrow, Rudd 1983; Martin 2001). Depending on the requirements, the option pricing model can range in complexity from a simple binomial model, to Black-Scholes, to sophisticated analytical and simulation models.

The primary methods for pricing options are binomial trees and other lattice methods, such as trinomial trees, and finite difference methods to solve the associated boundary value partial differential equations. According to Jia (2009), due to the complexity of the underlying dynamics, analytical models for option pricing entail many restrictive assumptions, so for real-world applications approximate numerical methods are employed, these include the valuation of options, the estimation of their sensitivities, risk analysis, and stress testing of portfolios. But, in recent years the complexity of numerical computation in financial theory and practice has increased enormously, putting more demands on computational speed and efficiency.

The most popular valuation model for options is the Black-Scholes model. The model is based on the theory that markets are arbitrage free and assumes that the price of the underlying asset is characterized by a Geometric Brownian motion. This method is commonly used for pricing European options as there is an analytic solution for their price (Bampou 2008).

Another technique for pricing options is the binomial lattice model. In essence, it is a simplification of the Black-Scholes method as it considers the fluctuation of the price of the underlying asset in discrete time. This model is typically used to determine the price of European and American options (Bampou 2008).

Monte Carlo simulation is a numerical method for pricing options. It assumes that in order to value an option, we need to find the expected value of the price of the underlying asset on the expiration date. Since the price is a random variable, one possible way of finding its expected value is by simulation. This model can be adapted to price almost any type of option (Bampou 2008).

The main options pricing models contain five factors that are used to determine a theoretical value for an option and which have to be taken into account when pricing option contracts (Hull 2008):
1. market price of the underlying asset;
2. strike price;
3. time to expiration;
4. volatility of the underlying asset;
5. interest rates;
6. dividends expecting during the life of the option.

Market price and strike price. The payoff from a call option will be the amount by which the stock price in the market exceeds the strike price dealt with the option. Call options therefore become more valuable as the stock price increases and less valuable as the strike price increases. For a put option, the payoff on exercise is the amount by which the strike price exceeds the stock price (Laurence, Avellaneda 2000). So the put option becomes less valuable as the stock price increases and more valuable as the strike price increases.

Time to expiration. Both put and call American options become more valuable as the time to expiration increases. European put and call options do not necessarily become more valuable as the time to expiration increases. This is because it is not true that the owner of a long-life European option has all the
exercise opportunities open to the owner of a short-life European option.

*Volatility.* The volatility of a stock price is a measure of how uncertain we are about future stock price movements. As volatility increases, the chance that the stock price will change in both directions increases. The value of both calls and puts therefore increase as volatility increases (Hull 2008; Martin 2001).

*Risk-free interest rate.* The risk-free interest rate affects the price of an option in a less clear-cut way. Without additional assumptions it is difficult to gauge the effect of increasing interest rates. Since increasing interest rates decrease the present value of the exercise price, there is a tendency for call values to increase and put values to decrease. It should be emphasized that these results assume that all variables remain fixed. In practice, when interest rates fall (rise), stock prices tend to rise (fall). The net effect of an interest rate change and the accompanying stock price change therefore may be different from that just given (Hull 2008; Jarrow, Rudd 1983).

*Dividends.* Dividends have the effect of reducing the stock price on the ex-dividend date. The values of call options are negatively related to the size of any anticipated dividend, and the value of a put option is positively related to the size of any anticipated dividend.

As vanilla options are traded in exchange markets, it is more possibilities to find historical information about real market prices. In the case of exotic options there is no much of such possibilities because these contracts in many cases are over the counter contracts. Choosing adequate for market conditions pricing model is crucially important.

In order to price option investor must distinguish between intrinsic value and time value of option contract. Intrinsic value is the value that any given option would have if it were exercised today. Basically, the intrinsic value is the amount by which the strike price of an option is in the money. It is the portion of an option's price that is not lost due to the passage of time (Wagner 2009). The following equations can be used to calculate the intrinsic value of a call or put option:

\[
\text{Call Intrinsic Value} = \text{Underlying Stock's Current Price} - \text{Call Strike Price} \\
\text{Put Intrinsic Value} = \text{Put Strike Price} - \text{Underlying Stock's Current Price}
\]

Stock's Current Price (6)

The intrinsic value of an option reflects the effective financial advantage that would result from the immediate exercise of that option. Basically, it is an option's minimum value. Options trading at the money or out of the money have no intrinsic value.

The second important driver is time value. Prior to expiration, any premium in excess of intrinsic value is called time value (What is an Option? 2012). Time value is also known as the amount an investor is willing to pay for an option above its intrinsic value, in the hope that at some time prior to expiration its value will increase because of a favourable change in the price of the underlying security (Wagner 2009). The longer the amount of time for market conditions to work to an investor’s benefit, the greater the time value. The formula for calculating the time value of an option is:

\[
\text{Time Value} = \text{Option Price} - \text{Intrinsic Value}
\]

Time value is basically the risk premium that the option seller requires to provide the option buyer the right to buy/sell the stock up to the date the option expires. It is like an insurance premium of the option; the higher the risk, the higher the cost to buy the option.

4. Monte Carlo simulation

Simulation methods can be very helpful when pricing options because prices of options do not have a simple closed form solution and efficient computational methods are needed to determine them. According to Gitman (2009), simulation is a statistics-based behavioural approach that applies predetermined probability distributions and random numbers to estimate risky outcomes. Another definition says that simulation is the imitation of a real world process of system. In finance, a basic model for the evolution of stock prices, interest rates, exchange rates, and other factors would be necessary to determine a fair price of a derivative security (Kaplan 2008). Simulations make assumptions about the behaviour of the system being modelled. Simulation is used because it transfers work to the computer.

