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Evaluation of conflict hazard and financial risk in the E7 economies' capital markets*

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Abstract

The purpose of this research is to examine the interaction between financial stress and conflict risk having impacts on financial instruments in capital markets within an interdisciplinary frame. The Fuzzy TOPSIS method is applied in order to analyse effects of conflict hazard on capital markets and financial instruments in the E7 economies and to demonstrate the best possible ranks of the E7 economies based on performance evaluation criteria. In order to obtain the dynamics of data as to develop a sufficient reference bases for expert opinions, conflict hazard index and financial stress index have been structured. The empirical results confirm that there is strong relation between financial stress index and conflict hazard index for the E7 economies. The fundamental conclusion demonstrates the effects of the financial and conflict risks for the stock selection in the E7 economies by the criteria derived from the Financial Stress Index and Conflict Risk Index.

Key words: *financial risk, conflict, financial stress, Fuzzy, TOPSIS*

JEL classification: *C6, D7, D8, G1*

1. Introduction

The financial risks and volatility in capital markets during the sovereign crisis in the Euro zone were intensified significantly similar to the financial situation in the last quarter of 2008. Financial risks had also transmitted into a global recession resulting in sharp slowdowns in financial and economic activities for emerging

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economies. The progress of economic recovery has been also stalling its effects on the E7 economies. On the one hand, financial stress and boundaries in capital markets transmitted to emerging economies from advanced economies. On the other hand, the conflict situation in Syria has been a challenging issue for the region and the E7 economies, having negative impacts on international trade. In the literature, the simultaneous effect of financial risks and conflict risks on capital markets has not been sufficiently examined yet. Within the framework of effective portfolio selection and investment decisions in capital markets, the research presented in this study focuses on the notion that conflict risk as one of the non-financial risk factors affects the stock performance of companies operating in emerging economies covering the E7 countries. In this study, the Fuzzy TOPSIS method was conducted to illustrate the possible rank of the E7 economies based on capital market performance evaluation in the light of simultaneity of the *Financial Stress and the Conflict Risk*.

The Hypothesis is that there is a strong relationship between financial stress and the conflict risk which affects the investment climate and financial stability, tested in the case of the E7 economies, which has negative impacts on the stock market performance.

The study begins with a literature review of conflict risk and financial stress in advanced economies (AEFSI), in emerging markets (EMFSI). At the second section, the Fuzzy TOPSIS method has been conducted. Finally, the result of this study will be discussed and recommendations will be provided for portfolio managers, investors and scholars.

2. Literature review

In the literature of political economy, the latest studies advocate that the progress of economic recovery has been stalling its effects on global economic activity while financial stress in advanced and emerging economies has been spilling over to financial system and banking activities. By the increase in overall macroeconomic risks globally, the weaker growth rates and higher risks attached to sovereigns and funding markets have contributed to concerns about financial stability and fiscal discipline in advanced economies (Conyon et al., 2011; Naes et al., 2011; Rjoub, 2011). According to official reports, *credit default swap* spreads breaking new records high and disconcerts investors about future possible chain reaction of bank failures in advanced economies whilst the possibility of sovereign defaults are still major concerns among investors (IMF, 2012).

The pressure on the low performance banks in European banking system has sparked a broader drive to shrink the balance sheet size by € 2.6 trillion through the

end-2013, which is almost equal to 7 percent of total assets. IMF staff estimation is that reduction in lending, sales of securities and noncore assets will be the major steps of this deleveraging process (IMF, 2012). The latest policy steps by authorities in advanced economies seem to have negative effects on the firm performance and on the rate of bank profits affecting equity price.

The latest economic outlook has been also contributing to the concerns for portfolio investments. However, portfolio managers easily adopt quantitative methods and approaches for stock pricing and selection. For instance, the Capital Asset Pricing Model (CAPM) developed by Sharpe (1964) and Lintner (1965) is still a strong tool for portfolio managers to investigate expected returns on selected instruments. Portfolio managers employing the CAPM assume that expected return on any security only depends on the sensitivity of its return to the market return (Muradoğlu et al., 2003).

In addition to the negative impact of the latest economic outlook on portfolio investments, financial risk factors affecting the sensitivity have been significantly considered for examination. Notwithstanding this, non-financial risk factors such as conflict risk have not been examined yet in the literature.

The major studies in the field of political economics and finance underlines the necessity of analyzing the conflict risk. There is a consensus on the negative effects of conflict risk on investment climate, financial performance and stock market volatility (Morales et al., 2009; Sun et al.; Andrade, 2009; Le and Zak, 2006). Conflict risk directly affects the investment climate, economic stability, physical infrastructure and work force.

In the literature, major studies on the nature of conflict demonstrate the financial and economic dimensions as majority of studies pointing out ethnic and politic dimensions. Mayer (2000), Boulding (1963), Dougherty & Pfaltzgraff (1990) develops a conceptual frame of conflict and combines ethnic, religious, cultural and economic dimensions within conflict definitions.

Hacıoğlu et al. (2012a) argue that there are two opposing camps on conflict studies in the literature for the methodology of conflict analysis. The first camp argues that conflict risk can be analysed by econometric models (Collier, 1999; Collier, 2003; Collier and Hoeffler, 2004a; Collier and Hoeffler, 2004b; Collier et al., 2007; Collier et al., 2006; Starr, 2004; Bray, 2005; Justino, 2004; Addison and Murshed, 2000). The opposing camp believes that statistics are prone to manipulations and misuse. Therefore, econometric models only provide scholars with unreliable result (Sambanis 2001; Elbadawi and Sambanis 2002; Lujala et al., 2005; Hegre and Sambanis 2006; Korf, 2006; Suhrke et al., 2005; Wimmer et al., 2009).

The conflict in transition economies at micro level creates disputes among individuals in work groups. Changing conditions at workplace affect Individual

aspirations, desires and motives. According to Hacıoğlu et al., conflict situation for international business has negative impacts affecting firm performance: (i) ambiguity at management ranks, (ii) increasing level of risks in business operations, (iii) communication problems among business units and intra-group activities, (iv) transfer of skilled workers for combating (v) deteriorating infrastructure and facilities are some effects of conflict situations (Hacioglu et al, 2012(b)).

A theoretical model should be also developed to evaluate the possible conflict risk for international business operations and portfolio investments. The major studies only consider the effects of political risk (Andrade, 2009; Le and Zak, 2006; Kyaw et al., 2011; Busse and Hefeker, 2007; Saleem and Vaihekoski, 2008). Although, the conflict risk model is not available for portfolio diversification. Moreover, it is not integrated with international capital asset pricing model. On the one hand, the risk of conflict for economic instability is not the single factor as financial stability becomes a major concern for economic development. On the other hand, the financial stress as financial risk indicator is another source for economic instability.

The subprime mortgage crisis in the USA spread into the financial turmoil in 2008, following the bankruptcies in banking system of several advanced economies and became the major issue for global economic activity (White, 2008; Ackermann, 2008).

