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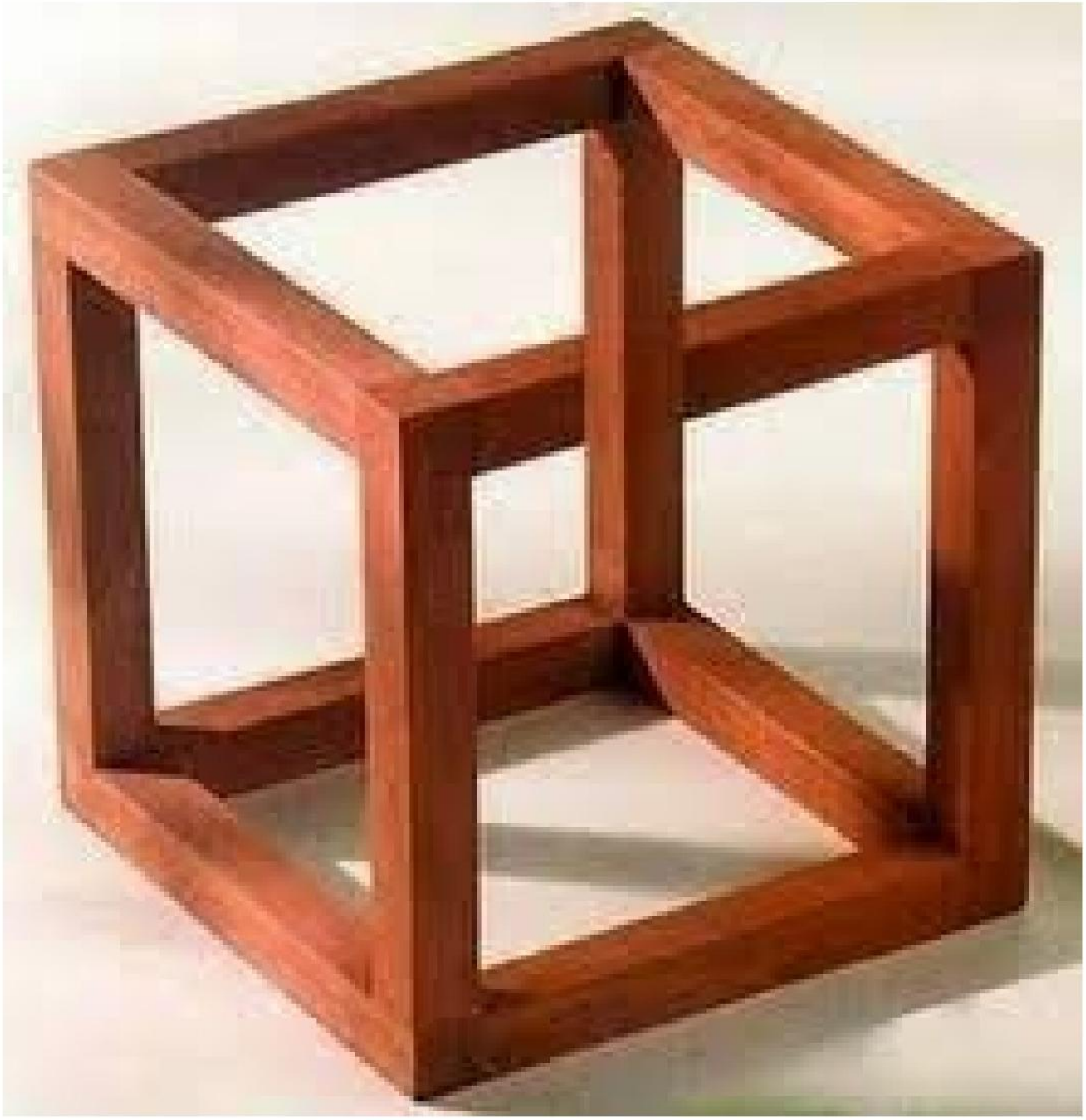

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Relationship between the State and Subsidized Companies: Agency Problem

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ABSTRACT

This paper deals with the problem of relationship between the state and companies, which activity is subsidized by the government, given the strong influence of the state on the companies and a possibility of the state interference in the company activity. In such cases there is a conflict of interests between the state and company, i.e. depending on the subsidy level and the level of political risk for the company in the relationship due to the possibility of expropriation of funds from the cash flow controlled by company. In this case, value (utility) for one of the parties may be positive in the relationship, while for another one it may be negative. This paper deals with all possible cases of subsidy levels and expropriation parameter resulting in positive value for each party. It also deals with the issue: what conditions of subsidy level and expropriation parameter, as well as the level of efforts made by company result in value (utility) gain for each party

KEYWORDS: companies subsidized by the government, conflict of interests, political risk, agent problem, value for the state, value for the company, maximum value, cash flow.

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A large number of papers (Brealey R.A., Habib M.A. 1996; Esty B.C. 2003; Byoun S. and Xu Z. 2014) are devoted to the problem of relationship between the state and companies in project financing. In these papers, much attention is given, in particular, to the use of concession and offtake agreements grants to involve a private sponsor in project financing. Taking into account the interests of both the private sponsor and the state, the optimal level of such concessions is studied. The relationship between the state and the state subsidized company is less investigated. The state is obliged to subsidize the activity of the company, which produces socially important goods, for which it is impossible or difficult to find the substitute goods in such circumstances. Sometimes, in principle, it is possible to find a substitute, but this requires additional state investments in substitute goods, in infrastructure, without which these substitute goods will not appear, investments, financial investments in the form of concession and offtake agreements grants, etc. The costs on these additional investments may be so significant that they may be unsustainable for the state budget under the specific circumstances. The circumstances may be internal and external. The external circumstances may occur in the form of external political risks. Different kinds of external sanctions at the state and corporate level resulting in limitation of funding opportunities and difficulty of the business project implementation that require considerable efforts: financial, managerial, innovation, etc., may be the example of such risks. The adverse external circumstances may be related to the external market risks associated with the change of the market conditions for the main export goods, such as oil, gas, metals, etc.

Adverse market conditions for these goods, i.e. a sales slowdown, results in decrease in cash flow coming into the country, and the amount of tax revenue decreases accordingly. The government may then have the limitations associated with implementation of global infrastructure projects requiring significant investments. The internal circumstances include the possibility that, although this issue is important for the state, there are many other issues that may not be deferred. And this problem solution is still deferred, and this situation may last long enough. For example, the situation with activity of the energy companies supplying the beneficiary regions may serve as an example of such circumstances. These regions are often economically underdeveloped, where there is practically no large business. Sometimes these regions have a large territory and small population distributed throughout the territory.

Due to the economic underdevelopment of the region, the level of population solvency is low. At the same time, the share of population in consumption of the energy company's goods (electricity and heat) sometimes can reach up to 80%. Considering this circumstance, the government limits the company product tariffs.

For all the reasons mentioned above, the cash flow of this company is not determined and shows significant volatility. And the cash flow level is often insufficient for normal operation of the company and manufacture of products in a volume sufficient to meet the consumers' needs. Of course, the government takes into account the social needs of population and shall fulfill its social obligations. Having no economic opportunity to radically effect the outdated and inefficient energy system structure of the region, the government is obliged to somehow, albeit inefficiently subsidize the energy companies providing the region with power. Such system of relationship between the government and the subsidized company may exist long enough, until the government finds sufficient means to change significantly the way of supply of this region with corresponding goods of adequate quality and in the required quantity. The described system of relationship between the state and subsidized company creates an interesting agent problem between the government and the company (the government is a principal, the company is an agent). An emphasis on the agent problem is made in the financial literature. The agent problem was globally set and investigated in the papers of Jensen M.C., Meckling W.H. 1976, Jensen M.C. 1998, etc. The concrete mathematical models specifying the applicable contracts to mitigate this problem in case where a business owner acts as a principal and the management acts as an agent, given the risks for both sides, were investigated, for example, in the papers of Gibbons R. 2010; Gibbons R. 2005, Minasyan V. 2014. But we will be interested in the agency problem that arises between the state and the state subsidized company. If a subsidy from the government is significant, it may deprive the company of an incentive to make significant efforts to obtain good results (high cash flows), for example, by reducing costs or using any innovations. I.e. the company, represented by its top managers, will seek to an increase in utility (value) for itself and will not care about the state interests (the utility for the state) in this relationship. The government, represented by the certain officials delegated to represent the interests of the state in the relationship with the company, may temporarily decrease the amount of the subsidy already

given by the government to subsidize this company by finding, from their point of view, "more important" ways to use these amounts at this stage. Allocating the appropriate amounts to subsidize the company, the appropriate officials from the government, who sometimes suffer a shortage of funds to finance other projects in this region, may from time to time ask the company to participate in financing of other projects, actually depriving the company of a part of the cash flow generated by the company. I.e. the subsidized company has a risk of expropriation of a part of the entire cash flow, which it could control in this system of relationship.

A natural task of harmonization of this complex relationship arises, taking into account the fact that, generally speaking, both members of this relationship have a specific idea of utility for themselves. In this paper, we construct a mathematical model of this relationship, taking into account the interests and risks of both the company and the state, and examine the optimal behavior of the company and the state in terms of utility for them.

Model description

Let us set the annual cash flow amount generated by the company X, $X = qp$, where q is the quantity of goods produced by the company per year, and p is a unit price. In view of the above mentioned state of the company, we suppose that the cash flow value is an uncertain and random value X uniformly distributed within the interval [a,b]. The company also invests its own funds in the amount of B to do its business. We suppose that the company shall have an amount not less than c per year to ensure its normal operation enabling to produce the required quantity of products (required by the government from the company). It is assumed that to increase the chances of reaching the amount of this value, the government subsidizes the company in the amount of K. If the company does not make additional efforts, the full amount available to the company is usually not enough for the normal operation of the company even in view of the subsidy Y = X + K, i.e. in this case Y < c. In such a case, there is no expropriation of funds on the part of public authorities, i.e. the company maintains control over the amount Y. If the company makes the necessary efforts, which are evaluated by value e, it is supposed that it will be able to decrease its costs by v (or increase utility for itself by v). Of course, the company will make the necessary effort, only if v > e. In such a

case, these is a possibility that the entire amount, which the company has at its disposal Y = X + K, may be enough for the normal operation of the company, i.e. random value Y may also take a value of Y ≥ c. However, in case of such increased flows (i.e. if it turns out that Y ≥ c), the possibility of the state interference in the company management and expropriation of funds from the entire amount, which the company has at its disposal Y, increases. It is implemented though parameter θ in the model, where $0 \le \theta \le 1$. It is the parameter determining the risk of expropriation. Expropriation is expressed in a way that the amount $Y_\theta = X(1-\theta) + K\theta$ is actually left at the company's disposal. Thus, the government authorities leave the company the share θ of the subsidy amount K, and the share 1 - θ of the company's cash flow amount X. The closer θ is to one, the bigger share of the subsidy amount is left with the company. The closer θ is to zero, the bigger share of the company's cash flow amount is left. In such a case, the additional amount $Y_{1-\theta} = X\theta + K(1-\theta)$ is withdrawn by the government for other needs.

I) Value for the company without efforts

Let us consider the value (utility) for the company, if it does not make additional effort to decrease expenses, V(K). It is evident that

$V(K) = E(Y) - B = E(Y \mid Y < c) - B = E(X + K \mid X < c - K) - B$,

where an expected value symbol is expressed as E(.), and E(.|.) is a conditional expected value symbol.

I.e. in this case, receiving subsidy K, the company make no efforts, and limitation by c – K value takes place for the company's cash flow value. The more the subsidy value is, the less the cash flow generated by the company is.

The further calculations depend on the fact, whether the value c – K is more than the maximum possible value of the company's cash flow b or not.

Let us consider the first case:

1) c – K > b or K < c –b. I.e. this is the case, when the subsidy value will not cover the lack of funds for normal operation of the company, even if the company receives the maximum possible cash flow b.

In this case (see the proof in Appendix)

$$V(K) = \mu + K - B. \quad (1)$$

As is known, $\mu = E(X) = \frac{b+a}{2}$ is an expected value of the company's cash flow X. The designation $\sigma = b - a$ will be further used for the value proportional to the standard deviation of the cash flow random value X (its "volatility"), which, as is known, is $\frac{b-a}{2\sqrt{3}}$.

However, such relationship with the government is of some interest for the company, only if the value takes on the positive, V(K) >0.

This implies the need to fulfill the following inequality:

$\mu + K - B > 0$ or $K > B - \mu$. I.e. the subsidy value shall be sufficiently large. And the more the subsidy amount K is, the more the value for the company.

Let us consider the second case:

2) $a \le c - K \le b$ or $c - a \ge K \ge c - b$. I.e. this is the case, when the subsidy value will cover the lack of funds for normal operation of the company, if the company receives the maximum cash flow level b.