Despite the fact that simulation methods are very useful, they might have some limitations too (Everaert 2011):

– Obtaining results may be computationally expensive
Monte Carlo simulation is one of the most popular numerical methods for pricing financial options and other derivative securities because of the availability of powerful workstations and recent advances in applying the tool (Charnes 2000; Tian et al. 2008). Monte Carlo simulation is a flexible method whose applicability does not depend on the dimension of the problem and does not suffer from the curse of dimensionality (Ibanez and Zapatero 2004). As the Monte-Carlo method relies on the average result of thousands of independent stochastic paths, massive parallelism can be adopted to accelerate the computation (Tian et al. 2008).


In some important applications, Monte Carlo simulation is used to find an approximation solution to a complex financial problem, particularly European-style and exotic options for which no analytical pricing formula is available (DeFusco et al. 2001). A Monte Carlo method is a technique that involves using random numbers and probability to solve problems and simulates paths for asset prices (Kamrad 2008; Jia 2009). Monte Carlo simulation generates a sample by drawing from a hypothesised analytical distribution. One of the biggest advantages is that successive replications generate a collection of samples with the same distributional properties as the original data (Everaert 2011; Gitman 2009). Though, there are some disadvantages too, as results depend on whether the distributional assumption is correct, there is a slow rate of convergence, it is very time-consuming and computationally intensive.

Moreover, Monte Carlo simulation is attractive relative to other numerical techniques because it is flexible, easy to implement and modify, and the error convergence rate is independent of the dimension of the problem (Charnes 2000). Since the convergence rate of Monte Carlo methods is generally independent of the number of state variables, it is clear that they become viable as the underlying models (asset prices and volatilities, interest rates) and derivative contracts themselves (defined on path-dependent functions or multiple assets) become more complicated (Fu et al. 2001; Jia 2009). A key specification in Monte Carlo simulations is the probability distributions of the various sources of risk. The implications of different investment policy decisions can be assessed through simulated time. In addition, Monte Carlo simulation is widely used to develop estimates of Value at Risk (DeFusco et al. 2001). This methodology simulates many times the profit and loss performance of the portfolio over a specified horizon.

Boyle (1977) was the first one who proposed a Monte Carlo simulation approach for European option valuation. The method is based on the idea that simulating price trajectories can approximate probability distributions of terminal asset values. Option cash flows are computed for each simulation run and then averaged. The discounted averaged cash flow using the risk-free interest rate represents a point estimator of the option value.

There are several ways to increase estimation accuracy; the simplest one is to increment the number of simulating paths. However, efficiency may also be improved by using variance reduction techniques, including the control-variate and antithetic-variate approaches (Cortazar 2000; Bolia and Juneja 2005). It will be interested in this thesis only in increasing the number of simulating paths.

The main characteristic that makes simulation so attractive is its ability to cope with uncertainty in a
very simple way. According to Cortazar (2000), the recent trend in modelling price uncertainty using multi-factor models is much easier to implement using standard simulation than using other numerical approaches.

5. Data and methodology

In order to adopt Monte Carlo simulation for option pricing Matlab software was used. The algorithms for simulation were based on the works of DeFusco et al. (2001), Everaert (2011), Zhang (2009), Goddard (2006a, 2006b). Options prices were found in 5 steps using Matlab software:

1) The characteristics of the option contract and underlying asset were specified. As the underlying asset the S&P 500 index was chosen.
2) The time grid was indicated. The horizon in terms of calendar time was taken and spited into a number of sub-periods. Calendar time divided by the number of sub-periods is the time increment, $\Delta t$.
3) Potential future asset paths were generated.
4) The payoff for each path for both European calls and puts were calculated.
5) In order to get the Option price discount back was made.

As the purpose was to compare prices acquainted with Monte Carlo simulation with the prices calculated using Black-Scholes model, the following formulas were used:

\begin{align*}
  c &= S e^{-q(T-t)} N(d_1) - X e^{-r(T-t)} N(d_2), \\
  p &= X e^{-r(T-t)} N(-d_2) - S e^{-q(T-t)} N(-d_1), \\
  d_1 &= \frac{\ln(S/X) + (r - q + \sigma^2/2)(T-t)}{\sigma \sqrt{T-t}}, \\
  d_2 &= d_1 - \sigma \sqrt{T-t},
\end{align*}

where:
- $c$ – premium of European call option;
- $p$ – premium of European put option;
- $S$ – stock price;
- $X$ – exercise price;
- $T-t$ – time to maturity;
- $r$ – risk free interest rate;
- $q$ – dividends;
- $\sigma$ – volatility of stock price;
- $N1$, $N2$ – the cumulative normal distribution function.

The research was based on the analysis of S&P 500 index, since it could be said that it is the most liquid one in the market. Historical data used in this research cover the period of the year of 2011. To calculate the volatility, the VIX index was taken, which is very useful to calculate S&P 500 index option prices. Moreover, US 3 month T-Bills were chosen as a risk free rate. Finally, the real historical S&P 500 index options prices were taken in order to compare simulated prices.

6. Empirical results

S&P 500 index asset paths for three period groups were generated: 1) weekly, 2) monthly and 3) 50 days. Every time 10000 runs in Monte Carlo simulation were taken in order to get asset paths. As it was mentioned all period groups were taken from the year of 2011.
little periods. One month 22 days on average, since weekends are excluded. Again, one of the monthly periods is shown graphically in Figure 2. All other asset paths for monthly periods have similar view.