The stress in financial system in advanced and emerging economies has been addressed as an important risk indicator (Illing and Liu, 2006; Hakkio and Keeton, 2009). Cardelli, Elekdağ and Lall (2009) proposed the financial stress index to evaluate (i) the current level of financial stress in advanced and emerging economies, (ii) the long-term implications for capital flows to emerging economies, (iii) the strength of transmission of financial stress from advanced economies and emerging economies. Balakrishnan et al. (2009) define financial stress as a period when the financial system is under strain and its ability to intermediate is impaired. Financial stress tends to be associated with at least four fundamental characteristics: large shifts in asset prices, an abrupt increase in risk and uncertainty, liquidity droughts, and concerns about the health of the banking system (Balakrishnan et al., 2009).

As it is obvious from the previous analysis, major studies dealing with the nature of conflict risk and financial risk do not sufficiently deal with the interaction and do not sufficiently focus on the economic and politic roots of financial turmoil based on an empirical model. One of the important reasons relies on the fact that a hybrid model has not been developed yet, which significantly demonstrates the interaction between conflict risk and financial stress.

3. Methodology

The subprime mortgage crisis rooted in the USA transmitted into a global economic recession in 2008 and caused dramatic slowdowns on the world economy. The overall risks and volatility related to the capital markets were also intensified significantly resulting in sharp slowdowns in financial and economic activities. The progress of economic recovery has been stalling its effects on emerging economies covering the E7 countries. The E7 economics consist of seven countries: China, India, Brazil, Mexico, Russia, Indonesia and Turkey.

The financial stress in advanced and emerging economies has spilled over to financial system and banking activities in the E7 economies. The major effect of this transmission has a reflection on international capital flows and trade transactions causing liquidity shortages. Banks and heavy industries in the E7 economies, in parallel to the volatility in capital markets of the E7 countries, have been simultaneously exposed to the financial ambiguity during the Sovereign Crisis in Europe in the mid of 2010. As a result, the global recession has the deepest impacts on financial development and growth in emerging economies.

The studies in the literature illustrate that there is a relationship between financial stability and the growth of economies. On the one hand, advanced economies have their reputations on deeper capital markets. On the other hand, emerging economies need to capture international capital inflows to fuel the economic activity. According to Torre and Schmukler (2007), the financial development in emerging countries also has its effect on the level of efficiency in industrial sectors. Then, it allows economies to prosper faster. They also address other important critiques on financial development theory while the another school argues that finance responds almost automatically to the changing demands from the real sector, for the second school argues that financial development simply follows economic growth and has very little effect on it (Robinson, 1952; Allen, 1990; Lucas, 1988; Levine, 2005).

According to *ACCA* financial development assessment report (2012), the national growth and development in the E7 economies significantly require both the growth and deepening of capital markets with a positive effect. The depth of capital markets in the E7 economies is an important task for policy makers at institutional and state levels. The deep markets through increased liquidity, feed the credit mechanism with the presence of developed secondary markets in which securities can be traded, providing an exit for investors and an opportunity for price discovery(Abbas and Christenson, 2007; Chami et al., 2009). Emerging risks in the global financial system has spread to emerging economies as financial stress transmitted from advanced economies to emerging economies.

The conflict situation in the Middle East and Syria has been a challenging issue for investors as it has impacts on international trade covering the E7 economies.

Especially, Russia and China have diplomatic challenges with remaining candidates of the E7 in Syrian conflict. According to the World Bank's *Multilateral Investment Guarantee Agency* (MIGA) World Investment and Political Risk Evaluation report, it has been noted that the latest global economic recession had negative impacts on the global economic activity. Meanwhile, straining government budgets in advanced and emerging economies caused pressure on exchange rates and sparked political and social tensions around the world.

In emerging economies devastating investment conditions, bipolar economic relations and privileges have deeper impacts on international trade. There are not only financial risks which devastate the conditions in financial system, but also the politic confrontations. Political confrontations between ethnic groups in a society, in some cases, turn into violent conflicts. On one hand, conflict with its negative effects on international trade and growth affect financial stability in the capital markets of emerging economies. On the other hand, deteriorating conditions for international business organizations result in capital outflows and increase the pressure on foreign exchange rates.

A theoretical model should be developed to evaluate the simultaneous effects of financial and political risk on the capital markets of the E7 economies in order to guide portfolio investors and scholars.

3.1. Collier's game-theoretical model of post-conflict risk and the conflict risk index

Conflicts with negative effects on investment climate, economic and financial stability, business and trade activities, and workforce, also affects stock performance of international business organizations operating within conflicting societies. Moreover, deteriorating conditions for international business organizations result in outflow of capital and foreign exchange. Collier and Hoeffler (2006) explains the post-conflict risk situation through a game-theoretic model illustrating that post-conflict economies maintain military spending at high level as a response to the high risk of further conflict. Collier and Hoeffler remark that allowing for the interdependence between risks and spending creates a counter-productive situation (Collier et al., 2006). Post conflict societies are also prone to future risks of conflict. According to Collier et al. (2006), the post-conflict peace is typically fragile: around half of all civil wars are due to post-conflict relapses (Collier et al., 2003). Collier's proposed model estimates a hazard function of the risk of conflict reversion on a sample confined to post-conflict countries (Collier, 2006). Model assumes the hazard is exponential and proportional in this equation

$$h(x_\tau, \beta; t) = \exp(x_\tau \beta)\, h^B(t) \quad (1)$$

where t denotes the duration of a post-conflict peace period, x_T is a vector of exogenous variables observed at calendar time τ, β is a vector of unknown parameters and h^B is the baseline hazard. In this specification, $\beta_j > 0$ implies that an increase in the associated explanatory x_{tj} variable leads to increase in the hazard of war, and a reduction in the expected duration of peace; and vice versa if $\beta_j < 0$. In this specification time axis was divided into W intervals by the points c_1, c_2, c_3, ..., c_w and constant baseline hazard rates are assumed within each interval

$$h^b(t) = exp\left(\alpha + \sum_{w=2}^{W} \lambda_W \, d_W(t)\right) \tag{2}$$

where $d_W(t)$ is a duration dummy variable equal to one if $c_{W-1} < t \leq c_W$ for $c_0 = 0$ and $c_0 = 0$ and $c_W = \infty$, and zero otherwise; α is an intercept; λ_2, ..., λ_w and are baseline hazard parameters. An intercept in the Collier's model is included, which implies that either negative or positive coefficients on λ_2, ..., λ_w imply that the hazard is either lower or higher than in the first interval.

$$s(10) = \exp\left(-\int_{u=0}^{10} h(.;u)du\right) \tag{3}$$

In this proposed model, it is assumed that post-conflict risk is the average risk that the peace will collapse. In this model, average risk was calculated as 46 percent in a sample of 68 post-conflict cases and 31episodes reverted to war. In the first post-conflict decade, it has been calculated as 40 percent. Within Collier's proposed model, the likelihood that a country 'survives' the first decade of peace is given by the survival function at *t=10* years. The function of the risk of a collapse is given by F(10) = 1- S(10)

A methodology of the conflict risk index should be developed regarding pre-conflict, conflict and post-conflict situation. Collier's proposed model relies on post-conflict situation. Hegre and Sambanis (2006) developed a sensitivity analysis of the empirical literature on Civil War Onset.