In this case (see the proof in Appendix)

$$V(K) = \frac{1}{2(b-a)}(K^2 - 2(c+a-b)K + c^2 - a^2 - 2(b-a)B). \quad (2)$$

The subsidy value, with which the minimum value for the company is achieved, is defined by the equation: $2K - 2(c+a-b) = 0$. I.e. the minimum value is achieved, when

$$K = K_{\min} = c - (b-a) = c - \sigma.$$

The quantity of the minimum value is

$$V_{\min} = \frac{1}{2(b-a)}((b-a)^2 - a^2) + c + a - b - B =$$

$$= \frac{b-a}{2} - \frac{a^2}{2(b-a)} + c - (b-a) - B = c - B - \frac{\sigma}{2} - \frac{a^2}{2\sigma}.$$

The minimum value takes on the largest quantity depending on "volatility" σ, if volatility meets the condition:

$-\frac{1}{2}+\frac{a^2}{2\sigma^2}=0$, whence it follows that $\sigma = a$, or b =2a.

I.e. the minimum value takes on the largest value, if the maximum possible value of the company's cash flow is two times more than its minimum value.

In this case, the least value is

$V_{\min} = c - B - a.$

However, such relationship with the government is of some interest for the company, only if takes on the positive value, V(K) >0.

This implies the need to fulfill the following inequality:

$K^2 - 2(c + a - b)K + c^2 - a^2 - 2(b - a)B > 0$

This condition is fulfilled with all values K, if

$(c + a - b)^2 + a^2 - c^2 + 2(b - a)B < 0,$

or

$2c(b - a) > (b - a)^2 + a^2 + 2(b - a)B,$

whence it follows that

$c > \frac{\sigma}{2} + \frac{a^2}{2\sigma} + B.$

It means that having such necessary (required) high enough cash flow levels, any subsidies meeting the conditions c – a $\geq$K $\geq$ c –b result in positive valuableness for the company.

If the necessary (required) cash flow level meets the condition

$c \leq \frac{\sigma}{2} + \frac{a^2}{2\sigma} + B,$

to create the positive value for the company, the subsidy level shall meet one of the following conditions:

$K > K_{(+)}$ or $0 \leq K < K_{(-)}$,

where

$K_{(-)} = \max(K_1, 0)$, $K_{(+)} = K_2$, and

$$K_{1,2} = c - (b-a) \pm \sqrt{(c+a-b)^2 + a^2 - c^2 - 2(b-a)B} =$$

$$= c - (b-a) \pm \sqrt{(b-a)^2 + a^2 + 2(b-a)B - 2c(b-a)} =$$

$$= c - \sigma \pm \sqrt{\sigma^2 + a^2 + 2\sigma B - 2\sigma c}.$$

II) Value for the company with efforts

If the company makes any effort, then according to the described above system of relationship between the company and government, value for the company $V_e(K)$ is equal to (see Appendix)

$$V_e(K) = E(Y \mid Y \le c) + E(Y_\theta \mid \mathrm{Y} > \mathrm{c}) - \mathrm{B} + \mathrm{v} - \mathrm{e} =$$

$$= E(X) - \theta E(X \mid X > c - K) - K(1-\theta)P\{X > c - K\} + K - B + v - e. \quad (3)$$

Further calculations depend on whether the value c - K exceeds the value of maximum possible value of company cash flow b or not.

Let us consider the first case:

1) c – K > b or K < c –b. I.e. this is the case when the subsidy value will not cover the lack of funds for normal company operation, even if the company receives the maximum possible cash flow b.

   Then

   $$V_e(K) = \frac{b+a}{2} + \mathrm{K} - \mathrm{B} + \mathrm{v} - \mathrm{e} = = \mu + K - B + v - e.$$

   However, such relationship with the government is of some interest for the company, only if takes on the positive value, V(K) >0.

   This implies the need to fulfill the following inequality:

   $\mu + K - B + v - e > 0$ or $K > B + e - v - \mu.$

   Thus, to obtain the positive valuableness for the company the subsidy level shall exceed the value in the right part of the last inequality.

2) $a \le c - K \le b$ or $c - a \ge K \ge c - b$. I.e. this is the case when subsidy value will cover the lack of funds for normal company operation, if the company receives the maximum cash flow b.

Then (see Appendix)

$$V_e(K) = \frac{b+a}{2} - \frac{\theta}{2\sigma}(b^2 - c^2 + 2cK - K^2) - \frac{K(b-c+K)(1-\theta)}{\sigma} + K - B + v - e. \quad (4)$$

In this case, the subsidy value, with which the extreme value for the company is achieved, is defined by the equation:

$$-2\theta c + 2\theta K - 2(1-\theta)(b-c) - 4(1-\theta)K + 2(b-a) = 0$$

I.e. when

$$K = K_{extr} = \frac{\theta(2c-b) + a - c}{3\theta - 2}.$$

Let us define at which parameter values of risk of expropriation θ this value becomes positive. This is true, if either

A) $\begin{cases} 3\theta - 2 > 0 \\ \theta(2c-b) + a - c > 0 \end{cases}$

or

B) $\begin{cases} 3\theta - 2 < 0 \\ \theta(2c-b) + a - c < 0 \end{cases}$

Equation system A) is satisfied, if $1 > \theta > \max(\frac{2}{3}, \frac{c-a}{2c-b})$,

and equation system B) is satisfied, if $0 < \theta < \min(\frac{2}{3}, \frac{c-a}{2c-b})$.

When $1 > \theta > \max(\frac{2}{3}, \frac{c-a}{2c-b})$, the valuableness for the company $V_e(K)$ takes on a minimum value at a point $K = K_{extr} = \frac{\theta(2c-b) + a - c}{3\theta - 2}$. However, when

$0 < \theta < \min(\frac{2}{3}, \frac{c-a}{2c-b})$, the valuableness $V_e(K)$ takes on a maximum value at a point

$$K = K_{extr} = \frac{\theta(2c-b)+a-c}{3\theta-2}.$$

It may also be noted that since

$$K_{extr} = \frac{2}{3} + \frac{5a-2b-c}{3\theta-2},$$

if

i) $5a-2b-c>0$, i.e. $c<5a-2b$,

when $\theta \to \frac{2}{3}+0$, $K_{extr} \to +\infty$ that means that at θ parameter values reaching to $\frac{2}{3}$ on the right, the unrestricted subsidy level is needed to achieve the extreme value for the company

(see Figure 1a).

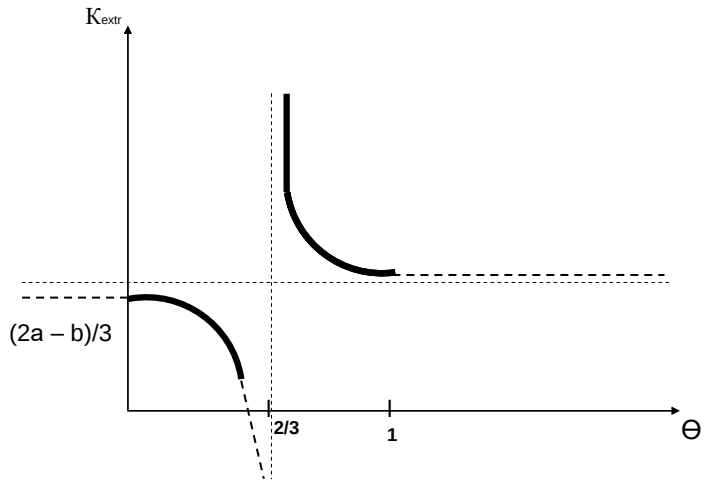

Figure 1a. Dependence of the extreme subsidy level on θ parameter. Case $c<5a-2b$.

If

ii) $5a-2b-c\le 0$, i.e. $c\ge 5a-2b$,

when $\theta \to \frac{2}{3}-0$, $K_{extr}\to +\infty$ that means that at θ parameter values reaching to $\frac{2}{3}$ on the left, the unrestricted subsidy level is needed to achieve the extreme value for the company (see Figure 1b).

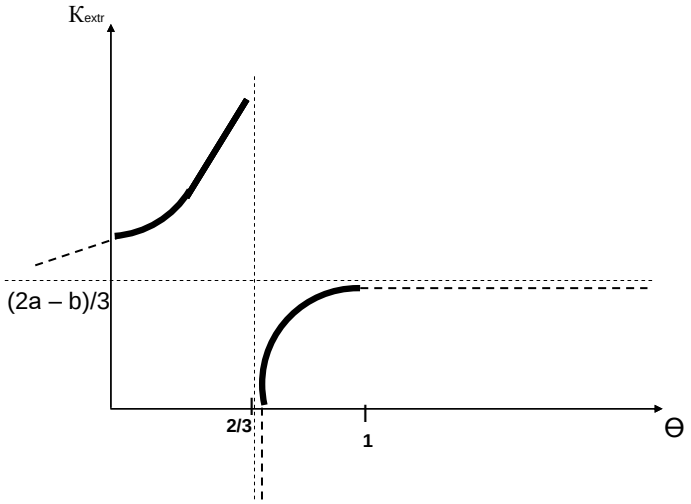

Figure 1b Dependence of the extreme subsidy level on θ parameter. Case $c\ge 5a-2b$.

However, such relationship with the government is of some interest for the company, only if takes on a positive value, $V_e(K)$ >0.

This implies the need to fulfill the following inequality:

$$(3\theta-2)K^2+2[c-a+\theta(b-2c)]K+(b-a)(b+a-2B-2e+2v)+\theta(c^2-b^2)>0. \quad (5)$$

Let us consider the following cases:

a) $3\theta-2>0$, i.e. $\theta>\frac{2}{3}$.

In this case the inequality (5) is fulfilled at any K values, if either of the following inequalities is fulfilled:

$$[c-a+\theta(b-2c)]^2-(3\theta-2)\{(b-a)(b+a-2B-2e+2v)+\theta(c^2-b^2)\}<0. \quad (6)$$

or

$$\theta^2(2b-c)^2+\{2cb-2ab+4ac+3a^2-2c^2-5b^2+6(b-a)(B+e-v)\}\theta+$$

$$+(c-a)^2+2(b-a)(b+a-2B-2e+2v)<0$$

Which means

$$L\theta^2+M\theta+N<0, \quad (7)$$

where

$$L=(2b-c)^2\geq 0,\ M=2cb-2ab+4ac+3a^2-2c^2-5b^2+6(b-a)(B+e-v)$$

and $N=(c-a)^2+2(b-a)(b+a-2B-2e+2v).$

For the existence of θ values, at which the inequality (7) is fulfilled, it is necessary that

$$M^2-4LN\geq 0.$$

When fulfilling the last inequality, θ values, at which the company valuableness is positive at any K values of subsidy, are defined by inequalities

$\theta_1<\theta<\theta_2$, where

$$\theta_{1,2}=\frac{-M\pm\sqrt{M^2-4LN}}{2L}$$

However, remembering that $0<\theta<1$, we obtain the following

$\theta_{(-)}<\theta<\theta_{(+)}$,

where

$\theta_{(+)}=\min(\theta_2,1)$ and $\theta_{(-)}=\max(\theta_2,0).$

The inequality is opposite to (6), i.e.

$$[c-a+\theta(b-2c)]^2-(3\theta-2)\{(b-a)(b+a-2B-2e)+\theta(c^2-b^2)\}\geq 0$$

it is fulfilled, if either $\theta\geq\theta_2$ or $\theta\leq\theta_1$.

Given that $0<\theta<1$, we obtain that the last inequality is fulfilled in the following cases:

A) if $\theta_2<1$, then $\theta_2\leq\theta<1$,

B) if $\theta_1 > 0,$ then $0 < \theta \le \theta_1,$

and in these cases the subsidy levels, at which the company valuableness is positive, are defined by either of the inequalities:

$K > K_2$ or $K < K_1$ where

$$K_{1,2} = \frac{-[c - a + \theta(b - 2c)] \pm \sqrt{L\theta^2 + M\theta + N}}{3\theta - 2}.$$

Though, given the need to meet the natural requirement, K > 0,

it is necessary to meet the following conditions in order to fulfill $K_1 > 0$ inequality:

$$\begin{cases} c - a + \theta(b - 2c) < 0 \\ 3\theta - 2 > 0 \end{cases}$$

These conditions are met with θ parameter values satisfying the inequalities

$$\max(\frac{2}{3}, \frac{c-a}{2c-b}) < \theta < 1,$$

Otherwise, the subsidy levels, at which the valuableness for the company is positive, are defined by one inequality:

$K > K_2$

If

b) $3\theta - 2 \le 0$, i.e. $\theta \le \frac{2}{3}$,

To fulfill the inequality (5) it is necessary to fulfill the following:

$[c - a + \theta(b - 2c)]^2 - (3\theta - 2)\{(b - a)(b + a - 2B - 2e) + \theta(c^2 - b^2)\} \ge 0$ or

$L\theta^2 + M\theta + N \ge 0$.