![Simulated Asset Paths](image)

**Fig.3.** Asset path for a period of 50 days

*Source: Found by the authors*

The last group of 50 days periods consists of only six periods. Periods start at January 28, February 9, February 25, April 1, April 29 and May 11. Again every period asset path looks similar, so only one of these asset paths is also shown in the graph in Figure 3.

The prices of European Call and Put Options were calculated from equations no. 1 and 4 from this work. Prices were found for all period groups. The following tables show European call and put option prices generated from Monte Carlo simulation approach in very time period group.

Initially, it was started with the weekly period group. As it was mentioned before, weekends are excluded from every week, so there are only five days in a week. Since there are a lot of periods, there were created cycles for each 52 weeks in Matlab software in order to generate option prices.

**Table 1.** Simulated weekly European Call and Put prices

<table>
<thead>
<tr>
<th>Weekly</th>
<th>European Call</th>
<th>European Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>07-Jan-11</td>
<td>8.39</td>
<td>10.12</td>
</tr>
<tr>
<td>14-Jan-11</td>
<td>26.08</td>
<td>1.54</td>
</tr>
<tr>
<td>21-Jan-11</td>
<td>39.84</td>
<td>0.46</td>
</tr>
<tr>
<td>28-Jan-11</td>
<td>12.53</td>
<td>6.65</td>
</tr>
<tr>
<td>04-Feb-11</td>
<td>28.49</td>
<td>1.48</td>
</tr>
<tr>
<td>11-Feb-11</td>
<td>4.89</td>
<td>13.84</td>
</tr>
<tr>
<td>18-Feb-11</td>
<td>18.12</td>
<td>3.23</td>
</tr>
<tr>
<td>25-Feb-11</td>
<td>18.19</td>
<td>6.41</td>
</tr>
</tbody>
</table>

*Source: Found by the authors*

Table 2 gives results for the simulated monthly prices of European options. Again, only working days are important, so one month may consist of 22 days on average.

| 04-Mar-11 | 26.75 | 2.58 |
| 11-Mar-11 | 61.49 | 0.13 |
| 18-Mar-11 | 8.99  | 18.93|
| 25-Mar-11 | 30.64 | 1.56 |
| 01-Apr-11 | 13.63 | 6.53 |
| 08-Apr-11 | 15.16 | 4.82 |
| 15-Apr-11 | 35.67 | 0.52 |
| 22-Apr-11 | 1.05  | 27.82|
| 29-Apr-11 | 48.58 | 0.07 |
| 06-May-11 | 9.80  | 8.75 |
| 13-May-11 | 9.43  | 8.37 |
| 20-May-11 | 43.31 | 0.24 |
| 27-May-11 | 6.57  | 12.08|
| 03-Jun-11 | 40.42 | 0.42 |
| 10-Jun-11 | 30.71 | 1.44 |
| 17-Jun-11 | 7.99  | 15.72|
| 24-Jun-11 | 45.45 | 0.44 |
| 01-Jul-11 | 0.03  | 66.32|
| 08-Jul-11 | 87.34 | 0.00 |
| 15-Jul-11 | 1.42  | 33.44|
| 22-Jul-11 | 44.33 | 0.42 |
| 29-Jul-11 | 22.43 | 5.41 |
| 05-Aug-11 | 20.15 | 9.98 |
| 12-Aug-11 | 48.58 | 6.72 |
| 19-Aug-11 | 30.91 | 11.02|
| 26-Aug-11 | 15.05 | 26.29|
| 02-Sep-11 | 46.13 | 3.90 |
| 09-Sep-11 | 10.97 | 30.88|
| 16-Sep-11 | 22.50 | 15.40|
| 23-Sep-11 | 28.90 | 12.66|
| 30-Sep-11 | 30.24 | 15.25|
| 07-Oct-11 | 50.11 | 6.27 |
| 14-Oct-11 | 22.67 | 11.92|
| 21-Oct-11 | 15.88 | 19.62|
| 28-Oct-11 | 25.09 | 8.10 |
| 04-Nov-11 | 35.98 | 6.05 |
| 11-Nov-11 | 8.17  | 29.35|
| 18-Nov-11 | 30.69 | 8.98 |
| 25-Nov-11 | 36.08 | 6.91 |
| 02-Dec-11 | 13.34 | 18.22|
| 09-Dec-11 | 4.33  | 36.59|
| 16-Dec-11 | 84.32 | 0.10 |
| 23-Dec-11 | 10.47 | 13.60|
| 30-Dec-11 | 36.43 | 2.02 |

*Source: Found by the authors*
Table 2. Simulated monthly Asian and European Call and Put prices

<table>
<thead>
<tr>
<th>Monthly</th>
<th>European Call</th>
<th>European Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-11</td>
<td>7.90</td>
<td>43.99</td>
</tr>
<tr>
<td>Feb-11</td>
<td>11.66</td>
<td>38.21</td>
</tr>
<tr>
<td>Mar-11</td>
<td>19.97</td>
<td>32.36</td>
</tr>
<tr>
<td>Apr-11</td>
<td>13.91</td>
<td>28.87</td>
</tr>
<tr>
<td>May-11</td>
<td>43.41</td>
<td>8.30</td>
</tr>
<tr>
<td>Jun-11</td>
<td>6.64</td>
<td>57.26</td>
</tr>
<tr>
<td>Jul-11</td>
<td>138.67</td>
<td>0.30</td>
</tr>
<tr>
<td>Aug-11</td>
<td>55.11</td>
<td>29.61</td>
</tr>
<tr>
<td>Sep-11</td>
<td>52.64</td>
<td>32.55</td>
</tr>
<tr>
<td>Oct-11</td>
<td>8.44</td>
<td>95.73</td>
</tr>
<tr>
<td>Nov-11</td>
<td>38.86</td>
<td>36.13</td>
</tr>
<tr>
<td>Dec-11</td>
<td>31.35</td>
<td>26.72</td>
</tr>
</tbody>
</table>

*Source: Found by the authors*

The last table (Table 3) for European Options shows the simulated prices for periods of 50 days. There are only six periods.