Hegre and Sambanis question the available analytical methods in the literature arguing that readers cannot distinguish between variation in empirical results because of the factors, variation and model specification. They insist on a reasonable compromise for focusing on selected dimensions of the model and regression coefficients. Hegre and Sambanis (2006), argues that armed intrastate conflict outbreaks occur disproportionately in countries with large and ethnically diverse populations, low income, inconsistent and unstable political systems.

Their sensitivity model composes of 88 variables from ethnic heterogeneity index to GDP data. The quantitative method with subjective selection criteria of model

variables is questionable as it includes immeasurable parameters such as ancient hatred. Moreover, in the literature, there have not been any sufficient quantitative studies conducted to assess the pre-conflict risk and conflict risk measurements. Still, there is not any consensus on which variables should be included in a conflict index model. Notwithstanding this, a conflict risk index as risk assessment tool can be developed in the light of studies took place in Conway and Kishi's Conflict Risk Assessment Report (2001) and UN OCHA's Natural and Conflict related Hazard in Asia- Pacific Report (2009). However, the OCHA's proposed risk assessment method is limited to only state-based internal armed conflict. International conflict risk has not been covered in the studies.There is also a need for developing a conflict index based on an interstate form streaming data from CIA World Fact Book and UCDP/PRIO's Armed Conflict Dataset. In addition to this, the level of armed conflicts can be a core determinant for such a model. Evaluating expert opinions for calculating the level of conflict risk composes a significant and a simple way for such a model. Credit rating organizations most generally use Expert Opinions for the evaluation of the Politic Risk ranging from 1 "no data-peace", 2 "low- some contractual disputes", 3 "medium- economic and diplomatic stress", 4 "high- confrontation" to 5 "Extreme- Armed Conflicts". For instance, Turkey's relations with Syria in 2012 can be categorized by "4".

The Foreign Affairs of Turkey has been confronted with Iran's foreign Policy over Syrian civil conflict and the possible conflict level has been recently changed from 2 "low-come contractual disputes of economic ties" to 3 of diplomatic stress. It is the simplest and clearest way of evaluating the country conflict risk. However, this method only covers a basic approach. Duration of Peace, Socio-economic status, post conflict risk, healing effect of time, ethnic diversity and other components have not been considered.

Table 1 illustrates the average points of Expert Opinions for each case. 18 Scholars evaluated year over year conflict risk according to 5 determinants. They have been asked to monitor CIA World Fact Book also. Within a 12-month rolling window for 3 years, Turkey's foreign relations with Iran and Syria have been deteriorating.

Table 1: Expert opinions for conflict risk level

Conflict risk between countries	2012	2011	2010
Turkey – Syria conflict risk	4,22	2,22	1,44
Turkey – Iran conflict risk	2,72	1,44	0,5

Source: Author's calculation

The following is a suggested index model which is developed for actual conflict risk evaluation

$$CRI = PCR_{index} + ACR_{index} + SER_{index} \quad (4)$$

where CPR_{index} illustrates Collier's proposed Post- Conflict Risk Model. If a conflict was experienced within the last decade; the index value then will be calculated and put into *Conflict Risk Index*. Otherwise, CPR_{index} is equal to 0 and it becomes an inefficient parameter.

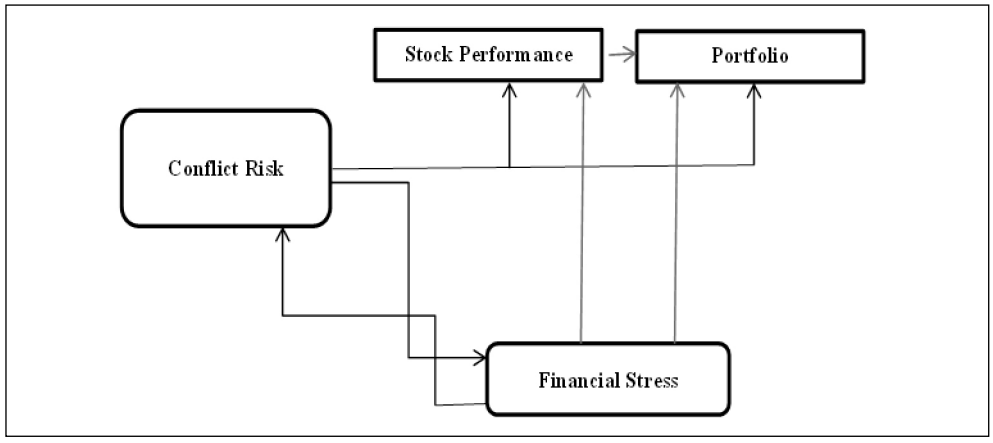
$$ACR_{index}\ \ \mu = \frac{1}{n}\sum_{j=1}^{n} x_i = \frac{1}{n}(x_1 + \cdots . + x_n) \tag{5}$$

It illustrates the *focus conflict risk element*. Experts evaluate the conflict situation based on 5 different categories: 1 "no data-peace", 2 "low- some contractual disputes", 3 "medium- economic and diplomatic stress", 4 "high- confrontation" to 5 "Extreme- Armed Conflicts". SER_{index} implies socio-economic risk index which has been developed by UN OCHA- NGI.

$$SER_{index} = HDI + HPI + GDP + IMR + CI \tag{6}$$

Where symbols represents; HDI for Human Development Index; HPI for Human Poverty Index; GDP for Gross Domestic Product; IMR for Infant Mortality Rate and CI for Composite Index including variables concerning electricity, health, education, and nutrition (UNOCHA-NGI, 2009:F10). In this specification, CRI > 0 implies that an increase in the associated explanatory variables ACR_{index} leads to increase in the hazard of war, and a reduction in the expected condition of peace; and vice versa if CRI ≤ 0. The value of zero implies neutral stance between countries and represent peace condition. If CRI is > 0, then risk of conflict between two parties is available. A value of 4 or higher has in the present condition reflects confrontation. A value of 5 or higher then reflects extreme violence and hazard.

Figure 1: The linkage between financial risk and the conflict risk in capital markets



Source: Author's design

3.2. Financial stress index

3.2.1. The construction of emerging markets financial stress index

The Financial Stress Index for advanced (AE_{FSI}) and emerged (EM_{FSI}) markets has been developed by Cardelli, Elekdağ and Lall (2009). EM_{FSI} compromises five preliminary variables aggregated into an overall index to capture credit conditions in three financial market segments (Banking, Securities and Exchange markets). Banking-sector Beta, β, stock market returns (SMR), time-varying stock market return volatility (SMV), sovereign debt spreads (SDs) and an exchange market pressure index (EMPI) are the main components of EMFSI (Balakrishnan et al., 2009: 7). Overall aggregated index illustrates the degree of financial stress associated with (i) large swings in asset prices, (ii) abrupt changes, (iii) liquidity conditions, and (iv) financial intermediation. The model developed by Cardelli, Elekdağ and Lall (2009) with five components is

$$EM_{FSI} = \beta + SMR + SMV + SDs + EMPI \tag{7}$$

where β denotes the *banking-sector beta* which is the standard capital asset pricing model (CAPM) beta, and defines as

$$\beta_{i,t} = \frac{COV(r^{M}_{i,t}, r^{B}_{i,t})}{\sigma^{2}{}_{i,M}} \tag{8}$$

where r illustrates the year-over-year banking returns.