Solutions of the last inequality are defined by θ values satisfying either $\theta < \theta_1$ or $\theta > \theta_2$ inequalities,

where

$$\theta_{1,2} = \frac{-M \pm \sqrt{M^2 - 4LN}}{2L}$$

However, remembering that $0 < \theta < 1$ we obtain the following

$0 < \theta < \theta_{(-)}$ or $1 > \theta > \theta_{(+)}$,

where

$\theta_{(+)} = \min(\theta_2, 1)$ and $\theta_{(-)} = \max(\theta_2, 0)$.

In these cases, the subsidy levels, at which the valuableness for the company is positive, are defined by inequalities:

$K_1 < K < K_2$, where

$$K_{1,2} = \frac{-[c - a + \theta(b - 2c)] \pm \sqrt{L\theta^2 + M\theta + N}}{3\theta - 2}.$$

Though, given the need to meet the natural requirement, K > 0,

it is necessary to fulfill the following conditions in order to fulfill $K_1 > 0$ inequality:

$$\begin{cases} c - a + \theta(b - 2c) > 0 \\ 3\theta - 2 < 0 \end{cases}$$

These conditions are fulfilled with θ parameter values satisfying the inequalities

$$0 < \theta < \min\left(\frac{2}{3}, \frac{c - a}{2c - b}\right).$$

However, in order for the company to make some efforts, the government shall offer it such subsidy level that the following inequality to be fulfilled

$V_e(K) - V(K) > 0$.

Let us consider the first case:

1) c – K > b or K < c –b. I.e. this is the case when the subsidy value will not cover the lack of funds for normal company operation, even if company receives the largest cash flow b.

Then

$V_e(K) - V(K) = v - e > 0$.

It means that the company is interested in making additional efforts at such subsidy levels.

2) a ≤ c – K ≤ b or c – a ≥ K ≥ c –b. I.e. this is the case when subsidy value will not cover the lack of funds for normal company operation, even if company receives maximum possible cash flow b. Then

$$V_e(K)-V(K)=\frac{1}{2\sigma}[b^2-a^2-\theta(b^2-c^2-2cK-K^2)-2K(b-c+K)(1-\theta)-$$
$$-(c^2-2cK+K^2-a^2)+2(v-e)(b-a)]>0$$

Or

$$3(1-\theta)K^2-2[2c-b(1-\theta)]K+(c^2-b^2)(1-\theta)-2(v-e)(b-a)<0$$

The subsidy levels satisfying the last condition exist, only if

$$[2c-b(1-\theta)]^2-3(1-\theta)^2(c^2-b^2)+6(1-\theta)(v-e)(b-a)\geq 0$$

Let us define θ parameter values at which the last inequality is fulfilled.

Having designated $\bar{\theta}=1-\theta$, this inequality will take the following form:

$$4c^2-4cb\bar{\theta}+b^2\bar{\theta}^2-3\bar{\theta}^2(c^2-b^2)+6\bar{\theta}(v-e)(b-a)\geq 0$$

$$\bar{\theta}^2[4b^2-3c^2]-2[2cb-3(v-e)(b-a)]\bar{\theta}+4c^2\geq 0 \qquad (8)$$

Let us consider the following cases:

X) $4b^2-3c^2>0$, i.e. $c<\frac{2\sqrt{3}}{3}b$. If the inequality is fulfilled:

$$[2cb-3(v-e)(b-a)]^2-4c^2(4b^2-3c^2)\geq 0,$$

the inequality (8) will be fulfilled when $\bar{\theta}>\bar{\theta}_2$ or $\bar{\theta}<\bar{\theta}_1$, where

$$\bar{\theta}_{1,2}=\frac{E\pm\sqrt{E^2-DF}}{D},$$

where $D=4b^2-3c^2$, $E=2cb-3(v-e)(b-a)$, a $F=4c^2$.

Given that $0<\bar{\theta}<1$, inequality (8) is fulfilled when

$\bar{\theta}_{\min}<\bar{\theta}<1$ and $0<\bar{\theta}<\bar{\theta}_{\max}$,

where

$\bar{\theta}_{\min}=\min(\bar{\theta}_2,1)$ and $\bar{\theta}_{\max}=\max(\bar{\theta}_1,0)$. I.e. when

$0<\theta<1-\bar{\theta}_{\min}$ and $1-\bar{\theta}_{\max}<\theta<1$.

In case of these θ parameter values, the subsidy levels, which lead to additional value for the company from the effort made, are defined by inequalities:

$K_1<K<K_2$, where

$$K_{1,2} = \frac{2c - b(1-\theta) \pm \sqrt{(2c - b(1-\theta))^2 - 3(1-\theta)^2(c^2 - b^2) + 6(1-\theta)(v-e)(b-a)}}{3(1-\theta)}.$$

If

$[2cb - 3(v-e)(b-a)]^2 - 4c^2(4b^2 - 3c^2) < 0$,

the inequality (8) will be fulfilled at any θ.

In case

Y) $4b^2 - 3c^2 \le 0$, i.e. $c \ge \frac{2\sqrt{3}}{3} b$. It is obvious that the inequality (8) may be fulfilled only after the following inequality is fulfilled

$[2cb - 3(v-e)(b-a)]^2 - 4c^2(4b^2 - 3c^2) \ge 0$.

At that, the inequality solutions (8) are given as interval $\bar{\theta}_1 < \bar{\theta} < \bar{\theta}_2$.

Given that $0 < \bar{\theta} < 1$, the inequality (8) is fulfilled when

$\bar{\theta}_{\max} < \bar{\theta} < \bar{\theta}_{\min}$. I.e. when $1 - \bar{\theta}_{\min} < \theta < 1 - \bar{\theta}_1$.

In case of these θ parameter values, the subsidy levels, which lead to additional value for the company from the effort made, are also defined by inequalities:

$K_1 < K < K_2$, where

$$K_{1,2} = \frac{2c - b(1-\theta) \pm \sqrt{(2c - b(1-\theta))^2 - 3(1-\theta)^2(c^2 - b^2) + 6(1-\theta)(v-e)(b-a)}}{3(1-\theta)}.$$

III) Value for the state without company efforts

The state is interested in sufficient company production output q that will be presented with utility function U(q) in the model. In this case, if the company does not make efforts e, the state counts on the low quality product output q_L. Value for the state from such system of relationship with the company is presented with value G(K), where

$G(K) = E[U(q_L)] - K.$

However, the government wants the valuableness to take on a positive value, G(K) >0.

This implies the need to fulfill the following inequality:

$E[U(q_L)] > \mathrm{K}$. I.e. the expected production utility for the state shall exceed the level of the company subsidization.

IV) Value for the state with company efforts

The state is interested in sufficient company production output q that will be presented with utility function U(q) in the model. In this case, if the company makes additional efforts e, the state counts on high quality product output q_H. Given that there is expropriation of the company funds in the large cash flow, value for the state is presented with $G_e(K)$, where

$$G_e(K) = E[U(q_H)] + E[Y_{1-\theta} \mid Y > c] - K =$$

$$= E[U(q_H)] + E[X\theta + K(1-\theta) \mid X > c - K] - K.$$

Further calculations depend on whether the value c - K exceeds the value of the maximum possible value of the company cash flow b or not.

Let us consider the first case:

1) c – K > b or K < c –b. I.e. this is the case when the subsidy value does not cover the lack of funds for normal company operation, even if the company receives the maximum possible cash flow b.

Then

$G_e(K) = E[U(q_H)] - \mathrm{K}$.

However, the government wants to take on a positive value, $G_e(K) > 0$.

This implies the need to fulfill the following inequality:

$E[U(q_H)] > \mathrm{K}$. I.e. the expected production utility for the state shall exceed the level of the company subsidization.

2) $a \le c - K \le b$ or $c - a \ge K \ge c - b$. I.e. this is the case when the subsidy value covers the lack of funds for normal company operation, if the company receives the maximum cash flow b.

Then (see proof in Appendix)

$$G_e(K) = E[U(q_H)] + \frac{K}{\sigma}(b - (c - K)) + \frac{\theta}{2\sigma}(b + c - 3K)(b - (c - K)) - K. \quad (9)$$

In this case, the subsidy value, with which the extreme value for the state is achieved, is defined by equation: $2(3\theta - 2)K - 2[a - c + \theta(2c - b)] = 0$

I.e. when

$$K = K_{extr} = \frac{\theta(2c - b) + a - c}{3\theta - 2}.$$

When $\theta > \frac{2}{3}$, this subsidy level results in the maximum value for the state, and when $\theta < \frac{2}{3}$, this subsidy level results in the minimum value for the state. I.e. the company and state interests are contending in this case.

However, the government wants to take on a positive value, $G_e(K) > 0$.

This implies the need to fulfill the following inequality:

$$2K^2 - 3\theta K^2 + 2(b - c)K + \theta(b + c)K - 3\theta(b - c)K - 2(b - a)K + \\ + \theta(b + c)(b - c) + 2(b - a)E[U(q_H)] > 0$$

or

$$(3\theta - 2)K^2 - 2[a - c + \theta(2c - b)]K + \theta(c^2 - b^2) - 2(b - a)E[U(q_H)] < 0.$$

Let us consider the first case:

1) $3\theta - 2 > 0$ or $\theta > \frac{2}{3}$.

Then the subsidy levels that satisfy the last condition exist, only if

$$[a - c + \theta(2c - b)]^2 - (3\theta - 2)\{\theta(c^2 - b^2) - 2(b - a)E[U(q_H)]\} \ge 0$$

Let us define θ parameter values, with which the last inequality is fulfilled.

This inequality is equivalent to the following inequality:

$$\theta^2(2c-b)^2-3\theta^2(c^2-b^2)+2\theta(a-c)(2c-b)+2\theta(c^2-b^2)+6\theta(b-a)E[U(q_H)]+$$
$$+(a-c)^2-4(b-a)E[U(q_H)]\geq 0$$

or

$$\theta^2(c-2b)^2+2\theta\{2ac-ab-c^2+cb-b^2+3(b-a)E[U(q_H)]\}+$$
$$+(a-c)^2+4(b-a)E[U(q_H)]\}\geq 0$$

It means

$$R\theta^2+2S\theta+T\geq 0, \qquad (10)$$

where

$$R=(c-2b)^2,$$

$$S=2ac-ab-c^2+cb-b^2+3(b-a)E[U(q_H)],$$

$$T=(a-c)^2+4(b-a)E[U(q_H)]$$

I.e. $R=(c-2b)^2\geq 0$, if in this case inequality $S^2-RT<0$ is fulfilled, inequality (9) is fulfilled at any θ parameter values.

If opposite inequality $S^2-RT\geq 0$ is fulfilled, inequality (10) is fulfilled, when $\theta\geq\theta_2$ or $\theta\leq\theta_1$,

where

$$\theta_{1,2}=\frac{-S\pm\sqrt{S^2-RT}}{R}$$

However, remembering that $0<\theta<1$, inequality (9) is fulfilled, when $\theta_{(+)}<\theta<1$ or $0<\theta<\theta_{(-)}$

where

$\theta_{(+)}=\min(\theta_2,1)$ and $\theta_{(-)}=\max(\theta_2,0)$.

In this case, the subsidy levels necessary for positive valuableness for the state are defined by inequalities:

$K_1<K<K_2$, where

$$K_{1,2}=\frac{a-c+\theta(2c-b)\pm\sqrt{[a-c+\theta(2c-b)]^2-(3\theta-2)[\theta(c^2-b^2)-2(b-a)E[U(q_H)]]}}{3\theta-2}$$

Given that subsidy levels K are positive, such subsidy levels exist only when $K_2 > 0$ and are defined by inequalities

$K_1^+ < K < K_2^+$, where

$K_1^+ = \max(K_1, 0)$ and $K_2^+ = \max(K_2, 0)$.

In this case, if $K_2^+ = 0,$ there are no subsidy levels resulting in positive value for the state.

Let us consider the second case, when

2) $3\theta - 2 \le 0$ or $\theta \le \frac{2}{3}$.

Then, if

$[a - c + \theta(2c - b)]^2 - (3\theta - 2)\{\theta(c^2 - b^2) - 2(b - a)E[U(q_H)]\} \ge 0$,

i.e. if

$\theta_{(+)} < \theta < 1$ or when $0 < \theta < \theta_{(-)}$

where

$\theta_{(+)} = \min(\theta_2, 1)$ and $\theta_{(-)} = \max(\theta_2, 0)$,

the subsidy levels necessary for positive value for the state are defined by inequalities:

$K > K_2$ or $K < K_1$, where

$$K_{1,2} = \frac{a - c + \theta(2c - b) \pm \sqrt{[a - c + \theta(2c - b)]^2 - (3\theta - 2)[\theta(c^2 - b^2) - 2(b - a)E[U(q_H)]]}}{3\theta - 2}$$

Given that subsidy levels K are positive, such subsidy levels exist only when $K_2 > 0$ and are defined by inequalities

$K > K_2^+$ or $K < K_1^+$ where

$K_1^+ = \max(K_1, 0)$ and $K_2^+ = \max(K_2, 0)$.