Table 3. Simulated 50 days Asian and European Call and Put prices

<table>
<thead>
<tr>
<th>Period starting at</th>
<th>Asian Call</th>
<th>Asian Put</th>
<th>European Call</th>
<th>European Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>28-Jan-11</td>
<td>13.11</td>
<td>29.9</td>
<td>32.08</td>
<td>46.2</td>
</tr>
<tr>
<td>09-Feb-11</td>
<td>19.93</td>
<td>16.96</td>
<td>39.93</td>
<td>32.27</td>
</tr>
<tr>
<td>25-Feb-11</td>
<td>11.37</td>
<td>29.2</td>
<td>28.89</td>
<td>43.8</td>
</tr>
<tr>
<td>01-Apr-11</td>
<td>40.35</td>
<td>4.28</td>
<td>59.04</td>
<td>14.91</td>
</tr>
<tr>
<td>29-Apr-11</td>
<td>22.04</td>
<td>15.28</td>
<td>40.85</td>
<td>29.81</td>
</tr>
<tr>
<td>11-May-11</td>
<td>24.31</td>
<td>13.41</td>
<td>43.41</td>
<td>28.02</td>
</tr>
</tbody>
</table>

*Source: Found by the authors*

Real historical option prices of S&P 500 index were taken in order to compare with European option prices simulated in Monte Carlo simulation. The historical prices were taken only for the year of 2011, because a longer time span would imply a tremendous amount of data. Moreover, data for 2011 is available only for the first 5 months, that is from the beginning of January, 2011 till the end of May, 2011. The data with observed prices contains S&P 500 index Call and Put options, with varying times to maturity and strike prices. Since the data consists of highest close bid and the lowest close ask, the average of both was used as an approximation of the price. The real observed data is grouped in the same time period groups as the simulated option prices.

Table 4 and the graph in the Figure 4 present weekly simulated and observed option prices. The real historical option prices were available only until the end of May, 2011, so the comparison is made only for the part of 2011. Moreover, some observed prices were missing during some weeks for the whole period.

Table 4. Simulated and Observed Option prices (weekly)

<table>
<thead>
<tr>
<th>Weekly</th>
<th>Simulated</th>
<th>Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Call</td>
<td>Put</td>
</tr>
<tr>
<td>07-Jan-11</td>
<td>8.39</td>
<td>10.12</td>
</tr>
<tr>
<td>14-Jan-11</td>
<td>26.08</td>
<td>1.54</td>
</tr>
<tr>
<td>21-Jan-11</td>
<td>39.84</td>
<td>0.46</td>
</tr>
<tr>
<td>28-Jan-11</td>
<td>12.53</td>
<td>6.65</td>
</tr>
<tr>
<td>04-Feb-11</td>
<td>28.49</td>
<td>1.48</td>
</tr>
<tr>
<td>11-Feb-11</td>
<td>4.89</td>
<td>13.84</td>
</tr>
<tr>
<td>18-Feb-11</td>
<td>18.12</td>
<td>3.23</td>
</tr>
<tr>
<td>25-Feb-11</td>
<td>18.19</td>
<td>6.41</td>
</tr>
<tr>
<td>04-Mar-11</td>
<td>26.75</td>
<td>2.58</td>
</tr>
<tr>
<td>11-Mar-11</td>
<td>61.49</td>
<td>0.13</td>
</tr>
<tr>
<td>18-Mar-11</td>
<td>8.99</td>
<td>18.93</td>
</tr>
<tr>
<td>25-Mar-11</td>
<td>30.64</td>
<td>1.56</td>
</tr>
<tr>
<td>01-Apr-11</td>
<td>13.63</td>
<td>6.53</td>
</tr>
<tr>
<td>08-Apr-11</td>
<td>15.16</td>
<td>4.82</td>
</tr>
<tr>
<td>15-Apr-11</td>
<td>35.67</td>
<td>0.52</td>
</tr>
<tr>
<td>22-Apr-11</td>
<td>1.05</td>
<td>27.82</td>
</tr>
<tr>
<td>29-Apr-11</td>
<td>48.58</td>
<td>0.07</td>
</tr>
<tr>
<td>06-May-11</td>
<td>9.80</td>
<td>8.75</td>
</tr>
<tr>
<td>13-May-11</td>
<td>9.43</td>
<td>8.37</td>
</tr>
<tr>
<td>20-May-11</td>
<td>43.31</td>
<td>0.24</td>
</tr>
</tbody>
</table>

*Source: Found by the authors*

From the table and the graph it can be found that simulated call prices in most of the cases vary only in tenth and only some do not match at all. For example, there is a huge difference on March 11, when simulated call price is really high. However, this cannot be counted as deviation, since real observed data is not available on that date. The same happens in other dates, where observed data is not available, and it was considered as zero in the graph.

Talking about Put prices, it was found that simulated Put prices are higher than the observed ones during these periods: February 11 and April 22. Again, it happened because observed data is missing on those
dates. Generally, it can be concluded that Monte Carlo simulation works pretty well when simulating option prices in weekly periods.