In EM_{FSI} equation, *stock market returns* are computed as the year-on-year change in the stock index multiplied by minus one, so that a decline in equity prices corresponds to increased securities-market-related stress. *Stock Market Volatility* is a time-varying measure of market volatility obtained from GARCH (1,1) specification, using month-over-moth real returns. *Sovereign debt spreads* is defined as the bond yield minus the 10-year US Treasury yield using JPMorgan EMBI Global Spreads. The EMPI demonstrates exchange rate depreciations and declines in international reserves, and is defined for county i in month t as

$$EMPI_{i,t} = \frac{(\Delta e_{i,t} - \mu_{i,\Delta e})}{\sigma_{i,\Delta e}} - \frac{(\Delta RES_{i,t} - \mu_{i,\Delta RES})}{\sigma_{i,\Delta RES}} \tag{9}$$

where Δe and ΔRES denotes the month-over-month percent changes in the exchange rate and total reserves minus gold, respectively.

3.2.2. The Construction of advanced economies financial stress index

Another version of FSI is developed for advanced economies. Cardarelli, Elekdağ and Lall (2009) constructed a monthly based market-oriented index for

17 economies. (AE_{FSI}) composes of 7 variables related to financial sector. The components of the AE_{FSI} are the banking-sector Beta, β, the TED spreads (TEDs), inverted term spreads (ITs), corporate debt spreads (CrDs), stock market return (SMR), stock market volatility (SMV) and exchange market volatility (EMV). The proposed model constructed by Cardarelli, Elekdağ and Lall (2009):

$$AE_{FSI} = \beta + TEDs + ITs + CrDs + SMR + SMV + EMV \tag{10}$$

TEDs is defined as the 3-month LIBOR, ITs as the governmental short term rate minus long term rate, CrDs as the corporate bond yield minus long-term governmental yield. EMV is a time varying measure of the monthly percent change of the real effective exchange using GARCH (1,1)[3]

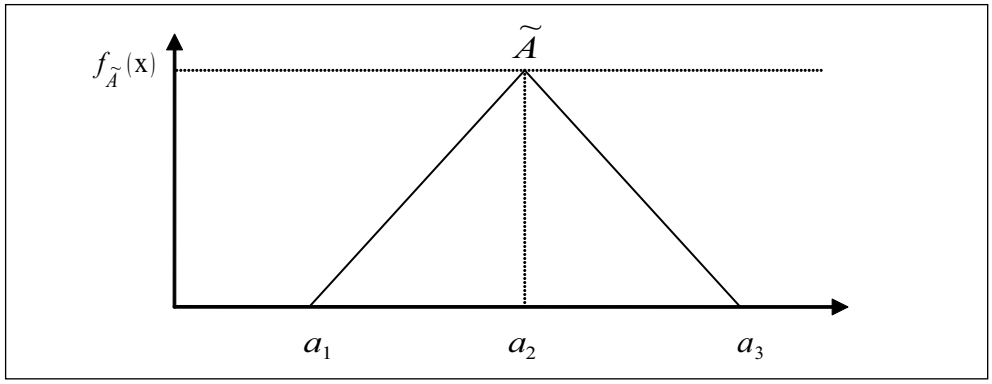
3.3. The fuzzy TOPSIS method

Hwang and Yoon (1981) suggested a technique which is called TOPSIS (The Technique for Order of Preference by Similarity to Ideal Solution). The approach is a well-known multi-criteria decision analysis method (MCDM) for ranking alternatives under the fuzzy environment and in the different studies as well. (Büyüközkan and Çifçi, 2012; Rouhani, Ghazanfari and Jafari, 2012; Krohling and Campanharo, 2011; Torlak et al., 2011; Vahdani et al., 2011; Jiang et al., 2011; Nezhad and Damghani, 2010; Sun, 2010; Sun and Lin, 2009; Wang and Elhag, 2006; Wang, Cheng and Cheng, 2009; Tzeng et al., 2005; Abo-Sinna and Amer, 2005; Opricovic and Tzeng, 2004; Olson, 2004; Liao, 2003; Cheng, Chan, and Huang, 2003; Jee and Kang, 2000; Feng and Wang, 2000). The method carries out the shortest and longest distance from the ideal solution to order the alternatives (Chen and Hwang, 1992; Hwang and Yoon, 1981). According to the TOPSIS method, the alternative has the longest distance from the negative-ideal solution. Nevertheless, it has the shortest distance from the positive-ideal solution. Thus, it can be chosen the best alternative that has the maximum similarity to the positive-ideal solution (Wang and Chang, 2007; Sun and Lin, 2009). It is difficult to make a decision for alternatives under the uncertainty. However, fuzzy approach can be used in such ambiguous conditions. The Fuzzy TOPSIS method has been gradually applied in recent studies for ranking alternatives. So, fuzzy numbers are used to determine the relative importance of criteria and alternatives instead of precise numbers in the TOPSIS approach. Fuzzy numbers are a fuzzy subset of a real numbers and express the idea of a confidence interval. A triangular fuzzy number can be defined as a triplet

$$\widetilde{A} = \left(a_1, a_2, a_3\right) \text{ of crisp numbers with } a_1 < a_2 < a_3 \tag{11}$$

[3] For data set: www.imf.org/external/pubs/ft/weo/2008/02/index.htm

Figure 2: The triangular fuzzy numbers



Source: Wu, Tzeng and Chen, 2009; Chen and Wang, 2009; Ngai and Wat, 2005

Membership function $f_{\tilde{A}}(x)$ of the fuzzy number $\tilde{A}$ is presented by

$$f_{\tilde{A}}(X)=\begin{cases}0, & x\langle a_1\\ (x-a_1)/(a_2-a_1), & a_1\le x\le a_2\\ (a_3-x)/(a_3-a_2), & a_2\le x\le a_3\\ 0, & x\rangle a_3\end{cases} \tag{12}$$

The modified model can be listed in the following steps:

Step 1: Settle the relative importance of each criteria and alternatives: linguistic variables are utilized to determine the relative importance of the attributes and alternatives. Linguistic scales for the weight of criteria and alternatives are conducted by Chen and Wang (2009), Chen and Huang (1992) have been used. These triangular fuzzy numbers are scaled as Very Low (VL) (0.00, 0.00, 0.25); Low (L) (0.00, 0.25, 0.50); Medium (M) (0.25, 0.50, 0.75); High (H) (0.50, 0.75, 1.00); Very High (VH) (0.75, 1.00, 1.00) for the criteria, also listed as Worst (W) (0.00, 0.00, 2.50); Poor (P) (0.00, 2.50, 5.00); Fair (F) (2.50, 5.00, 7.50); Good (G) (5.00, 7.50, 10.00); Best (B) (7.50, 10.00, 10.00) for the alternatives.