In this case, if $K_2^+ = 0,$ there are no subsidy levels resulting in positive value for the state.

However, if the company made an effort e, the state is interested to get the valuableness gain for itself. I.e. it is desirable to fulfill the inequality:

$G_e(K) - G(K) > 0$.

Let us consider the first case:

1) c – K > b or K < c –b. I.e. this is the case when the subsidy value does not cover the lack of funds for normal company operation, even if company receives the maximum possible cash flow b.

Then

$G_e(K) - G(K) = E[U(q_H)] - E[U(q_L)] > 0$

It means that the state is interested in the company efforts, if the expected high quality product output utility is larger than that of the low quality products, i.e. $E[U(q_H)] > E[U(q_L)]$.

2) a ≤ c – K ≤ b or c – a ≥ K ≥ c –b. I.e. this is the case when the subsidy value covers the lack of funds for normal company operation, if the company receives the maximum cash flow b. Then

$G_e(K) - G(K) =$

$$= (E[U(q_H)] - E[U(q_L)]) + \frac{K}{\sigma}(K - (c-b)) + \frac{\theta}{2\sigma}(b + c - 3K)(K - (c-b)) > 0. \quad (11)$$

I.e. in this case $(K - (c-b) > 0$, if natural condition $E[U(q_H)] > E[U(q_L)]$ is fulfilled, fulfillment of inequality (11) requires the inequality: $b + c - 3K > 0$, which is equivalent to $K < \frac{b+c}{3}$. I.e. when these conditions are fulfilled, the state gets the valuableness gain from the effort made by the company.

It is also known from (10) that when conditions $E[U(q_H)] > E[U(q_L)]$ and $K < \frac{b+c}{3}$ are fulfilled, increase in θ political risk parameter results in increase in valuableness gain for the state, while growth of σ company cash flow volatility reduces the valuableness gain from the effort made by the company for the state.

Let us denote $\Delta E(U) = E[U(q_H)] - E[U(q_L)]$

Let us find all K values, with wich inequality (11) is fulfilled, i.e.

$$\Delta E(U) + \frac{K^2}{\sigma} - \frac{K}{\sigma}(c-b) - \frac{3\theta}{2\sigma}K^2 + \frac{\theta}{2\sigma}(3(c-b) + b + c)K + \frac{\theta}{2\sigma}(c^2 - b^2) > 0$$

or

$$(2-3\theta)K^2 - 2(c-b-\theta(2c-b))K + \theta(c^2-b^2) + 2\sigma\Delta E(U) > 0 \quad (12)$$

The following cases are possible:

1) $2-3\theta > 0$ or $\theta < \frac{2}{3}$.

If, in this case, the following inequality is fulfilled

$$(c-b-\theta(2c-b))^2 - (2-3\theta)[\theta(c^2-b^2) + 2\sigma\Delta E(U)] < 0,$$

inequality (12) is fulfilled at any K subsidy level values.

The last inequality is equivalent to the following one:

$$\theta^2(7c^2 - 4cb - 2b^2) - 2\theta(2c^2 - 3cb + b^2 - 3\sigma\Delta E(U)) +$$
$$+ (c-b)^2 - 4\sigma\Delta E(U) < 0$$

Or

$$A\theta^2 - 2B\theta + C < 0 \quad (13)$$

where

$A = 7c^2 - 4cb - 2b^2$,

$B = 2c^2 - 3cb + b^2 - 3\sigma\Delta E(U)$,

$C = (b-c)^2 - 4\sigma\Delta E(U)$.

Let us suggest that

A) $A = 7c^2 - 4cb - 2b^2 > 0$. It is easy to check that this condition is fulfilled, when

$$c > \frac{2+3\sqrt{2}}{7} b.$$

If, in this case, inequality $B^2 - AC \geq 0$ is fulfilled, inequality (13) is fulfilled, when

$$\theta_1 < \theta < \theta_2$$

where

$$\theta_{1,2} = \frac{-B \pm \sqrt{B^2 - AC}}{A}$$

However, remembering that $0 < \theta < 1$, inequality (13) is fulfilled, when $\theta_{(-)} < \theta < \theta_{(+)}$,

where

$\theta_{(+)} = \min(\theta_2, 1)$ and $\theta_{(-)} = \max(\theta_2, 0)$.

If the opposite inequality is fulfilled:

B) $A = 7c^2 - 4cb - 2b^2 \le 0$, i.e. if $c \le \frac{2+3\sqrt{2}}{7} b$,

inequality (13) is fulfilled, when $0 < \theta < \theta_{(-)}$ or when $\theta_{(+)} < \theta < 1$

In all these cases, the subsidy levels necessary for valuableness gain from additional efforts made by the company for the state are defined by inequalities: $K > K_2$ or $K < K_1$, where

$$K_{1,2} = \frac{c - b - \theta(2c - b) \pm \sqrt{[c - b - \theta(2c - b)]^2 - (2 - 3\theta)[\theta(c^2 - b^2) + 2\sigma\Delta E(U)]}}{2 - 3\theta}$$

Given that K subsidy levels are positive, the subsidy levels necessary for valuableness gain for the state are defined by inequalities

$0 < K < K_1^+$, where $K_1^+ = \max(K_1, 0)$ or $K > K_2$.

If

2) $2 - 3\theta \le 0$ or $\theta \ge \frac{2}{3}$.

If, in this case, inequality

$(c - b - \theta(2c - b))^2 - (2 - 3\theta)[\theta(c^2 - b^2) + 2\sigma\Delta E(U)] \ge 0$ (14) is fulfilled,

inequality (12) is fulfilled, when K subsidy level values satisfy the conditions:

$K_1 < K < K_2$.

Given that K subsidy levels are positive, the subsidy levels necessary for valuableness gain for the state are defined by inequalities

$K_1^+ < K < K_2$ where $K_1^+ = \max(K_1, 0)$.

Let us find θ parameter values, when inequality (14) is fulfilled.

It is obvious that, when

C) $A = 7c^2 - 4cb - 2b^2 > 0$. I.e. when $c > \frac{2+3\sqrt{2}}{7} b$

inequality (13) will be fulfilled when $0 < \theta \le \theta_{(-)}$ or when $\theta_{(+)} \le \theta < 1$.

If

D) $A = 7c^2 - 4cb - 2b^2 \le 0$ or when $c \le \frac{2+3\sqrt{2}}{7} b$

inequality (13) is fulfilled, when $\theta_{(-)} < \theta < \theta_{(+)}$.

Conclusion

This paper deals with the relationship between the state and the state subsidized company. In such cases there is a conflict of interests between the state and company, i.e. depending on the subsidy level and the level of political risk for the company in the relationship due to the possibility of expropriation of funds from the cash flow controlled by company. In this case, value (utility) for one of the parties may be positive in the relationship, while for another one it may be negative.

The company can make additional efforts to increase the valuableness. But, in this case, valuableness (utility) gain from the efforts made by the company does not always result in value (utility) gain for the state. This paper deals with all possible cases of subsidy levels and expropriation parameter resulting in positive valuableness for each party. It also deals with the issue: what conditions of subsidy level and expropriation parameter, as well as the level of efforts made by company result in value (utility) gain for each party.

Appendix

Proof of formula (1)

Let us consider the first case:

If c – K > b or K < c – b,

$$V(K) = \frac{1}{\sigma}\int_a^b (x+K)dx - B = \frac{1}{\sigma}\left(\frac{b^2}{2} - \frac{a^2}{2} + K(b-a)\right) - B = \frac{b+a}{2} + K - B = \mu + K - B. \quad (1)$$

Proof of formula (2).

If a ≤ c – K ≤ b or c – a ≥ K ≥ c –b,

$$V(K)=\frac{1}{\sigma}\int_{a}^{c-K} xdx+K-B=\frac{1}{\sigma}(\frac{(c-K)^2}{2}-\frac{a^2}{2})+K-B=$$

$$=\frac{1}{2(b-a)}(K^2-2(c+a-b)K+c^2-a^2-2(b-a)B). \quad (2)$$

Proof of formula (3).

If the company makes effort e, according to the described system of relationship between the company and the government, value for the company $V_e(K),$ is equal to

$$V_e(K)=E(Y\mid Y\le c)+E(Y_\theta\mid \mathrm{Y}>\mathrm{c})\text{-}\mathrm{B}+\mathrm{v}\text{-}\mathrm{e}=$$

$$=E(X\mid X\le c-K)+KP\{X\le c-K\}+(1-\theta)E(X\mid X>c-K)+K\theta P\{X>c-K\}-B+v-e=$$

$$=E(X)-\theta E(X\mid X>c-K)+K-KP\{X>c-K\}+K\theta P\{X>c-K\}-B+v-e=$$

$$=E(X)-\theta E(X\mid X>c-K)-K(1-\theta)P\{X>c-K\}+K-B+v-e. \quad (3)$$

Proof of formula (4).

$$V_e(K)=\frac{b+a}{2}-\frac{\theta}{\sigma}\int_{c-K}^{b} xdx-\frac{K(1-\theta)(b-c+K)}{\sigma}+K-B+v-e=$$

$$=\frac{b+a}{2}-\frac{\theta}{\sigma}(\frac{b^2}{2}-\frac{(c-K)^2}{2})-\frac{K(1-\theta)(b-c+K)}{\sigma}+K-B+v-e=$$

$$=\frac{b+a}{2}-\frac{\theta}{2\sigma}(b^2-c^2+2cK-K^2)-\frac{K(b-c+K)(1-\theta)}{\sigma}+K-B+v-e. \quad (4)$$

Proof of formula (9).

$$G_e(K)=E[U(q_H)]+\frac{1}{\sigma}\int_{c-K}^{b}(x\theta+K(1-\theta))dx-K=$$

$$=E[U(q_H)]+\frac{1}{\sigma}(\theta(\frac{b^2}{2}-\frac{(c-K)^2}{2})+K(1-\theta)(b-c+K))-K=$$

$$=E[U(q_H)]+\frac{K}{\sigma}(b-(c-K))+\frac{\theta}{2\sigma}((b-K)^2-(c-2K)^2))-K=$$

$$= E[U(q_H)] + \frac{K}{\sigma}(b-(c-K)) + \frac{\theta}{2\sigma}(b+c-3K)(b-(c-K)) - K. \quad (9)$$

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Colouring with Children: the case of "Happy lanes- Cirkáló"

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ABSTRACT

This paper proposes a workshop for the process introducing 'Happy Lanes' colouring method; a colouring method for design educators for children. It focuses colouring perception in two approaches: from the neuropsychological and neurobiological. While we point on the benefits of the method with help of some special worksheets we analyse the process of solution, step by step, looking at the working of the colouring lanes, as the essence of the method. It stems from Berlyne's motivation theory relating to the active inference theory, especially predictive coding and free energy principle. Through this method as a map, children can map their way between each and every level of the hierarchical brain system and cortical microcircuits. The colouring process includes two ways in parallel with each other in a top-down system; by creative, independent problem solving. According to the motivation theory the goal of this process is the optimal arousal level, which depend on the stimuli of the environment; in this case, children colour the task with the aid of the colouring lanes. This they do without any help from someone.

KEYWORDS: Colouring, Happy Lanes- Cirkaló, cognitive, worksheets.

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Introduction

There is casual structure of brain in our world that the brain distils and embodies in its inferential machinery. Modern versions of Helmholtz's ideas are now among the most popular explanations for message passing in the brain-generally cast in terms of the Bayesian brain hypothesis or predictive coding. These are not abstract or hand waving schemes; the anatomical and physiological evidences available points towards predictive coding as the organizing principle for cortical microcircuits and hierarchical brain system (Bastos, 2012), productive coding in sensory system, and for a related treatment of motor system (Adams, 2012). In these schemes, neuronal representations in higher levels of sensory cortical hierarchies entail hypotheses that provide predictions for lower levels. These top-down predictions are compared with representations at the lower level to form a prediction error (usually associated with the activity of superficial pyramidal cells). This prediction error is then passed back up the hierarchy, to change higher representations (usually associated with the activity of deep pyramidal cells). These changes provide better predictions and thereby reduce prediction error at each and every level of the hierarchy." (Friston, 2013). In other words the process of solution takes place in a dynamic and complex system where memories remain under constant monitoring in order to ensure the right decisions.

In art, especially colouring where children follow various lines, blocks and predictive ideas, the issue of productive coding are followed, resulting in independent decision taken on the basis of the imagination and creative thinking, especially of children. These in turn produce images and stories depending on which method is more easily and accurately applied. This is a very sensitive procedure, which arises as a result of the co-existence of numerous constituents and is carried out automatically but there is the need to analyse more component of the theory that explains how children get the immensely calm, balanced and tranquil psychological state during the solution of the task. This article reports on methods on the "Happy lanes" Cirkáló – a colouring method, that helps children to use their visual sense in colouring as way of measuring their predictive coding. References will be made to the key methodological points of the method in education and development work, with emphasis on

analysing the internal structure of the method. In this this article, we also seek to reveal modern interdisciplinary relationships to provide evidence of the modern approaches of the application and its efficiency. We report on samples of projects undertaken with some worksheets, assisted by the analysis of the work and references to the experiences gathered during the application of the method.