Table 5 and the graph in the Figure 5 give the results of monthly simulated and real historical option prices. Again, the observed option prices were available only until the end of May, 2011.

![Simulated and Observed Option Prices (Weekly)](image)

**Fig. 4.** Simulated and Observed Option prices (weekly)

*Source: Found by the authors*

From the table and the graph it is possible to see that simulated and observed prices match almost perfectly, only decimal parts differ in most of the cases. To sum up, Monte Carlo simulation helps very well to predict Call and Put option prices in monthly periods.

When comparing simulated and real observed prices during the different periods of 50 days, very similar results like during monthly periods can be seen. Simulated and historical prices match almost very well. Most of the prices vary only in tenth except few. Moreover, simulated prices are higher than the real observed prices at the end of the graph. In summary, Monte Carlo simulation is quite accurate when predicting option prices for the longer periods.
Table 5. Simulated and Observed Option prices (monthly)

<table>
<thead>
<tr>
<th>Monthly</th>
<th>Simulated</th>
<th>Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Call</td>
<td>Put</td>
</tr>
<tr>
<td>Jan-11</td>
<td>7.90</td>
<td>43.99</td>
</tr>
<tr>
<td>Feb-11</td>
<td>11.66</td>
<td>38.21</td>
</tr>
<tr>
<td>Mar-11</td>
<td>19.97</td>
<td>32.36</td>
</tr>
<tr>
<td>Apr-11</td>
<td>13.91</td>
<td>28.87</td>
</tr>
<tr>
<td>May-11</td>
<td>43.41</td>
<td>8.30</td>
</tr>
</tbody>
</table>

Source: Found by the authors

All in all, when comparing simulated option prices with real historical prices, the results were quite similar for the given period of time. They show that Monte Carlo simulation helps to predict options prices very well for either very short time periods or very long time periods too.

Using Black – Scholes equation the prices were calculated using real observed data of S&P 500 index from the year of 2011. The following tables and graphs give a comparison between simulated European option prices and calculated with Black – Scholes formula. The results from Black - Scholes are grouped in the same time period groups as the simulated option prices. Therefore, simulated prices and prices from analytical Black- Scholes formula should be compared in weekly and monthly time periods, as well as in 50 day time periods.
Fig. 6. Weekly simulated and Black–Scholes option prices