Step 2: Calculate the fuzzy weight of criteria and build the fuzzy decision matrix: the fuzzy weights for each attribute and the ratings of the alternatives under each criterion are computed to bring out the fuzzy decision matrix

$$\begin{array}{c} \\ A_1 \\ A_2 \\ \widetilde{D} = A_3 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{cccccc} \text{C1} & \text{C2} & \text{C3} & & \dots & \text{Cn} \end{array} \\ \begin{bmatrix} \widetilde{X}_{11} & \widetilde{X}_{12} & \widetilde{X}_{13} & & \cdots & \widetilde{X}_{1n} \\ \widetilde{X}_{21} & \widetilde{X}_{22} & \widetilde{X}_{23} & & \cdots & \widetilde{X}_{2n} \\ \widetilde{X}_{31} & \widetilde{X}_{32} & \widetilde{X}_{33} & & \cdots & \widetilde{X}_{3n} \\ \vdots & \vdots & \vdots & \ddots & & \vdots \\ \widetilde{X}_{m1} & \widetilde{X}_{m2} & \widetilde{X}_{m3} & & \cdots & \widetilde{X}_{mn} \end{bmatrix} \end{array} \tag{13}$$

$$\widetilde{X}_{ij} = \frac{1}{k}\left(\widetilde{X}_{ij}^{1} + \widetilde{X}_{ij}^{2} + \widetilde{X}_{ij}^{3} + ... + \widetilde{X}_{ij}^{k}\right) \tag{14}$$

where $i = 1, 2, 3, ..., m$ and $j = 1, 2, 3, ..., n$; $\widetilde{X}_{ij}^{k}$ is the rating of the alternatives are provided by the decision makers.

Step 3: Construct the weighted normalized fuzzy decision matrix: Fuzzy decision matrix can be normalized by

$$\widetilde{r}_{ij} = \left(\frac{a_{ij}}{c_{ij}^{*}}, \frac{b_{ij}}{c_{ij}^{*}}, \frac{c_{ij}}{c_{ij}^{*}}\right)$$
$$c_{ij}^{*} = \sqrt{\sum_{i=1}^{m} c_{ij}^{2}} \tag{15}$$

Normalized fuzzy decision matrix can be weighted by multiplying the columns of the decision matrix in the fuzzy environment with the calculated weights.

Step 4: Compute the distance of the alternatives from the positive and negative-ideal solution in the fuzzy environment: the fuzzy positive-ideal solution A^{+} and the fuzzy negative-ideal solution A^{-} can be determined by the following equations

$$A^{+} = \left(\widetilde{v}_1^{*}, \widetilde{v}_2^{*}, \widetilde{v}_3^{*}, ...\widetilde{v}_n^{*}\right) \text{ and } A^{-} = \left(\widetilde{v}_1^{-}, \widetilde{v}_2^{-}, \widetilde{v}_3^{-}, ...\widetilde{v}_n^{-}\right) \tag{16}$$

where $\widetilde{v}_j^{*} = (1,1,1)$ and $\widetilde{v}_1^{-} = (0,0,0)$

The distances of each alternative from the positive and negative-ideal solution are calculated by the formulas

$$D_i^* = \sum_{j=1}^{n} d(\tilde{v}_{ij}, \tilde{v}_j^*) \tag{17}$$

$$D_i^- = \sum_{j=1}^{n} d(\tilde{v}_{ij}, \tilde{v}_j^-) \tag{18}$$

Step 5: Compute the similarities to the ideal solution: the closeness coefficient should be calculated to rank the alternatives. The final step can be formulated by

$$CC_i = \frac{D_i^-}{D_i^+ + D_i^-} \tag{19}$$

The closeness coefficient of each alternative is calculated to rank the performance order. By this formula, the CC_i index value lies between 0 and 1. The largest the index value illustrates the best the performance of the alternatives.

4. Empirical data and analysis – an application on the stock markets in the E7 economies

In this study we aim to illustrate (i) the effect of conflict-risk on the stock performance of companies operating in emerging economies covering the E7 countries, (ii) the possible linkage between conflict risk and financial stress in capital markets based on content analysis and finally (iii) the rank of the E7 economies according to the performance of capital markets, which are exposed to the simultaneous effect of the conflict risk and financial risks based on Fuzzy TOPSIS Method. To test the propositions, the conflict between Russia and Georgia (2008) and the conflict in Syria at the Middle East as actual conflict hazards for the E7 economies, have been taken into *Fuzzy TOPSIS analysis* in addition to which financial stress in advanced and emerged markets.

Table 2: Hierarchical framework of performance evaluation of stocks based on conflict and financial stress

Goal	Major Index	Sub-index
Performance evaluation based on conflict and financial stress	AEFSI	*Beta,* TEDs, ITs, CrDs, SMR, SMV, EMV
	EMFSI	*Beta*, SMR, SMV, SDs, EMPI
	CRI	PCR, ACR, SER

Source: Author

We developed the seven determinants derived from major index and sub-index (table 2) to apply in *Fuzzy TOPSIS.*

Table 3: The derived determinants for FUZZY TOPSIS analysis and their sources

Criteria	Derived determinants	Source
C1	Future expectations on the stock market	AEFSI-EMFSI
C2	The financial stability in capital markets	
c3	Stability in sovereigns	
c4	Strength of currency	
c5	Post conflict recovery	ACR- CRI
C6	Socio-economic condition	
c7	Political stability	

Source: Author

The data for the *Russian-Georgian Conflict* and the political tensions surrounding the E7 economies has been generated based on the expert opinions. Financial Analysts and Portfolio Managers are determined as the experts.

Table 4: The aggregate fuzzy weight of criteria

Criteria	a_1	a_2	a_3
C1	0.42	0.67	0.92
C2	0.50	0.75	1.00
C3	0.17	0.42	0.67
C4	0.08	0.25	0.50
C5	0.17	0.42	0.67
C6	0.33	0.58	0.83
C7	0.58	0.83	1.00

Source: Author's calculation

In the first step, the linguistic variables are used for fuzzy weight of criteria. Fuzzy ratings applied by Chen and Wang (2009) and Chen and Huang (1992) are used in this study. According to the ratings of three decision makers, fuzzy numbers of the criteria is weighted and aggregated by the equations (12) and (13) in table 4.

Table 5: The linguistic rating of each alternative

Criteria	Alternative 1			Alternative 2			Alternative 3			Alternative 4		
	DM1	DM2	DM3	DM1	DM2	DM3	DM1	DM2	DM3	DM1	DM2	DM3
C1	*F*	*G*	*B*	*F*	*F*	*F*	*P*	*P*	*F*	*P*	*P*	*F*
C2	*F*	*F*	*B*	*F*	*F*	*G*	*P*	*F*	*F*	*P*	*P*	*F*
C3	*F*	*G*	*G*	*F*	*F*	*G*	*P*	*P*	*F*	*P*	*P*	*F*
C4	*F*	*F*	*F*	*P*	*P*	*F*	*P*	*P*	*F*	*P*	*P*	*P*
C5	*G*	*F*	*G*	*P*	*F*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
C6	*F*	*F*	*P*	*P*	*F*	*P*	*P*	*F*	*P*	*P*	*W*	*P*
C7	*G*	*F*	*G*	*F*	*G*	*F*	*G*	*F*	*G*	F	P	F
Criteria	Alternative 5			Alternative 6			Alternative 7					
	DM1	DM2	DM3	DM1	DM2	DM3	DM1	DM2	DM3			
C1	*F*	*F*	*G*	*F*	*P*	*F*	*G*	*G*	*G*			
C2	*F*	*G*	*G*	*F*	*F*	*F*	*G*	*G*	G			
C3	*P*	*P*	*F*	*F*	*F*	*G*	*B*	*G*	*G*			
C4	*F*	*F*	*F*	*F*	*F*	*F*	G	F	G			
C5	*G*	*G*	*B*	*P*	*P*	*P*	*G*	*B*	*B*			
C6	*F*	*F*	*P*	*F*	G	F	F	P	F			
C7	*G*	*F*	*G*	*G*	*F*	*G*	*G*	*G*	*G*			

Source: Author's calculation

In table 5, the linguistic parameters (Chen and Huang (1992); Chen and Wang (2009)) declared by the experts are exercised for the rating of each alternative.