Literature Study

Cognitive development, or growth, is the result of a chain of events triggered by the loosening of the cognitive balance, when discrepancies between incoming stimuli and the information stored in the central nervous system emerge. The conflict ensuing between these two sources motivates curiosity and explorative behaviour patterns; the latter providing the individual with the information that helps attenuate the conflict. The attenuation of the conflict consequently reinforces curiosity, thus guaranteeing that attention will be paid to novel stimuli in the future. It is in relation to this set of stored information that individuals develop their physiological arousal or stimulatory levels, and the new informational input triggers exploratory or avoidance behaviour, depending on whether they increase or decrease the arousal. The goal of the individual is to reach the optimal arousal level all the time, since neither low-stimulus environments nor over-stimulated ones are pleasant. According to the hypothesis formulated by Berlyne, experience of arousal as pleasant or unpleasant is determined by inputs from reward and aversion centres in the brain, which provide a neuropsychological basis for the two different types of curiosity: diversive and specific curiosity.

Basically we observe the process of perception in two approaches: according to neuropsychological and neurobiological approaches. Berlyne's (1960) theory indicate that we always want to find the optimal arousal level: by increasing the novelty, complexity and variety of the stimuli in a person's environment, or by supply information that will reduce the individual's subjective uncertainty and discomfort.

The active inference explains this process based on predictions/ and with couple of the perception and the action. We change our prediction to explain the sensory input through the perception; alternatively we change the sensory input to fulfill our prediction. This is a conflict between the action and the perception.

Thus, when we look at the diversive curiosity about the low stimuli level of the environment then we actually change the input to fulfill our prediction. Why? Because we must create prediction from the "empty" environment to increasing the level of the arousal but we must change the input to fulfill it! Alternatively, when we look at the specific curiosity about the high stimuli level of the environment then we actually change our prediction, that we can explain the input. The reason being that there is so much stimuli and one must create modified prediction to reduce the arousal level that can find and explain the input.

In the following section we present activities of worksheets in a certain sequence. This does not necessarily mean a methodological sequence that has to be followed during the development work. The method may be applied with several aims and according to several methodologies. Later, after this, we analyse some solved worksheets with special, typical mistakes to draw conclusions and to understand more of the colouring process, by step by step "in mirror" of the theory

Methodology

The principle never changes, except the theme of the pictures, the details, as well as the shape, complexity and difficulty of certain details of the pictures. Also their correlation with the colouring lanes, include infinite variation possibilities. It thus renders it possible to create varied worksheets and to also arrange them according to the level of difficulty of the worksheets. The colouring lane operates in a rather complex manner within the system, being able to transform, to generate new worksheets in different ways, without theoretically losing its basic feature. One should not forget, however, that the drawing should also be annexed to it, because the structure of the task can only be determined based on two elements together, on their relationship with each other. So, at first, the colouring lanes generate the task. The

basic principle for arranging the pictures is according to the level of their difficulty. Thus, apart from generating the task itself, colouring lanes is the necessary prerequisite for us to be able to create more and more complex, difficult tasks.

In this study, we report on two groups of worksheets engaged in the process by groups of children. These groups were created on the basis of the development of the way children think. The most basic method is when small children assign information they consider to be related into small groups (figure 1.) When they are faced with new information, they analyse whether it can be assigned into one of the known groups or whether a new group should be created. They create sequences of inter-related information, separate exceptions out of which they create a new group. They arrange pieces of information into an order, highlighting differences – smaller, larger, more, less, etc.

The first group of work sheets presents an opportunity for this kind of reasoning.

Figure 1. The easiest worksheet for the early childhood

The drawings are easy to comprehend, lightly differentiated, and the drawing details include identical, similar and different-, according to their colours - shapes and sizes. Their inter-relations are characteristic; the repetition of the shapes in sequences may be detected. The other group of work sheets (figure 2.) on the other hand offer tasks that help the thinking skills in terms of comprehension of pictures by the help of more complex picture building; the rising number of drawing elements, and the increasingly complex relation of the colouring lanes to these elements.

Figure 2.: Relatively complex worksheet

Of course, these systems no longer facilitate simple sequence creation, although it is interesting to see how the two operate parallel and how they shift from one another depending on which solution is the most practical for children. The shift may often be detected also within a single worksheet. Therefore it is not easy to draw a line between the two large types of work sheets. Instead, we seek to provide children the opportunity to freely make use of both.

We follow with other series, indicating problems of space appearing, as the problems of shape – background, foreground – background. Colouring lanes shift from one shape to another, breaking the parallel character of vertical lines, and they pose quite a task, because behind the colourful spots swirling on the surface, following the system of drawing shapes is a more difficult task for children. Basically, this series of work sheets prompts the question: how does our vision work, which shapes do we see as more dominate than others. On the basis of the example of Rudolph Arnheim, whereby the question arises: do we see a white circle on a black square, or a black square on a white background, which has a white round shape hole in the middle, according to the phenomena of the ambiguous perception or binocular rivalry. We could assume that the colourful shapes, as the system of colouring lanes is more dominant because it attracts our attention more, but this does not happen in every case.

There were worksheets where drawings are more clearly distinguishable, and colouring lanes only feature as reflections of the colours. But we can also find examples where we can hardly

notice the drawings in the background, because the system of colouring lanes almost completely dominates the pictures. There is a series based on a similar principle, meaning the opposite drawing direction of drawings and colouring lanes, but in a special and specific context. The horizontal parallels of the colouring lanes and the crooked spots of waves squeeze against one another, serving to purpose fully develop children's ability to recognise the essence of pictures, as well as their spatial vision and ability to concentrate. The waves can also be seen in the background of the small boat, thereby also posing the problem of foreground – background, shape – background.

This appears in a different shape on the worksheet depicting a balloon where the crooked green spots of hills tower above each other and the horizontal – parallel spots of colouring lanes create the real task. In the case of these tasks, of course, there are more drawing details and more attention must be paid to ensure that the final solution is indeed the complete picture.

The next big step is the symmetry – mirror image series. The solution principle is naturally the same as always, but the tasks help in understanding, practicing and mastering the knowledge of symmetry – mirror image. During the series of tasks, we can eventually find ourselves facing greater challenges, both has a result of the detail in the drawings and the more complicated appearance of colouring lanes. In this case, greater concentration ability, monotony endurance and sharper memory will be required from children.

Following the various approaches of spatial problems, we have arrived at the spatial imagery and understanding of geometrical shapes, with the help of dividing the squares into a number of smaller squares; then to the work sheets with two- or more solutions, where the solution of the same worksheet could be several different pictures. To understand the real essence of the method, first of all we must analyse one or two "incorrectly" completed worksheets in more detail. These errors have a moral for us, because they help give some glimpse into the unique thinking of children and cast a light on the way in which this method provides an opportunity for us to do so.

A 4-5 year old girl coloured this worksheet (figure 3.) in two ways and if she had continued, there would likely have been more and more different solutions. She handled the above problem on the first worksheet in a similar way, but she manipulated with green colour, colouring the area between the two wheels of the car green, so that the green shape of the trailer would have a match on the picture. Thus, she did not consider it necessary to colour the black shape of the rear wheel. The match for the black shapes was already present in the picture, engulfing the green shape, which also had its pair on the trailer.

Figure 3.: An example of the special solutions worksheet

It was interesting to see how, after completing this work, the little girl started to colour the same worksheet once again, though nobody suggested her to do so. We could see that her approach was totally different. She used completely new approaches for this new solution (figure 4.).

Figure 4.: An example of the special solutions

The previous train of thought was no longer of interest to her, she coloured the bottom part including the wheels as she had to, based on the colouring lanes, however, the top half of the

car, which she had had no particular interest in during the first solution and which she coloured correctly based on the colouring lanes in the first solution, was given a whole new meaning. The horizontal division of colouring lanes and their system of building onto one another provided the opportunity of forming series. The interchanging of yellow and blue colouring lanes appears in a completely new form, by the creation of a counter-point. The blue-yellow division of the top colouring lane, moving from left to right appears in her presentation, in the line to be coloured in the blue yellow blue yellow series, if we look at it within the system of windows. But we can also look at this exceptional and genius solution from top to bottom as well. Next the blue of the top colouring lane is followed by a yellow patch in the lane to be coloured, which then is followed by another blue colouring lane.

Discussions

An important characteristic of the method is that it offers a straightforward system of rules for the solution, and the performance of children may also be assessed on the basis of this. On top of this, on a higher level, all this is overwritten, and rules may gain a new meaning, they may be voided and children will have their chance to think in their own „stubborn" ways freely, while we will be given the opportunity to follow this procedure. The worksheets are really tools for this, and no matter what way children solve the tasks, it will certainly be an experience for them and to us.

Diverse curiosity motivates stimulus-seeking, exploratory behaviour, which will increase arousal to an optimal level by increasing the novelty, complexity and variety of the stimuli in a person's environment. In contrast, specific curiosity leads to exploratory behaviour designed to supply information that will reduce the individual's subjective uncertainty and discomfort.

When an individual lacks information about the stimuli which impinge on it, it will perceive specific curiosity as a state of mild discomfort and heightened physiological arousal. Stimuli with relatively high arousal potential that exceed the organism's optimal level may evoke

either specific curiosity and exploratory behaviour or fear and flight, depending on how much novelty, complexity or unpredictability is introduced. Increases in stimulus intensity (arousal potential) were sometimes rewarding and, at other times, such increases generate avoidance responses so that a subsequent decrease in stimulus intensity was rewarding. Small to moderate increases in arousal were often rewarding whereas extreme increases were generally aversive.

Berlyne's figure illustrates the correlation between diverse and specific exploration and the changes in the optimal level of arousal potential, illustrating how lines marking the curiosity-drive and the anxiety drive change in respect to these. This figure is important because it shows that curiosity and anxiety have a combined motivational effect on diversive and specific exploratory behaviour and we shall see how the mechanism contained in my method can be fitted into this theoretical framework, in fact, how it modifies it. The visual nature of tasks, combined with the transfer of cognitive information and the internal mechanism of worksheets creates a system that activates diverse and specific exploration in an almost organic union, since, whenever children face a more complex decision during task solution, their specific curiosity triggers a behaviour of exploration where they must use the help of the colouring lanes to solve the task, this reduces the level of arousal. On the other hand, when they no longer require the help of the colouring lanes, because they clearly see the system of drawing shapes, then the diverse curiosity is the motivator and arousal is lifted to an optimum level. In other words when ones begin the solving, the new information lift up the level of arousal and activate the specific curiosity. After, during the task solving process this arousal level will be reduced and it will activate the diverse curiosity and will lift the level of arousal. When there will be a new problem or information, the level of arousal also will be lifted and the specific curiosity will be activated. Then this process will repeat itself on the higher level of the stored information.

The movement of transfer of information between the lower and higher level of the brain is also continuous, because children must monitor, check the all drawing and colouring lanes shapes and compare them with the details of picture in relation with relationship of shape-

background, foreground-background, part-whole and they must distinguish between the routine picture of the colouring lanes and the real drawing shapes. The figure as illustrates the process, can also be compared to two tornadoes moving in opposite directions (figure 5)

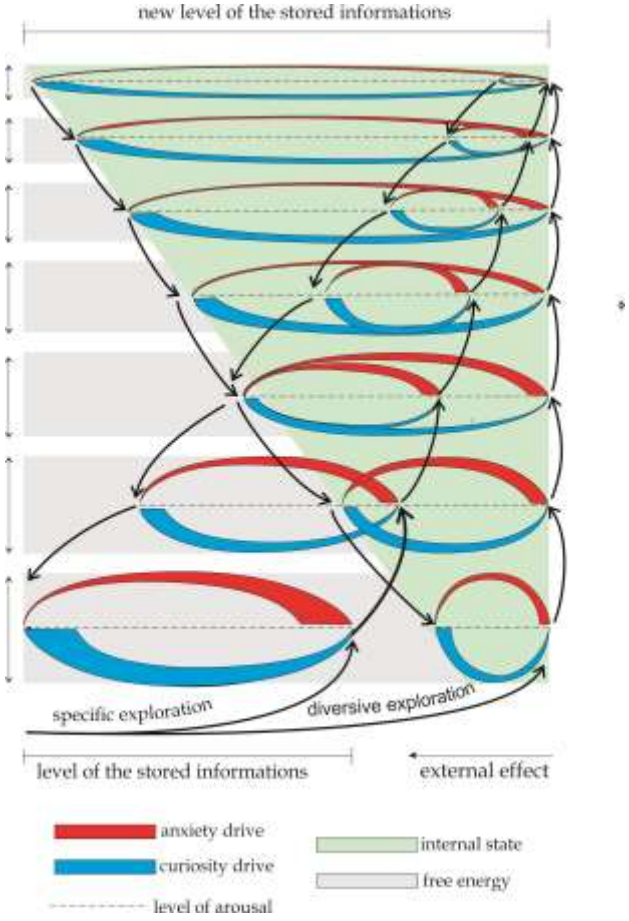

Figure 5.: "Tornado" principle

One can see that the process which starts from the level of stored information shows an upward movement, alongside a spatial, spiral form, always one level up in the correlation of curiosity and anxiety, while the level of arousal decreases and increases, subsequently setting an optimal arousal level; it is at this point that diversive and specific exploration become balanced during task-solving. One can see how it arrives at a broader level of storage where the process starts all over again. One can also observe the decrease in the level of anxiety.