Source: Found by the authors

Table 6. Weekly simulated and Black–Scholes option prices

<table>
<thead>
<tr>
<th>Weekly</th>
<th>Call</th>
<th>Put</th>
<th>Call</th>
<th>Put</th>
<th>Weekly</th>
<th>Call</th>
<th>Put</th>
<th>Call</th>
<th>Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>07-Jan-11</td>
<td>8.39</td>
<td>10.12</td>
<td>5.06</td>
<td>18.22</td>
<td>08-Jul-11</td>
<td>87.34</td>
<td>0.00</td>
<td>73.07</td>
<td>0.01</td>
</tr>
<tr>
<td>14-Jan-11</td>
<td>26.08</td>
<td>1.54</td>
<td>17.85</td>
<td>4.65</td>
<td>15-Jul-11</td>
<td>1.42</td>
<td>33.44</td>
<td>0.78</td>
<td>46.32</td>
</tr>
<tr>
<td>21-Jan-11</td>
<td>39.84</td>
<td>0.46</td>
<td>29.93</td>
<td>1.85</td>
<td>22-Jul-11</td>
<td>44.33</td>
<td>0.42</td>
<td>32.56</td>
<td>2.05</td>
</tr>
<tr>
<td>04-Feb-11</td>
<td>28.49</td>
<td>1.48</td>
<td>19.95</td>
<td>4.41</td>
<td>05-Aug-11</td>
<td>20.15</td>
<td>9.98</td>
<td>14.66</td>
<td>17.65</td>
</tr>
<tr>
<td>11-Feb-11</td>
<td>4.89</td>
<td>13.84</td>
<td>2.58</td>
<td>22.99</td>
<td>12-Aug-11</td>
<td>48.58</td>
<td>6.72</td>
<td>40.31</td>
<td>12.47</td>
</tr>
<tr>
<td>18-Feb-11</td>
<td>18.12</td>
<td>3.23</td>
<td>11.34</td>
<td>8.28</td>
<td>19-Aug-11</td>
<td>30.91</td>
<td>11.02</td>
<td>24.93</td>
<td>18.39</td>
</tr>
<tr>
<td>25-Feb-11</td>
<td>18.19</td>
<td>6.41</td>
<td>12.40</td>
<td>12.78</td>
<td>26-Aug-11</td>
<td>15.05</td>
<td>26.29</td>
<td>12.38</td>
<td>37.01</td>
</tr>
<tr>
<td>04-Mar-11</td>
<td>26.75</td>
<td>2.58</td>
<td>18.63</td>
<td>6.73</td>
<td>02-Sep-11</td>
<td>46.13</td>
<td>3.90</td>
<td>36.72</td>
<td>8.59</td>
</tr>
<tr>
<td>11-Mar-11</td>
<td>61.49</td>
<td>0.13</td>
<td>49.26</td>
<td>0.75</td>
<td>09-Sep-11</td>
<td>10.97</td>
<td>30.88</td>
<td>8.89</td>
<td>42.14</td>
</tr>
<tr>
<td>18-Mar-11</td>
<td>8.99</td>
<td>18.93</td>
<td>6.43</td>
<td>28.01</td>
<td>16-Sep-11</td>
<td>22.50</td>
<td>15.40</td>
<td>17.82</td>
<td>23.64</td>
</tr>
<tr>
<td>01-Apr-11</td>
<td>13.63</td>
<td>6.53</td>
<td>8.51</td>
<td>13.37</td>
<td>30-Sep-11</td>
<td>30.24</td>
<td>15.25</td>
<td>25.03</td>
<td>23.34</td>
</tr>
<tr>
<td>08-Apr-11</td>
<td>15.16</td>
<td>4.82</td>
<td>8.94</td>
<td>11.73</td>
<td>07-Oct-11</td>
<td>50.11</td>
<td>6.27</td>
<td>41.28</td>
<td>12.00</td>
</tr>
<tr>
<td>15-Apr-11</td>
<td>35.67</td>
<td>0.52</td>
<td>24.39</td>
<td>2.47</td>
<td>14-Oct-11</td>
<td>22.67</td>
<td>11.92</td>
<td>16.70</td>
<td>20.43</td>
</tr>
<tr>
<td>22-Apr-11</td>
<td>1.05</td>
<td>27.82</td>
<td>0.46</td>
<td>39.95</td>
<td>21-Oct-11</td>
<td>15.88</td>
<td>19.62</td>
<td>12.74</td>
<td>29.46</td>
</tr>
<tr>
<td>29-Apr-11</td>
<td>48.58</td>
<td>0.07</td>
<td>35.72</td>
<td>0.63</td>
<td>28-Oct-11</td>
<td>25.09</td>
<td>8.10</td>
<td>18.51</td>
<td>15.13</td>
</tr>
<tr>
<td>06-May-11</td>
<td>9.80</td>
<td>8.75</td>
<td>5.30</td>
<td>17.72</td>
<td>04-Nov-11</td>
<td>35.98</td>
<td>6.05</td>
<td>27.74</td>
<td>12.00</td>
</tr>
<tr>
<td>20-May-11</td>
<td>43.31</td>
<td>0.24</td>
<td>30.96</td>
<td>1.56</td>
<td>18-Nov-11</td>
<td>30.69</td>
<td>8.98</td>
<td>23.59</td>
<td>16.23</td>
</tr>
<tr>
<td>03-Jun-11</td>
<td>40.42</td>
<td>0.42</td>
<td>28.94</td>
<td>2.11</td>
<td>02-Dec-11</td>
<td>13.34</td>
<td>18.22</td>
<td>9.52</td>
<td>27.99</td>
</tr>
<tr>
<td>10-Jun-11</td>
<td>30.71</td>
<td>1.44</td>
<td>20.89</td>
<td>4.75</td>
<td>09-Dec-11</td>
<td>4.33</td>
<td>36.59</td>
<td>3.11</td>
<td>49.11</td>
</tr>
<tr>
<td>17-Jun-11</td>
<td>7.99</td>
<td>15.72</td>
<td>4.74</td>
<td>26.06</td>
<td>16-Dec-11</td>
<td>84.32</td>
<td>0.10</td>
<td>69.79</td>
<td>0.56</td>
</tr>
<tr>
<td>24-Jun-11</td>
<td>45.45</td>
<td>0.44</td>
<td>32.85</td>
<td>2.09</td>
<td>23-Dec-11</td>
<td>10.47</td>
<td>13.60</td>
<td>6.67</td>
<td>23.24</td>
</tr>
<tr>
<td>01-Jul-11</td>
<td>0.03</td>
<td>66.32</td>
<td>0.01</td>
<td>79.04</td>
<td>30-Dec-11</td>
<td>36.43</td>
<td>2.02</td>
<td>26.47</td>
<td>5.64</td>
</tr>
</tbody>
</table>

Source: Found by the authors
Figure 6 and Table 6 show weekly simulated and Black – Scholes option prices. The results present that simulated Call option prices are a little bit higher than Call prices from analytical Black – Scholes formula whereas simulated Put option prices are a little bit lower. Generally, both simulated prices and prices calculated from analytical formula do not vary a lot as a result famous Black – Scholes formula can be replaced by Monte Carlo simulation when calculating option prices.

Table 7. Monthly simulated and Black – Scholes option prices

<table>
<thead>
<tr>
<th>Monthly</th>
<th>Simulated Call</th>
<th>Simulated Put</th>
<th>Black – Scholes Call</th>
<th>Black – Scholes Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan-11</td>
<td>7.90</td>
<td>43.99</td>
<td>11.93</td>
<td>35.74</td>
</tr>
<tr>
<td>Feb-11</td>
<td>11.66</td>
<td>38.21</td>
<td>15.72</td>
<td>32.27</td>
</tr>
<tr>
<td>Mar-11</td>
<td>19.97</td>
<td>32.36</td>
<td>24.49</td>
<td>28.78</td>
</tr>
<tr>
<td>Apr-11</td>
<td>13.91</td>
<td>28.87</td>
<td>16.44</td>
<td>26.67</td>
</tr>
<tr>
<td>May-11</td>
<td>43.41</td>
<td>8.30</td>
<td>46.26</td>
<td>8.05</td>
</tr>
<tr>
<td>Jun-11</td>
<td>6.64</td>
<td>57.26</td>
<td>7.21</td>
<td>56.17</td>
</tr>
<tr>
<td>Jul-11</td>
<td>138.67</td>
<td>0.30</td>
<td>142.45</td>
<td>0.31</td>
</tr>
<tr>
<td>Aug-11</td>
<td>55.11</td>
<td>29.61</td>
<td>57.14</td>
<td>30.38</td>
</tr>
<tr>
<td>Sep-11</td>
<td>52.64</td>
<td>32.55</td>
<td>54.36</td>
<td>32.27</td>
</tr>
<tr>
<td>Oct-11</td>
<td>8.44</td>
<td>95.73</td>
<td>8.89</td>
<td>95.77</td>
</tr>
<tr>
<td>Nov-11</td>
<td>38.86</td>
<td>36.13</td>
<td>40.40</td>
<td>36.65</td>
</tr>
<tr>
<td>Dec-11</td>
<td>31.35</td>
<td>26.72</td>
<td>31.94</td>
<td>27.60</td>
</tr>
</tbody>
</table>