Table 6: Weighted normalized fuzzy decision matrix

Alternative	C1			C2			C3			C4		
A1	0.10	0.24	0.41	0.08	0.21	0.36	0.08	0.22	0.41	0.06	0,18	0,37
A2	0.05	0.16	0.33	0.06	0.18	0.36	0.07	0.19	0.37	0.02	0,12	0,29
A3	0.02	0.11	0.26	0.03	0.13	0.29	0.02	0.11	0.26	0.02	0,12	0,29
A4	0.02	0.11	0.26	0.02	0.10	0.25	0.02	0.11	0.26	0.00	0,09	0,25
A5	0.07	0.19	0.37	0.08	0.21	0.39	0.02	0.11	0.26	0.06	0,18	0,37
A6	0.03	0.14	0.30	0.05	0.16	0.32	0.07	0.19	0.37	0.06	0,18	0,37
A7	0.10	0.24	0.45	0.10	0.23	0.43	0.12	0.27	0.44	0.09	0,24	0,45
	C5			C6			C7					
A1	0.09	0.22	0.42	0.04	0.16	0.36	0.07	0.19	0.36			
A2	0.02	0.11	0.27	0.02	0.13	0.31	0.06	0.17	0.33			
A3	0.00	0.08	0.23	0.02	0.13	0.31	0.07	0.19	0.36			
A4	0.00	0.08	0.23	0.00	0.07	0.22	0.03	0.12	0.26			
A5	0.12	0.28	0.46	0.04	0.16	0.36	0.07	0.19	0.36			
A6	0.00	0.08	0.23	0.08	0.23	0.45	0.07	0.19	0.36			
A7	0.14	0.31	0.46	0.04	0.16	0.36	0.09	0.21	0.39			

Source: Author's calculation

Weighted fuzzy decision matrix is normalized by the equation (14) and (15) in table 6.

Table 7: Closeness coefficients

Alternative	D+	D–	CC*i*
A1	5.527	1.782	0.243
A2	5.849	1.454	0.199
A3	6.031	1.264	0.173
A4	6.207	1.076	0.147
A5	5.618	1.694	0.231
A6	5.756	1.555	0.212
A7	5.307	2.0168	0.275

Source: Author's calculation

In the next steps, the distances of each alternative from the fuzzy positive and negative ideal solution are calculated to compute the values of the CC*i* by the formulas (15), (16), (17) and (18) in table 7.

5. Results and discussion

Turkey, China, Russia, Indonesia, India, Brazil and Mexico are ranked according to the *CCi* results. The alternative has the highest value of the *CCi* is the first to order the performance. In the study, Turkey is the first with a value of 0,275 and China follows with a value of 0,243. As a result of this analysis, stock market performance results in E7 demonstrate the final ranking by the criteria derived from the Financial Stress Index and Conflict Risk Index.

The results in this study are listed in descending order according to the computed values of the CC*i* in table 8.

Table 8: The final ranking for the alternatives

Rank	Alternative	Stock markets	CC*i*
1	A7	Turkey	0.275
2	A1	China	0.243
3	A5	Russia	0.231
4	A6	Indonesia	0.212
5	A2	India	0.199
6	A3	Brazil	0.173
7	A4	Mexico	0.147

Source: Author's calculation

The computed values of the CC*i* in table 8 illustrate the possible alternative rank for the E7 economies based on performance evaluation criteria. It also reflects the stock market performance results in the E7 economies and demonstrates the final ranking by the criteria derived from the Financial Stress Index and Conflict Risk Index. The value of the CC*i* reflects that Turkey has the best possible stock market performance in comparison with the other E7 economies.

As a general phenomenon, it has been accepted that the developing economies with the significant level of growth attract investors overseas. Moreover, the developing world is also growing much faster than advanced economies which have strong financial system. Notwithstanding this, the E7 economies illustrated strong evidences in the recovery of foreign portfolio and direct investments since the global recession.

The potential of the firms in the E7 economies has triggered international investors' risk appetite in capital markets. However, it is the hardest way to enter fast growing economies for international firms as local markets cause a challenge for competition. Moreover, the growth of emerging economies encourages investors to direct their funds into portfolio investments. The capital markets in these E7 economies play a significant role in attracting investors through their fast growing and promising financial assets. The capital markets in the emerging economies covering equities, debts and derivative instruments contribute to promote the economic activity. The effective link between growth and strong capital markets drives trade and economic ties between the E7 economies.

6. Conclusion

The results of this study illustrate that the hypothesis on considerable relationship between financial stress and conflict risk with negative impacts on the stock market performance of the E7 economies, is confirmed**.** The traditional approach to the stock market performance evaluation consists of financial parameters while it generally omits nonfinancial parameters such as conflict risk. The major contribution of this study **is** to develop a generic model which correlates the conflict risk and financial stress together with financial and non-financial parameters. With this novel method, it has been illustrated that the possible alternative ranks for the stock market performances of the E7 economies based on the effects of nonfinancial and financial parameters can be determined.

The limitation of this study **is** that the model covers the relative importance of the financial and non-financial criteria of the E7 economies with experts' choices. All experts' choices in assessment process have been selected from the emerging economies. The major constraint on this selection process stems from the lack of

opportunity for communicating with the best experts in advanced economies. It was also difficult to locate out experts with interdisciplinary background. This study could be further widened to consider other evaluation methods such as VIKOR and PROMETHEE which could have been applied for the ranking of the E7. In addition, the study can be expanded for comparative analysis between developed and developing markets. The obtained results have important consequences in implementing portfolio investment strategies for effective selection decision making processes.

References

Abbas, A., Christenson, J. (2007) "The Role of Domestic Debt Markets in Economic growth: An Empirical Investigation Low-income Countries and Emerging Markets", *IMF Working Paper* 07/127, pp. 7-14. Available from <http://www.imf.org/external/pubs/ft/wp/2007/wp07127.pdf>, accessed, [Accessed on 20 February 2013].

Abo-Sinna, M. A., Amer, A. H. (2005) "Extensions of TOPSIS for multi objective large-scale nonlinear programming problems", *Applied Mathematics and Computation*, 162, pp. 243-256.

ACCA (2012) "The Rise of capital markets in emerging and frontiers economies", *Accaglobal*, Available from <http://www.accaglobal.com/content/dam/acca/global/PDF-technical/global-economy/pol-tp-rcm.pdf> [Accessed on 21st February, 2013].

Ackermann, J. (2008) "The Subprimie Crisis and Its Consequences", *Journal of Financial Stability,* (4), pp. 329-337.

Addison, T., Murshed, S. M. (2000) "The Fiscal Dimensions of Conflict and Reconstruction", *UNU/WIDER,* pp. 2-5.