Conclusion

As we have seen in the analyses of errors, the appearance of the colouring lane shapes and their dominance could define vision and during the solution of the task, the loud cavalcade will be dominant and not the drawing structure. This greatly influences the solution, taking into account at the same time that the performance of children is influenced by the complex effects of a number of circumstances. Worksheets, as we have seen, demand increased focus, attention and monotony endurance and perseverance from them. It is no wonder that children solve a certain part of the worksheet by the exact application of the solution principle. They go wrong from time to time, though they understand what the task is. A good example for this is the next worksheet, which shows a typical example. (figure 6)

Figure 6.: Some mistakes that also add up to the solution

In the encircled sections, the little boy had no more patience and endurance to change pencils, though he used the two different shades of blue very cunningly several times during the task solution, however, we can see how by the end of the task, he used the blue colour that he

happened to have in his hand to finish off the colouring of the two different blue shapes. This same phenomenon may be observed in two other encircled area of the picture.

In the next section, in order to make the complexity of the method truly clear, we must analyse its internal mechanism as well as the process of task solution. In the introduction, in relation to the presentation of the method, as well as in the analyses of worksheets, we mentioned the complex function of the colouring lanes and we must continue along this train of thought with the detailed analyse of motivation theory in relationship with the inferential machinery of casual structure of brain and the basic of their progress in parallel with each other in dynamics of forward-backward and top-down. Thus there will be a condition, in which system there will be seen how the checking process of stored, saved routine pictures connect to this system and how can become the vision, which mechanism works based on the free energy formula to interpretative vision during the task solving.

Let us take the already familiar worksheet as an example. The basic starting point is their visual sensitivity and vivid imagination. Children comprehend the picture immediately, regardless of how the colouring lanes seem to "scribble all over it" and hide its meaning. This is followed by the understanding and application of the solution principle, namely; the role of the colouring lanes.

In summary, task solution is characterized by a complex activity that encompasses theoretical and practical action. Continuous and dynamic information transfer – monitoring – forwarding is carried out between the higher and lower hierarchies of the brain, dynamically shifting among the levels of shape following and creative thinking, with the automatic movement of the arousal level, as a result of which it can always remain in the optimum – rewarding phase.

All this ensures a focused, integrated and balanced task solution process, as well as the balanced, peaceful psychological state. This is a significantly focused activity on its own, but we must remember that it is accompanied by practical activity as well. There are several coloured pencils in front of children scattered on the table or collected in small boxes. We

have tried several methods but the end was always pencils all over the table for easier access. This is important because in addition to the focused mental activity children must also pay attention to selecting the right colour pencil, putting it back to a safe place from where it does not fall off the table and others can also reach it, giving the pencils to their peers when they need them; in other words, children must organize their work properly, which continuously divides their attention.

The essence of method are the so-called “colouring lanes”, which I drew and coloured into the pictures showing the colour of the picture’s details. It is on the basis of and with the help of these that the children colour and complete the picture with the appropriate colours. The children can only see the whole original pictures, when the task has been completed punctually and correctly. The first step in solving a task always is that children have to colour the incomplete parts with the appropriate colours based on, the help of the colouring lanes. All they do is to advance by following the rules but they do not have to necessarily observe anything. But the task offers the children far more than this. Each and every picture portrays displays something happening. Seeing this, they no longer need the help of the colouring lanes every time, because they already see the whole picture, identify the form and they understand, what happens in the picture. For example, the car is blue, the windows are yellow, etc.; they see the spatial relations, the foreground-background relation, recognize the forms and are able to follow them. Then they advance in their work creatively and independently, and no need the help of the colouring lanes. Where there is uncertainty, the colouring lanes that are integrated in the task help in providing directions. However, if they are able to advance without that, they can ignore it. The children are able to work independently and no need the external help and assistance of the teacher. Children are not put off the work, but they continue the colouring work in intense and balanced state.

Summarizing the above, one can see that on the one hand colouring lanes generate the task. By complicating them and making it more difficult, it is possible to arrange the tasks according to level of difficulty. The colouring lanes, being the clue to the task, help children

to find the solution. However, if they are not needed at a certain point, they can be ignored, while still being available for use at a higher level.

It is obvious that the worksheets arouse the curiosity of children because they are visually sensitive and can only see the original picture after they correctly and completely colour it first. The image is built gradually, detail by detail as children carry on colouring, and this sustains their motivation

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Relationships of Participation in Study Abroad Programs and Persistence, Degree Attainment, and Time-to-Degree of Undergraduate Students in the U.S.

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ABSTRACT

The purpose of this study was to assess the predictive effect of participation in study abroad and earned credits abroad on persistence degree attainment, and time-to-degree of undergraduate students. The analysis was based on the Beginning Postsecondary Students Longitudinal Study (BPS) and the Baccalaureate and Beyond Longitudinal Study (B&B), which are national data sets maintained by the National Center for Education Statistics (NCES) of the U.S. Department of Education. The analysis accounted for student characteristics, academic preparation, social integration, and academic integration. The findings revealed that participation in study abroad and earned credits abroad positively affected persistence and degree completion of undergraduate students in the U.S., and are associated with shorter time-to-degree.

KEYWORDS: Participation in study abroad, persistence, degree attainment, time-to-degree, international education.

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Statement of the research problem

The number of U.S. study abroad students has significantly increased over the last decades. According to the 2012 Open Doors report, from about 50,000 students during the academic year 1985-86, the number jumped to more than 273,000 students for the academic year 2010-2011 (The IIE, 2012). This increase may be the reflection of the initiatives by many U.S. campuses to integrate global competence through international experience into their core educational mission (The IIE, 2009). Many scholars in the field of international education assert that intercultural interactions can lead to the development of intercultural competence (Deardorrf, 2004). According to Hunter (2004), intercultural or global competence involves an intercultural awareness, respect and appreciation of diverse cultures, and the ability to compete globally. In other words, intercultural interactions provide an opportunity for students to move beyond comfort zones and develop a multiple perspective of the world through self-reflection (Brasskamp, 2009), which can potentially lead to intrinsic motivation for continuous enrollment in school until graduation.

Several studies have investigated perceptions of study abroad programs by higher education administrators, faculty, and students (Jean Francois, 2010; Stuart, 2007), as well as the impact of study abroad on global mindedness, and intercultural communication skills of students (Walton, 2002). However, some parents and even faculty have questioned the relevance of study abroad programs, and many students are concerned about the academic value of study abroad programs and the risk to delay their graduation (Booker, 2001; Bollag, 2004; Marcum & Roochnik, 2001). Some single institution studies have documented that students who studied abroad have higher graduation rates than those who did not (Office of Institutional Research, 2009; Posey, 2003; Sutton & Rubin, 2010; Young, 2008). However, no research has been conducted regarding whether a nationally representative sample confirms such assertion. Given the growing attention that study abroad has received from legislators (Commission on the Abraham Lincoln Study Abroad Fellowship Program, 2005), education administrators (American Council on Education, 2008), and the public at large (Year of Study Abroad, 2006), it is important to conduct more studies exploring its academic meaningfulness

with respect to its effect on persistence, degree attainment, and time-to-degree. This study aimed to fill that gap.

Literature Review and Conceptual Framework

Literature Review

The higher education community has increasingly focused on evidence-based outcomes about the academic value of study abroad programs (Gray, Murdoch, Stebbins, 2002; Hadis, 2005). Several studies argued that study abroad has positive effect on the cognitive, affective, and cultural development of participating students (Hadis, 2005; Button, Green, Tengnah, Johanson, & Baker, 2005; Ryan & Twibell, 2000). Some scholars asserted that study abroad programs contribute to increase the level of student cognition (Frish, 1990), enhance their international perspectives, global political concerns, and cross-cultural interests (Bates, 1997; Carlson & Widaman, 1988; & Ryan & Twibell, 2000), reshape their American identity (Dolby, 2004; Souders, 2006), and increase their interest in global issues, language skills, and personal growth (Hadis, 2005). Ryan and Twibell (2000) found that students who participated in study abroad programs showed evidence of enhanced international perspectives of global political and cross-cultural issues. In a quasi-experimental study on 300 undergraduate students who study abroad (in Europe), Carlson and Widaman (1988) found increased global political concerns, cross-cultural interests, and cultural cosmopolitanism among participants who studied abroad in comparison to those who did not. However, there is an expectation among various stakeholders to provide further evidence of the effectiveness of study abroad programs (Gray, Murdock, and Stebbins, 2002). Pascarella and Terenzini (2005) have questioned the validity on research related to the effectiveness of study abroad programs, because such studies did not control for variables (full-time enrollment status, high grades, majoring in the arts and humanities, and the social sciences) that influence student participation in study abroad programs. This study responds to the call for further investigation exploring whether national data sets confirm the effects of participating in study

abroad programs and earning credits abroad on student persistence, degree attainment, and time-to-degree.

Conceptual Framework

The proposed study hypothesized that student participation in study abroad programs would serve as an integrating factor and motivation for persistence, degree attainment, and time-to-degree of college students (Tinto, 1987; Pascarella & Terenzini, 2005; Laanan, 2004). Study abroad was used with respect to (a) participation in a travel abroad program, and (b) whether college credits were earned from a study abroad program or not. Persistence, degree attainment, and time-to-degree were used in a student-centered perspective. Thus, students were considered irrespective of whether or not they have transferred from one institution to another.

Study abroad: Study abroad encompasses various structured and non-traditionally structured formats, such as, international education tours, for credit programs of study, internship abroad, work-abroad, volunteer or service abroad, and teaching abroad (Dwyer, 2004; Rai, 2004). The term study abroad in the proposed study refers to a structured learning experience led by a faculty member in which student participants have to live and learn in a foreign country for a long (one semester or more) or a short period of time (one to six weeks). Studies on international education have documented that study abroad provides students with unique opportunities for academic and social integration through intercultural interactions (Green, Johanson, Rosser, Tengnah, & Segrott, 2008), which can eventually contribute to persistence, degree attainment, and time-to-degree.

Persistence, degree attainment, and time-to-degree: Degree attainment is a key goal for stakeholders in higher education, because it tends to be the outcome rewarded by the labor market (Cabrera, Burkum, & Nasa, 2005). The correlation between degree attained and higher salary (Snyder, Tan, & Hoffman, 2006) stresses the value of college education as a path to social and economic opportunities for students. Persistence or continuing enrollment is

considered as one of the most significant predictors of student time-to-degree and degree attainment (Adelman, 2006). Furthermore, the increase in time-to-degree over the last decades (Turner, 2004) has inspired the call for more accountability in higher education and greater interest to explore factors that can contribute to reverse the trend (Adelman, 2006).

The Tinto' student integration model is regarded as one of the most empirical tested explanations of attrition and persistence in higher education (Cabrera, Nora, & Castaneda, 1992). According to Tinto (1985), student's persistence results from their social and academic integration into the college environment. Variables related to student success recently identified by Engstrom and Tinto (2008) included commitment, expectations, support, feedback, involvement (academic integration and social integration), and learning. Tinto model has validated the consistency of the longitudinal nature of student retention as well as the role of institutional fitness on student persistence (Goel, 2002). However, critiques argued that the model failed to consider racial and ethnic minorities (Tierney 1992). Bean and Metzner (1985) found that Tinto's model posed some challenges to determine the directionality of the effects of the tested variables.

Consequently, Bean and Metzner (1985) developed the attrition model, which predicts student persistence through behavioral intentions and intent to stay. Bean and Metzner (1985) suggested that social integration is not a significant factor for the persistence of undergraduate students, and argued that their attrition result from academic integration and environmental variables (i.e. finances, hours of employment, outside encouragement, family responsibilities, and opportunity to transfer). The model asserted that environmental variables have greater influence on student attrition and retention than the academic variables. A test of the model conducted by Metzner and Bean (1987) found that environmental factors were not significant factors in student attrition. Stahl and Pavel (1992) conducted a study, using structural equation modeling, which revealed that the attrition model was not a good fit for their sample, which consisted of students from an urban community college. A more recent study conducted by Zhai, Monzon, and Grimes (2005) found that only one environmental factors (hours worked) suggested by Bean and Metzner was a significant factor of student attrition.