Source: Found by the authors

Table 7 and Figure 7 present monthly simulated and Black – Scholes option prices. As it can be seen from the graph both simulated prices and prices calculated from analytical formula match together almost perfectly, only in the beginning of the year there are small deviations. Commonly, Monte Carlo simulation gives quite accurate results for option price prediction during the monthly periods.
Table 8. 50 days simulated and Black – Scholes option prices

<table>
<thead>
<tr>
<th>Period starting at</th>
<th>Simulated Call</th>
<th>Simulated Put</th>
<th>Black – Scholes Call</th>
<th>Black – Scholes Put</th>
</tr>
</thead>
<tbody>
<tr>
<td>28-Jan-11</td>
<td>32.08</td>
<td>46.2</td>
<td>40.89</td>
<td>37.04</td>
</tr>
<tr>
<td>9-Feb-11</td>
<td>39.93</td>
<td>32.27</td>
<td>50.69</td>
<td>25.33</td>
</tr>
<tr>
<td>25-Feb-11</td>
<td>28.89</td>
<td>43.8</td>
<td>35.55</td>
<td>36.4</td>
</tr>
<tr>
<td>1-Apr-11</td>
<td>59.04</td>
<td>14.91</td>
<td>64.86</td>
<td>12.83</td>
</tr>
<tr>
<td>29-Apr-11</td>
<td>40.85</td>
<td>29.81</td>
<td>44.87</td>
<td>27.6</td>
</tr>
<tr>
<td>11-May-11</td>
<td>43.41</td>
<td>28.02</td>
<td>47.72</td>
<td>25.88</td>
</tr>
</tbody>
</table>

Source: Found by the authors

Finally, simulated and Black – Scholes option prices for the period of 50 days are given in Table 8 and Figure 8. Simulated Call prices and simulated Put prices move together with prices from analytical formula respectively. However, the graph shows that Black – Scholes Call option prices are higher than simulated ones, while Black – Scholes Put option prices are lower than simulated prices. This might tell that for longer periods Black – Scholes formula lead to some errors when the amount of data increases and Monte Carlo simulation becomes better method to calculate option prices. This also was discussed in literature in the papers of Jia (2009), Charnes (2000), Tian et al. (2008), Boyle (1977) and others.

Fig.8. 50 days simulated and Black – Scholes option prices
Source: Found by the authors

To sum up, Monte Carlo simulation gives almost very good results when comparing with the results from analytical Black – Scholes formula. Both Call and Put option prices match very well especially in monthly periods. However, sometimes Monte Carlo simulation is even more accurate than the analytical model, especially in longer periods, like in this case of 50 days.

Conclusions

After the research of option pricing the following conclusions can be made:

The main distinguishing feature of the option contract is that his holder has possibility to choose if to use this contract. The writer of the option is in the opposite position; he has the obligation to fulfil the choice of the holder.

The main factors in option pricing are market price of the underlying asset, strike price, volatility of the asset, time to maturity of the contract, interest rates and dividends.

Option pricing is very essential area of research in financial community. Primary methods to calculate option prices remain binomial models and finite difference methods. So in most of the cases options can be valued analytically or using numerical combination. For example, the most known Black – Scholes model provides obvious closed form solutions for the values of certain call and put options.

In situations when numerical and analytical models
become unavailable, simulation methods always give better results because they have proved to be valuable and flexible computational tools to calculate the value of options with multiple sources of uncertainty or with complicated features. The main characteristic that makes simulation so attractive is its ability to cope with uncertainty in a very simple way.

Monte Carlo simulation is one of the most popular numerical method for pricing financial options and other derivative securities because of the availability of powerful workstations and recent advances in applying the tool. Monte Carlo simulation proved to be very attractive technique, as it is flexible, easy to implement and modify.

The comparison between simulated European option prices and real observed option prices showed that simulated and historical prices in most of the cases matched almost perfectly and varied only in tenth. Generally, it can be concluded that Monte Carlo simulation helps pretty well when predicting option prices for either very short time periods or for longer time periods like 50 days.

The results presented that simulated Call option prices are a little bit higher than Call prices from analytical Black–Scholes formula whereas simulated Put option prices are a little bit lower in weekly periods. When discussing the outcomes during the monthly periods, there were found that simulated and Black–Scholes option prices match almost perfectly, only in the beginning of the graph there were small deviations. Commonly, Monte Carlo simulation gives quite accurate results for option price prediction during the short and medium periods.

During longer periods like 50 day periods, the results show that Black–Scholes Call option prices are higher than simulated ones, while Black–Scholes Put option prices are lower than simulated prices. This might tell that for longer periods Black–Scholes formula lead to some errors when the amount of data increases and Monte Carlo simulation becomes better method to calculate option prices.

Both simulated prices and prices calculated from analytical formula do not vary a lot and as a result famous Black–Scholes formula can be replaced by Monte Carlo simulation when calculating option prices. Monte Carlo simulation is sometimes even more accurate than the analytical model, especially in longer periods.