Allen, F (1990) "The Market for Information and the Origin of Financial Intermediaries", *Journal of Financial Internediation*, Vol.1, No.1, pp. 3-13.

Andrade, S. C. (2009) "A model of Asset Pricing under Country Risk", *Journal of International Money and Finance*, (28), pp. 671-695.

Balakrishnan, R. et al. (2009) "The Transmission of Financial Stress from Advanced to Emerging Economies", *IMF- WP*/09/133, pp. 3-25.

Boulding, K. E. (1963) *Conflict and Defence: A General Theory*, New York: Harper, pp. 424-456.

Busse, M. and Carsten Hefeker (2007) "Political Risk Institutions and Foreign Direct Investment", *European Journal of Political Economy*, 23, pp. 37-415.

Büyüközkan, G., Çifçi, G. (2012) "A novel hybrid MCDM approach based on fuzzy DEMATEL, fuzzy ANP and fuzzy TOPSIS to evaluate green suppliers", *Expert Systems with Applications*, 39, pp. 3000-3011.

Cardelli, R. et al. (2011) "Financial Stress and Economic Contractions", *Journal of Financial Stability*. (7), pp.78-97.

Chami, R. et al. (2009) "A Framework For Financial Market Development" *IMF Working Paper* WP/09/156, <http://www.imf.org/ external/pubs/ft/wp/2009/ wp09156.pdf>, [accessed 12 February 2013]

Chen, L., Wang, T. C. (2009) "Optimizing partners' choice in IS/IT outsourcing projects: The strategic decision of fuzzy VIKOR", *International Journal of Production Economics*,120, pp. 233-242.

Chen, S. J., Hwang, C. L. (1992), *Fuzzy Multiple Attribute Decision Making Methods and Applications.* Berlin: Springer.

Cheng, S. et al. (2003) "An integrated multi-criteria decision analysis and inexact mixed integer linear programming approach for solid waste management", *Engineering Applications of Artificial Intelligence*, 16, pp. 43-554.

Collier, P. (1999) "On the Economic Consequences of Civil War", *Oxford Economic Papers*, 51(1), pp. 1-16.

…… (2006) *Economic Causes of Civil Conflict and their Implications for Policy*, Oxford University Press.

Collier, P. L. et al. (2003) "Breaking the Conflict Trap: Civil Wr and Development Policy", *World Bank Policy Research Report*. Oxford, UK. Oxford University Press, pp. 7-12.

Collier, P., & Hoeffler, A. (2004a) "Aid, Policy and Growth in Post-Conflict Societies", *European Economic Review*, 48(5), pp. 4-9.

…… (2004b) Greed and Grievance in Civil War. Oxford Economic Papers, 56., pp. 2-8.

Collier, P. et al. (2006) "Beyond Greed and Grievance: Feasibility and Civil War". CSAE. *Working Paper* 10, pp. 7-14.

Collier, Paul & Anke Hoeffler (2006) "Military Expenditure in Post-Conflict Societies", *Economics of Governance*, (7), pp. 89-106.

Collier, P. et al. (2007) "Post-Conflict Risks. Center for the Study of American economics", *Oxford OKI 3UQ*, UK, pp. 3-9.

Conyon, M et al. (2011) "Corporate Governance and the 2008-2009 Financial Crisis", *Corporate Governance-An International Review*, V.19, I.5, pp. 399-404.

Conway, G, Kishi, N. (2001) *Conflict Risk Assessment Report*, Carleton University: Canada.

Dougherty, J. E. and Pfaltzgraff, R. L. (1990) *Contending Theories of International Relations: A Comprehensive Survey*, New York: Harper, pp. 515-518.

Elbadawi, & Sambanis, N. (2002) "How Much War Will we see?: Explaining the Prevalence of Civil War", *Journal of Conflict Resolution*, 46(3), p. 1.

Feng, C. M., Wang, R. T. (2000) "Performance evaluation for airlines including the consideration of financial ratios" *Journal of Air Transport Management*, 6, pp. 133-142.

Hacıoğlu, Ü. et al. (2012a) "Economic Approach to Conflict Issue: Investment in Post- Conflict Situation for International Business", *International Journal of Business Administration*, V.3. N.5, pp. 1-8.

…… (2012b) "Risky Business in Conflict Zones: Opportunities and Threats in Post Conflict Economies", *American Journal of Business and Management*, V.1, N. 2, pp. 1-5.

Hakkio, C. S., W. E., Keeton (2009) "Financial Stres: What is it, how van it be measured, and why does it matter?"*, Economic Review*. 2, pp. 5-50.

Hegre, H., Sambanis, N. (2006) " Sensitivity Analysis of the Empirical Literature on Civil War Onset", *Journal of Conflict Resolution*, 50, pp. 508-535.

Hwang, C. L., Yoon, K. (1981) *Multiple Attributes Decision Making Methods and Applications*. Berlin: Springer, pp. 357-371.

Illing, M., Liu, Y. (2006) "Measuring Financial Stress in a Developed Country: An Application to Canada", *Journal of Financial Stability,* 2 (3), pp. 243-265.

IMF (2012) *Global Financial Stability Report*, pp. 4-20.

http://www.imf.org/external/pubs/ft/gfsr [Accessed on 13 Aptir 2012].

Jee, D. H., Kang, K. J. (2000) "A method for optimal material selection aided with decision making theory", *Materials and Design*, 21, pp. 199-206.

Jiang, J. et al. (2011) "TOPSIS with fuzzy belief structure for group belief multiple criteria decision making", *Expert Systems with Applications*, 38, pp. 9400-9406.

Justino, P. (2004) "Redistribution, Inequality and Political Conflict", *PRUS Working Paper*, N. 18, pp. 1-12.

http://www.swan.ac.uk/economics/res2004/program/papers/justino.pdf [accessed on 21 April 2012].

Korf, B. (2006) "Cargo Cult Science, Armchair Empiricism and the Idea of Violent Conflict"*, Third World Quarterly*, 27(3), pp. 459-476.

Krohling, R. A., Vinicius C. C. (2011) "Fuzzy Topsis For Group Decision Making: A Case Study For Accidents With Oil Spill in the Sea", *Expert Systems with Applications*, 38, pp. 4190-4197.

Kyaw A. N. et al. (2011) "Factors in Multinational Valuations: Transparancy, Political Risk and Diversification", *Journal of Multinational Financial Management*, 21, pp. 55-67.

Le, Q. V., P. J. Zak (2006) "Political Risk and Capital Flight", *Journal of International Money and Finance*, 25, pp. 308-329.

Levine, R. (2005) "Finance and Growth", (in) *Handbook of Economic Growth*, (ed.) P. Aghion and S. Durlauf, Amsterdam: Elsevier, pp. 865-934.

Liao, H. C. (2003) "Using PCR-TOPSIS to optimize Taguchi's multi-response problem", *International Journal of Advanced Manufacturing Technology*, 22, pp. 649-655.

Lintner, J. (1965) "The Valuation of Risky Assets and Selection of Risky Assets in Stock Portfolios and Capital Budgets", *Review of Economics and Statistics,* 47, pp. 13-37.