Cabrera, Nora and Castaneda (1993) developed a hybrid model of student retention that combined both Tinto student integration model and Bean and Metzner's attrition model. Cabrera, Nora and Castaneda (1993) argued that environmental factors, including intent to persist and family and friend encouragement were the main factors of student persistence. Sandler (2000) insisted that persistence be approached in a systematic manner. Similarly, Atwell, Heil and Reisel (2011) found in a recent study that no single factor can explain attrition or persistence of undergraduate students. This suggests the opportunity for further studies investigating additional factors that contribute to persistence, degree attainment, and time-to-degree. Therefore, understanding the contribution of participation in study abroad to persistence, degree attainment, and time-to-degree can only strengthen existing literature.

Methods

This study aimed to understand whether participation in study abroad is associated with persistence, degree attainment, and time-to-degree of U.S. undergraduate students. The research study used a hierarchical regression analysis procedure to assess the predictive effect of participation in study abroad on persistence degree attainment, and time-to-degree of undergraduate students, using the Beginning Postsecondary Students Longitudinal Study (BPS: 04/06/09) and the Baccalaureate and Beyond Longitudinal Study (B&B:08/09) maintained by the National Center for Education Statistics (NCES). Like numerous other national surveys produced by NCES, the BPS and B&B are characterized by data collection through complex survey design. As such, there are two analytical issues associated with the use of data collected through complex sampling designs: the representativeness of the sample being analyzed and the correct assessment of population variances that form the basis for the identification of statistical effects and hypothesis testing (Thomas & Heck, 2001). Because the surveys of interest were conducted using complex survey designs, involving stratification, clustering, and unequal probabilities of case selection (Cataldi, & al., 2011), analyses took into account the complex sampling designs in order to estimate variances accurately. The first step in a multistage analysis process was data cleaning, including examination of anomalous

data patterns as well as missing data and distributions of the variables of interest. The statistical software PASW 18 was used. Then, variable reduction was performed in light of adequacy to answer the research questions under consideration. This step was necessary because most of NCES surveys have a large number of variables, many of which appear to measure the same construct. Also, application of sample weights and computing weight adjustment was performed.

Research Questions

1. Are there significant differences in persistence, degree attainment, and time-to-degree of students who participated in study abroad programs or earned credits abroad and those who did not?

Controlling for relevant student characteristics, academic preparation, social integration, and academic integration,

2. Is participation in study abroad programs associated with persistence of U.S. undergraduate students?
3. Is participation in study abroad programs associated with degree attainment of U.S. undergraduate students?
4. Is participation in study abroad programs associated with time-to-degree for U.S. undergraduate students?

Data sets

As indicated earlier, the research used the restricted-use data of Beginning Postsecondary Students Longitudinal Study (BPS: 04/06/09) and the Beginning Postsecondary Students Longitudinal Study (BPS: 04/06/09) sponsored by the National Center for Educational Statistics (NCES). The BPS: 04/09 is a dataset built from a longitudinal study that tracks a nationally representative sample of students who began their postsecondary education for the first time during the academic year 2003-2004. The BPS is appropriate because it includes data that are longitudinal in structure, on U.S. undergraduate students, and provides

information on demographic characteristics of students, school and work experience, persistence, transfer, and degree attainment that enabled the researcher to address the research questions in the proposed study.

The B&B:08 is a follow-up to the National Postsecondary Student Aid Study (NPSAS), which focuses on "students completing requirements for their baccalaureate degrees during the NPSAS academic year (Cataldi, Green, Henke, Lew, Woo, Shepherd, & Siegel, 2011). The B&B:08 provides data on key postsecondary issues such as access, enrollment, curricula, attainment, educational experience, and social impact of education. The B&B:08 contains information about student participation in study abroad programs and earned credits abroad. The research used sample weights, as suggested by Thomas and Heck (2001).

Variables

The dependent variables in this study were (a) persistence, (b) degree attainment, and (c) time-to-degree. Persistence is a continuous variable if continuous enrollment is considered. On the other hand, persistence is a dichotomous variable that equals one if student enrollment is progressive and zero if otherwise (continuous enrollment = 1, other = 0). The proposed study used persistence as a dichotomous variable. A dummy variable represented degree attainment, indicating whether a student attained a bachelor degree or not at the last institution attended (attained a bachelor degree = 1, other = 0). Time-to-degree was used as a continuous variable, which measures the length of time (number of months) students took to complete a bachelor degree after their postsecondary enrollment.

The independent variables in this study were participation in study abroad, earned credits abroad, student characteristics, social integration, and academic integration. Participation in study abroad is a dichotomous variable that equals one if student participated in study abroad and zero if otherwise. Earned credits abroad is also a dichotomous variables (Earned credits abroad = 1, did not earn credits abroad = 0). The analysis accounted for Student characteristics include variables such as age (<25 years = 1, other = 0), race (White = 1, other

= 0), major (Humanities = 1, other = 0; Social sciences = 1, other = 0), family income (income percentile), parent/sibling education level (did not complete high school = 1, other = 0), student goal (bachelor degree = 1, other = 0), delayed postsecondary entry (delay entry = 1, other = 0), high school educational tract (high school = 1, other = 0), multiple institutions (multiple institutions = 1, other = 0), type of institution (public = 1, private = 0), enrollment status (full time = 1, other = 0), which which were found associated to persistence, degree attainment, and to time-to-degree (Tierney, 1992, Horn, Berger, & Carroll, 2005). In addition, academic preparation, which is known to impact time-to-degree, graduation and retention rates were also considered. Adelman (2006) Cabrera, Burkum and LaNasa (2005), Pascarella and Terenzini (2005) argue that academic preparation is a strong predictor of persistence and degree completion. High school GPA and SAT/ACT composite scores were used to measure academic preparation. Many scholars have also validated the construct of social integration and academic integration as a predictor of student persistence (Braxton, Milem, & Sullivan, 2000; Sandler, 2000; Titus, 2004). The social integration index and the academic integration index were used to run the statistical analyses. The account for academic preparation and the other aforementioned independent variables (student characteristics, academic integration, and social integration) helped isolate the specific effects of study abroad from other factors. Table 1 describes the dependent and independent variables, and their corresponding data set.

Table 1- Dependent and independent variables and the corresponding data sets

Dependent Variables			
Variable	Label	Description	Data Set
Persistence	CONTENR	Continuously enrolled at undergraduate institution	B&B
Degree attainment	MTBACH	Transcript: Attained bachelor's indicator	BPS
Time-to-degree	PSE_BA	Time to 2007-08 bachelor's degree	B&B
Independent Variables			
Sex	GENDER	SEX	B&B
Race	RACE	Race/Ethnicity	B&B
Major	MAJORS4Y	Bachelor's degree major 2007-08	B&B
Income percentile (SES)	PCTALL	Income percentile (dependents' parents and independents) in 2006	B&B
Parental education level	PAREDUC	Highest education level attained by either parent as of 2007-08	B&B
Student's goal	HIGHLVEX	Highest level of education ever expected as of 2007-08	B&B
High school graduation track	HSDEG	High school degree type	B&B

Delay postsecondary enrollment	HS_PSE	Months between high school graduation and postsecondary enrollment	B&B
Number of institutions attended	NUMINST	Number of institutions attended in 2007-08	B&B
Type of institution	CONTROL	Bachelor's degree institution control in 2007-08	B&B
Enrollment status	MTSTATUS	Transcript: Enrollment intensity during term	BPS
High school GPA	HSGPA	Grade point average in high school	B&B
SAT scores	TESATDER	SAT I score	B&B
Academic integration index	ACAINX	Transcripts GPA in 4 year of attendance, multiplied by 100	BPS
Social integration index	SOCINX (n8comsrv + n8wstdy)	(Community service or volunteer in last 12 months + Work study: Community service project)/2*100	B&B
Participation in study abroad	NUSABEVR	Ever study abroad as of 2007-08	B&B
Earned credits abroad	QESABERN	Earned credits abroad	B&B

Data Analysis

Pairwise comparisons, and Mean and Standard Deviation were used to answer research question 1 "Are there significant differences in persistence, degree attainment, and time-to-degree of students who participated in study abroad programs or earned credits abroad and those who did not?" To address research question 2, "After adjusting for student characteristics, academic preparation, college performance, social integration, and academic integration, is participation in study abroad programs associated with persistence of U.S. undergraduate students?", a sequential or hierarchical regression analysis was used to measure the association between participation in study abroad programs and persistence. Hierarchical regression enables to examine how much study abroad adds to the prediction of undergraduate student persistence, which can be accounted for by other variables as well (Cohen, 2001). The first sequence of the regression analysis adjust ed for student characteristics. According to the National Survey of Student Engagement (NSSE, 2007), study abroad students have more educated parents, better grades, are more likely to be enrolled full-time, and more likely to major in the arts and humanities and the social sciences. The second sequence added the academic preparation, social integration index, and academic integration index which are accepted in the literature as associated with persistence, degree completion, and time-to-degree (Adelman, 2006; Cabrera, Burkum, & LaNasa, 2005; Pascarella & Terenzini, 2005; Titus, 2004). The third sequence added variable for

participation in study abroad. The fourth and final sequence added variable for earned credits abroad. Change in R^2 helped determine the effect of participation in study abroad program on persistence. Unstandardized regression coefficients were examined with respect to their role in the prediction equation. Standardized regression coefficients were used to assess the importance of each independent variable, especially participation in study abroad and study abroad credits earned. To avoid the effect of shared variance of correlated independent variables on *B* weight of other variables, structure coefficients were computed for all the independent variables, except study abroad and earned credits abroad. Squared structure coefficients of the independent variables were used to determine the percentage of variance accounted for by each independent variable in predicting student persistence. The hierarchical regression analysis used for persistence was repeated for degree attainment and time-to-degree, in order to address research questions 3, "Is participation in study abroad programs associated with degree attainment of U.S. undergraduate students?", and research question 4, "Is participation in study abroad programs associated with time-to-degree for U.S. undergraduate students?"

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Findings

Assumptions Analysis

The relevant assumptions were tested before conducting the hierarchical multiple regression analysis. The sample size comes from nationally representative data sets (BPS and B&), thus was adequate for the analysis (Tabachnick & Fidell, 2001). Multicollinearity diagnostics were assessed and were within an acceptable range (i.e., .78 to .91). Therefore, the assumption of multicollinearity was met (Coakes, 2005). The Mahalanobis distance scores did not indicate any multivariate outliers. The residual and scatter plots suggested that the assumptions of normality, linearity and homoscedasticity were all satisfied (Pallant, 2001).

Sample Characteristics

As previously indicated, the sample in this study came from nationally representative longitudinal surveys conducted by the U.S. Department of Education. The sample concerned by the analysis in this study included 15, 048 U.S. undergraduate students, including 6,225 males (41.4%) and 8,823 females (58.6%). About 13% (1,958 students) of the participants have studied abroad, and 87% (13,090 students) did not. The mean ages of the participants were 18 at the start of their postsecondary education in 2003 (M=18.70, SD=3.01) and 26 in 2009 (M=26.49, SD=6.56). Participants were White (71.4%), Black (9.3%), Hispanics (9.2%), Asians (6.6%), two or more races (2.5%) and other such as American Indian (0.4%), Native Hawaiian (.3%), and other (0.2%). The participants majored in Bio/Physical Sciences/Math/Agriculture (20.1%), Applied Sciences (14.1%), Business (13.1%), Social Sciences (12.1%), Humanities (9.2%), Education (8.8%), Engineering (8.1%), Health Care Fields (7.2%), Computer and Information Sciences (4.8%), and General Studies (2.5%). Table 2 delineates the descriptive statistics for the control variables included in the analysis.

Table 2 - Descriptive Statistics for Variables Included in the Analysis (N=15050)

Variable	*M*	*SD*	Min	Max
Age in 2009	26.49	6.56	19	74
Gender	1.59	.49	1	2
Race/ethnicity	1.69	1.42	1	8
Bachelor's Degree Major	5.82	2.85	1	10
Income Percentile	47.84	29.46	0	1000
Parental Education Level	5.51	2.66	0	10
Student's Goal	5.99	1.29	4	8
HS Graduation Track	1.12	.59	1	6
Delayed Postsecondary Entry	10.34	31.60	-3	524
Number of Institutions Attended	1.85	.95	1	8
Type of Institution	1.47	.59	1	3
Enrollment Status	.93	.71	-9	2
HS GPA	5.08	3.30	-3	7
SAT Score	896.35	446.79	-3	1600
Academic Integration	300.58	87.16	-9	1
Social Integration	-192.54	267.97	-9	1
Participated in Study Abroad	.13	.34	0	1
Credits Earned Abroad	.48	3.11	-9	81
Persistence	1.07	.407	-9	2
Time-to-degree	76.42	65.84	21	663
Degree Attainment	.22	.41	-9	1

Note: *M* = Mean *SD*= Standard Deviation

Pairwise comparisons in persistence, degree attainment, and time-to-degree in relation to study abroad

Are there significant differences between persistence, degree attainment, and time-to-degree of students who participated in study abroad or earned credits abroad and those who did not? Pairwise comparisons revealed that the persistence rate was 71.3% for students who studied abroad and 71.4% for those who did not. Similarly, the persistence rate was 70.9% for students who earned credits abroad and 71.3% for those who did not. Among the students who studied abroad, 35.5% attained their bachelor degree, compared to 36.7% for those who did not. However, 55.2% of students who earned credits abroad attained their bachelor degree, compared to 36.7% for those who did not. Table 3 includes the frequency and percentage for persistence, degree attainment, and time-to-degree in relation to participation in study abroad and earned credits abroad.