References


Dear readers,

I am delighted to introduce a new issue (2013, Volume 2, Number 4) of the Journal of Security and Sustainability Issues. This publication is a testament to the ongoing efforts of Vilnius Gediminas Technical University (VGTU) and The General Jonas Žemaitis Military Academy of Lithuania, which serve as joint partners in the journal’s publication.

The journal’s mission is to embrace problems related to security and sustainability issues through a wide range of contemporary research topics. It aims to provide efficient solutions and policy recommendations for sustainable and secure economic growth. VGTU, as a partner university, publishes 19 peer-reviewed journals, 8 of which are indexed by Web of Science, which highlights its significant role in the scientific community.

The academic community, political and governmental institutions, business practitioners, and international organizations are the target audience for the journal. Insights from its discussions can provide input to the European Commission and are aimed at researchers and specialists. The university has adopted a long-term strategy towards scientific activities, which is reflected in its peer-reviewed research journals.

The General Jonas Žemaitis Military Academy of Lithuania, as a partner to VGTU, is deeply engaged in the elaboration of their paper will not be published.

Contributions to the Journal of Security and Sustainability Issues must report original research and will be subject to peer-review.

Instructions for Authors

Complete guidelines for preparing and submitting your manuscript to this journal are provided below. The instructions are directed specifically at the authors who wish to submit a manuscript to the Journal of Security and Sustainability Issues.

The Journal of Security and Sustainability Issues considers all manuscripts on the strict condition that they have been submitted only to it; that they neither have been published in another journal. Authors who fail to adhere to this condition will be charged with all costs which the Journal of Security and Sustainability Issues incurs and their paper will not be published.

Contributions to the Journal of Security and Sustainability Issues must report original research and will be subject to peer-review.

General Information

All papers are to be written in English. The Journal of Security and Sustainability Issues is an internationally refereed journal designed to further the frontiers of knowledge in security and sustainability. Each article is reviewed by at least two experts, appointed by the Editorial Board, who will examine the manuscript through a double-blind refereeing process in terms of its relevance, academic rigor, and high-level applications. An electronic copy prepared in MS Word and printed in Times New Roman typeface should be submitted to the Editorial Board following the requirements presented below.

Structure of the Article

An article should include the following parts: title, authors’ names, name and address of their workplace, summary, keywords, introduction (the object and goal of the research, the methods applied, the review of literature and its analysis, etc.), the main text, conclusions or recommendations, references, short biographical note about the contributors at the end of the article (name, surname, academic title, and scientific degree, duties, research interests).

Format of the Article

The text of the article should be printed with single intervals on 210x297 mm format pages with the print area of 150x255 mm each. The length of the article should not be less than 8 pages and cannot exceed 25 pages.

The title of the article should be printed in 11 pt bold type and should be centered. There should be a single line space between the title and the author’s name.

The name and surname of the authors should be printed in small letters of 11 pt bold type, and should be centered. Below the author’s surname, the name of the institution (represented by the author or co-authors) must be printed in 10 pt italic; its address and the author’s email written and centered.

Abstract and Keywords should be printed single spaced, in 9 pt typeface, in one column and after the institution address and space of three lines below the institution address should be left. Words Abstract and Keywords must be printed in bold. The size of the abstract cannot be less than 600 typographic signs. There should be a space of one line between the abstract and keywords. 6-10 keywords should be provided and selected according to Thesaurus, e.g., http://www.esds.ac.uk/search/hassetSearch.asp.

Introduction, main text, and conclusions should be printed in 11 pt type single interval in one column at the distance of 1 line from keywords.

Figures or tables should be mentioned in the text and the place should be indicated in the separate line. The numbers of figures and tables and inscriptions below are written in 9 pt regular typeface. Figures and tables are separated from the text by one-line space.

The titles of chapters and sub-chapters are printed in small letters, 11 pt bold-regular type and aligned left. The introduction, titles of chapters, and conclusions are numbered. The titles of chapters and sub-chapters should be separated from the text by one-line space.

The name of the author of the source, the year of publication, and pages should be presented in the text in brackets. The list of references is given after the conclusions. The word References is spelled in small letters, 11 pt bold-regular type, left ranged and the list of references in 9 pt. The references are to be presented in the alphabetical order, in the original language; translation into English is given in square brackets. References according to the Harvard citation style, e.g., http://libguides.library.uwa.edu.au/harvard.
**Contents**  
2013 2(4) June

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manuela Tvaronavičienė, Virginija Grybaitė, Živilė Tunčikienė</td>
<td>Globalization drivers in developed and less developed countries: if consistent patterns can be traced</td>
<td>5</td>
</tr>
<tr>
<td>Gitana Dudzevičiūtė</td>
<td>The research of the economic structural changes: energy consumption aspect</td>
<td>13</td>
</tr>
<tr>
<td>Agnė Šimelytė, Jūratė Gintarė Antanavičienė</td>
<td>Foreign direct investment policy as an instrument for sustainable economic growth: a case of Ireland</td>
<td>25</td>
</tr>
<tr>
<td>Vereskun Mikhail</td>
<td>Large corporate enterprises’ intangible assets managing as a way to secure a sustainable development of competitive advantages</td>
<td>47</td>
</tr>
<tr>
<td>Ravi Prakash</td>
<td>Looking beyond the GDP: quantitative evaluation of the “Holistic Progress Index” (HPI)</td>
<td>57</td>
</tr>
<tr>
<td>Raimonda Martinkutė-Kaulienė, Jelena Stankevičienė, Santautė Žinytė</td>
<td>Option pricing using Monte Carlo simulation</td>
<td>65</td>
</tr>
</tbody>
</table>