Lucas, R. E. (1988) "On the Mechanics of Economic Development", *Journal of Monetary Economies*, V. 22, N.1, pp. 3-42.

Lujala, P. et al. (2005) "A diamond curse? Civil War and a Lootable Resource", *Journal of Conflict Resolution*, 49(4), pp. 538-561.

Mayer, B. S. (2000) *The Dynamics of Conflict Resolution: A Practioner's Guide,* California: Jossey-Bass, pp. 26-71.

MIGA (2009) "World Invest-ment and Political Risk", *The World Bank*, Washington, pp. 13-95.

Morales, R. R. et al. (2009) "Innovative Methods in Assessing Political Risk for Business Internationalization", *Research in International Business and Finance*, 23, pp. 144-156.

Muradoğlu, G. et al. (2003) "Measuring the Systemic Risk" *International Journal of Business*, 8 (3), pp. 316-328.

Naes, R. et al. (2011) "Stock Market Liquidity and the Business Cycle", *The Journal of Finance,* Vol. LXVI, pp. 139-142.

Nezhad, S. S. et al. (2010) "Application of A Fuzzy Topsis Method Base on Modified Preference Ratio and Fuzzy Distance Measurement in Assessment of Traffic Police Centers Performance", *Applied Soft Computing*, 10, pp. 1028-1039.

Ngai, E. W. T. and F. K. T. Wat (2005) "Fuzzy Decision Support System For Risk Analysis In E-Commerce Development", *Decision Support Systems*, 40, pp. 235-255.

Olson, D. L. (2004) "Comparison of Weights in Topsis Models". *Mathematical and Computer Modelling*, 40, pp. 721-727.

Opricovic, S., Tzeng, G. H. (2004) "Compromise Solution by Mcdm Methods: A Comparative Analysis of Vikor And Topsis", *European Journal of Operational Research*, 156, pp.445-455.

Rjoub, A. M. S. (2011) "Business Cycles, Financial Crisis and Stock Volatility", *International Journal of Economic Perspective*, 5 (1), pp. 83-95.

Robinson, J. (1952). *The Generalization of the General Theory: the rate of Interest and other Essays*, London: Macmillian, pp. 67-94.

Rouhani, S. et al. (2012) "Evaluation Model Of Business Intelligence For Enterprise Systems Using FUZZY TOPSIS", *Expert Systems with Applications*, 39, pp. 3764-3771.

Saleem, K., Mika Vaihekoski (2008) "Pricint of Global and Local Sources of Risk in Russian Stock Market", *Emerging Market Review*, 9, pp. 40-56.

Sambanis, N. (2001) "Do Ethnic and Nonethnic Civil Wars Have the Same Causes?. *Journal of Conflict Resolution*, 45(3), pp. 259-282.

Sharpe, W. F. (1964) "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk", *Journal of Finance*, 19, pp. 425-422.

Starr, M. (2004) "Monetary Policy in Post-Conflict Countries: Restoring Credibility", *WPS*, Washington: American University Press, 7, pp. 3-28.

Suhrke, A. et al. (2005) "Economic Aid to Post-conflict Countries: a Methodological Critique of Collier and Hoeffler", *Conflict, Security & Development*, 5(3), pp. 329-361.

Sun C. C., Lin, G. T. R. (2009) "Using FUZZY TOPSIS Method For Evaluating The Competitive Advantages Of Shopping Websites", *Expert Systems with Applications*, 36, pp. 11764-11771.

Sun, C. C. (2010) "A Performance Evaluation Model By Integrating FUZZY AHP And FUZZY TOPSIS Methods", *Expert Systems With Applications*, 37, pp. 7745-7754.

Torlak, G. et al. (2011) "Analyzing Business Competition by Using FUZZY TOPSIS Method: An Example of Turkish Domestic Airline Industry", *Expert Systems with Applications*, 38, pp. 3396-3406.

Torre, A. and Sergio. L. Schmukler (2007). *Emerging Capital Markets and Globalization*, Stanford University Press, pp. 1-9.

Tzeng, G. H. et al. (2005) " Multi-Criteria Analysis of Alternative Fuel Buses For Public Transportation", *Energy Policy*, 33, pp. 1373-1383.

UNOCHA (2009) "Risk Assessment and Mitigation Measuring for Natural and Conflict Related Hazard in Asia Pacific", NGI report no: 20071600-1.

Vahdani, B. S. et al. (2011) "Group Decision Making Based on Novel FUZZY Modified TOPSIS Method", *Applied Mathematical Modelling*, 35, pp. 4257-4269.

Wang, J. et al. (2009) "Fuzzy Hierarchical Topsis For Supplier Selection" *Applied Soft Computing*, 9, pp. 377-386.

Wang, T. C., Chang, T. H. (2007) "Application of Topsis In Evaluating Initial Training Aircraft Under A Fuzzy Environment", *Expert Systems With Applications*, 33, pp. 870-880.

Wang, Y. (2006) "Fuzzy Topsis Method Based On Alpha Level Sets With An Application To Bridge Risk Assessment", *Expert Systems With Applications*, 31, pp. 309-319.

Wang, Ying-Ming and Elhag, Taha M. S. (2006) "Fuzzy TOPSIS Method Based on Alpha Level Sets With An Application to Bridge Risk Assessment", *Expert Systems with Applications*, 31, pp. 309-319.

White, W. R. (2008) "Past Financial Crises, The Current Financial Turmoil, And The Need For A New Macrofinancial Stability Framwork", *Journal of Financial Stability*,(4), pp. 307-312.

Wimmer, A. et al. (2009) "Ethnic Politics and Armed Conflict: A Configurationally Analysis of a New Global Data Set", *American Sociological Review*, 74(2), pp. 316-337.

Wu, H. et al. (2009) "A Fuzzy Mcdm Approach For Evaluating Banking Performance Based on Balanced Scorecard", *Expert Systems with Applications*, 36, pp. 100135-10147.

Procjena opasnosti konflikta i financijskog rizika na tržištima kapitala u E7 gospodarstvima

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Sažetak

Svrha ovog istraživanja je ispitati interakciju između financijskog stresa i rizika konflikta koji imaju utjecaj na financijske instrumente na tržištima kapitala unutar interdisciplinarnog okvira. Fuzzy TOPSIS metoda primjenjuje se kako bi se analizirali učinci opasnosti konflikta na tržištima kapitala i financijskih instrumenata u E7 gospodarstvima a u cilju da bi se na najbolji mogući način na temelju rezultata evaluacijskih kriterija rangirala E7 gospodarstva. Da bi se dobila dinamika podataka u svrhu razvijanja odgovarajuće referentne baze za stručna mišljenja, strukturirani su indeks opasnosti konflikta i indeks financijskog stresa. Empirijski rezultati potvrđuju da postoji jaka veza između indeksa financijskog stresa i indeksa opasnosti konflikta za E7 gospodarstva. Temeljni zaključak pokazuje učinke financijskih rizika i rizika konflikta za odabir dionica u E7 gospodarstvima po kriterijima koji proizlaze iz Indeksa financijskog stresa i Indeksa sukoba.

Ključne riječi: *financijski rizik, konflikt, Fuzzy TOPSIS metoda*

JEL klasifikacija: *C6, D7, D8, G1*

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