Table 3 - Frequency and percentage for persistence, degree attainment, and time-to-degree in relation to participation in study abroad and earned credits abroad

	Study abroad F(%)	Did not study abroad F(%)	Earned credits abroad F(%)	Did not earn credits abroad F(%)
Persistence				
Yes	1400 (72%)	9350 (71%)	9180 (71%)	10900 (72%)
No	540 (28%)	3740 (29%)	3760 (29%)	4150 (28%)
Total	1940 (100%)	13090 (100%)	12940(100%)	15050 (100%)
Degree Attainment				
Yes	90 (37%)	660 (36%)	8200 (55%)	770 (37%)
No	170 (63%)	1190 (64%)	6660 (45%)	1330 (63%)
Total	260 (100%)	1850 (100%)	14860(100%)	2100 (100%)

Note. F = Frequency

The mean of persistence for students who participated in study abroad (M=.09, SD=1.89) was not significantly different from that of students who did not participate (M=.11, SD=1.85). However, there were no significant differences in the persistence of students who earned credits abroad (M=.06, SD=.199) and students who did not (M=.11, SD=1.85), $F(1, 27993) = 5.23$, $p<.05$. There were no significant differences between the means of degree attainment for students who studied abroad (M=.05, SD=.21) and those who did not (M=.06, SD=.24). However, the mean of degree attainment was significantly higher for students who earned

credits abroad (M=.24, SD=.24) and those who did not (M=.06, SD=.42), F (1, 26916) = 491, p=.000. The mean of time-to-degree for the national sample that involved this study was 76.42 (SD=65.84). Time-to-degree represents the number of months it takes for students to complete their bachelor degree. The average number of months for students who studied abroad (M=56.46, SD=37.58) was significantly shorter than that of students who did not study abroad (M=79.40, SD=68.58), F(1, 15046) = 209.64, p=.000. The same significant difference was observed for students who earned credits abroad (M=67.67, SD=56.75) and students who did not (M=77, SD=66.37), F (1, 15046) = 17.84, p=.000. Table 4 presents pairwise comparisons, and mean and standard deviation for persistence, degree attainment, and time-to-degree in relation to participation in study abroad and earned credits abroad.

Table 4 - Pairwise comparisons, and Mean and Standard Deviation for persistence, degree attainment, and time-to-degree in relation to participation in study abroad and earned credits abroad

	Study abroad *M (SD)*	Did not study abroad *M(SD)*	Earned credits abroad *M(SD)*	Did not earned credits abroad *M(SD)*
Persistence	.11 (1.85)	.09 (1.89)	.06 (1.99)*	.11 (1.85)*
Degree Attainment	.05 (.21)	.06 (.24)	.24 (.42)*	.06 (.24)*
Time-to-degree	56.46 (37.58)*	79.40 (68.58)*	67.67 (56.75)*	77.00 (66.37)*

Note. M=Mean SD=Standard Deviation *p<.05

Study abroad and persistence

Controlling for relevant student characteristics, social integration, and academic integration, is participation in study abroad programs associated with persistence of U.S. undergraduate students? To assess whether participation in study abroad programs is associated with the persistence of U.S. undergraduate students, a hierarchical multiple regression analysis was conducted. The overall model was significant, R^2 = .231, F (13, 234) = 3.95, p<.01. The unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), and squared structure coefficients for the full model are reported in Table 5.

Table 5 - Unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), t-values, p-values, R square (R^2), Adjusted R Square (ΔR^2)) for Variables as Predictor of Persistence of U.S. Undergraduate Students

Variables	*B*	B	t-value	R^2	ΔR^2
Model 1				.231**	.252**
Intercept	2.930		9.367		
Age: < 25 years	.098	.047	.656		
Gender: Male	.109	.053	.790		
Race: White	-.115	-.052	-.738		
Major: Humanities	.007	.112	.030		
Major: Social sciences	-.171	-.059	-.871**		
Income percentile	.001	.018	.262		
Parental education level	.322	.067	.962		
Student goal: Bachelor degree	-.313	-.139	-2.029*		
High school grad track: HS diploma	.059	.015	.215		
Delay postsecondary enrollment	-.001	-.039	-.570		
Attended multiple institutions	-.285	-.138	-2.055*		
Type of institution: Private for-profit	-.025	-.006	-.092		
Enrollment status: Full-time	.062	.030	.447		
Model 2				.301**	.253**
Intercept	1.296				
Academic preparation	.016	.115	1.569*		
Academic integration index	.006	.509	8.728**		
Social integration index	.000	.079	1.353		
Model 3				.303**	.255**
Intercept	1.27				
Studied Abroad	.084	.029	.472		
Model 4				.403**	.269**
Intercept	1.48				
Earned credits abroad	.155	.139	.656**		

Note. B, β, and t-value reported are those from the step at which the variable was entered into the equation.
*p<.05. **p<.001.

In the first step, twelve variables were included: income percentile, delayed postsecondary enrollment, gender (male = 1, female = 0), and dummy coding for age (less than 24 years = 1, other = 0), race (White = 1, minority = 0), major (Humanities = 1, other = 0; Social sciences = 1, other = 0), parental education (did not complete high school = 1, other = 0), student goal (professional degree or doctorate = 1, other = 0), high school graduation track (high school = 1, other = 0), attendance of multiple institutions (attended one institution = 1, other = 0), type of institution (private for-profit = 1, other = 0), and enrollment status (full time = 1, other = 0). These variables accounted for a significant amount of variance in persistence of undergraduate students, R^2 = .231, F (13, 2221) = 3.95, p<.01. Only student goal, b=-.139, t (234) = 2.029, p<.05, major in social sciences, b=.-159, t(234)=.-871, p<.01, and attendance

of multiple institutions, b=-.138, t(234)=2.055, p<.05 were significant predictors of persistence in the first model.

Academic preparation composite scores (High school GPA + ACT/SAT Scores/2*100), academic integration index (First year cumulative college GPA for 2003-2004 *100), and social integration index (community service or volunteer in last 12 months + work study service project/2 *100) were entered into the regression equation. These variables explained an additional 25% of variation in persistence of undergraduate students and this change was significant, $\Delta F(2, 219) = 38.83$, $p < .000$. Student goal, b=-.140, t(219)=2.349, p<.05, attendance of multiple institutions, b=-.143, t(219)=2.457, p<.01, academic preparation, b=.115, t(219)=1.569, p<.05, and academic integration index, b=.509, t(219)=8.728, p<.01 were the only significant predictors of persistence in the second model.

In the third step, study abroad (participated in study abroad = 1, other = 0) was entered in the regression analysis. The model was significant, but did not add to the variance of persistence, $\Delta R^2 = .255$, $\Delta F(2, 218) = 4.107$, $p < .001$. In the fourth and final step of the regression analysis, earned credits abroad (earned credits abroad = 1, other = 0) scores were entered, and accounted for a significant proportion of the variance in persistence of undergraduate students, $\Delta R^2 = .269$, $\Delta F(2, 217) = 5.557$, $p < .001$. In the fourth and last model, only student goal, b= -.145, t(217)=2.411, p<.01, attendance of multiple institutions, -.148, t(217)=2.519, p<.01 and academic integration index, b=.513, t(219), p<.01, and earned credits abroad, b=.139, t(217)=.656, p<.01 were significant predictors of persistence of undergraduate students in the United States.

Study abroad and degree attainment

Controlling for relevant student characteristics, social integration, and academic integration, is participation in study abroad programs associated with degree attainment of U.S. undergraduate students? To test the hypothesis that study abroad is associated with the degree

attainment of U.S. undergraduate students, a hierarchical multiple regression analysis was conducted. The overall model was significant, R^2 = .161, F (13, 640) = 3.19, p <.01. The unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), and squared structure coefficients for the full model are reported in Table 6.

Table 6
Unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), t-values, p-values, R square (R^2), Adjusted R Square (ΔR^2)) for Variables as Predictor of degree attainment of U.S. Undergraduate Students.

Variables	B	B	t-value	R^2	ΔR^2
Model 1				.161**	.142**
Intercept	.400		4.235		
Age: < 25 years	.103	.100	2.486**		
Gender: Male	-.030	-.030	-.754		
Race: White	.001	.001	.023		
Major: Humanities	.065	.037	.934		
Major: Social sciences	-.008	-.006	-.142		
Income percentile	-.001	-.078	-1.956**		
Parental education level	.012	.235	.318*		
Student goal: Bachelor degree	.028	.026	.651		
High school grad track: HS diploma	.129	.060	1.516		
Delay postsecondary enrollment	.001	.039	.991		
Attended multiple institutions	-.053	-.052	-1.340		
Type of institution: Private for-profit	-.031	-.013	-.349		
Enrollment status: Full-time	.181	.178	4.629**		
Model 2				.272**	.153**
Intercept	-.023				
Academic preparation	.706	.041	.678*		
Academic integration index	.002	.334	9.234**		
Social integration index	5.089E-5	.027	.748*		
Model 3				.272**	.156**
Intercept	-.026				
Studied Abroad	-.063	-.044	-1.162		
Model 4				.288**	.176**
Intercept	.066				
Earned credits abroad	.002	.111	.125*		

Note. Betas reported are those from the step at which the variable was entered into the equation.*p<.05. ***p<.001.

In the first step, twelve variables were included: income percentile, delayed postsecondary enrollment, gender, and dummy coding for age, race, major, parental education, student goal, high school graduation track, attendance of multiple institutions, type of institution, and enrollment status. These variables accounted for a significant amount of variance in persistence of undergraduate students, R^2 = .161, F (13, 640) = 3.19, p = .000. Age, b=.100, t (640) = 2.486, p=.01, income percentile, b=-.078, t(640)=1.956, p=.05, parental education level, b=.235, t(640)=.318, p<.05, and enrollment status, b=.178, t(640)=4.629, p=000 were significant predictors of persistence in the first model.

Academic preparation scores, academic integration index, and social integration index were entered into the regression equation. These variables significantly added to the amount of variance in degree attainment of undergraduate students in the U.S., ΔR^2 = .153, ΔF(2, 638) = 42.82, p = .000. Age, b=.140, t(638)=2.73, p<.01, income percentile, b=-.078, t(638)=2.08, p<.05, enrollment status, b=.166, t (638)=4.56, p<.01, academic preparation, b=.041, t(638)=.678, p<.05, academic integration index, b=.334, t(638)=9.23, p<.01, and social integration index, b=.027, t(638)=.748, p<.05 contributed significantly to the explanation of degree attainment of undergraduate students in the U.S. in the second model.

In the third step, study abroad (participated in study abroad = 1, other = 0) was entered in the regression analysis. The model was significant, but did not add to the variance of persistence, ΔR^2 = .156, ΔF(2, 635) = 5.255, p < .001. In the fourth and final step of the regression analysis, earned credits abroad (earned credits abroad = 1, other = 0) scores were entered, which accounted for a significant proportion of the variance in degree attainment of undergraduate students, ΔR^2 = .176, ΔF(2, 636) = 7.341, p = .001. In the fourth and last model, only age, b=.110, t(638)=2.86, p<.01, income percentile, b=-.072, t(638)=1.89, p<.05, enrollment status, b=.163, t (638)=4.49, p<.01, academic integration index, b=.336, t(638)=9.26, p<.01, and earned credits abroad, b=.111, t(638)=.125, p<.05 accounted for a significant proportion of the variance in degree attainment of undergraduate students in the United States.

Study abroad and time-to-degree

Controlling for relevant student characteristics, social integration, and academic integration, are study abroad programs associated with time-to-degree for U.S. undergraduate students? To test the hypothesis that study abroad is associated with the time-to-degree of U.S. undergraduate students, a hierarchical multiple regression analysis was conducted. The overall model revealed a significant association between participation in study abroad and time-to-degree of undergraduate students in the U.S., R^2 = .351, F (13, 640) =26.58, p <.01. The unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), and squared structure coefficients for the full model are reported in Table 7.

Table 7 - Unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), t-values, p-values, R square (R^2), Adjusted R Square (ΔR^2)) for Variables as Predictor of time-to-degree of U.S. Undergraduate Students

Variables	B	B	t-value	R^2	ΔR^2
Model 1				.351**	.337**
Intercept	97.172		10.403		
Age: < 25 years	-61.343	-.504	-14.994**		
Gender: Male	1.322	.011	.338		
Race: White	-13.950	-.106	-3.131*		
Major: Humanities	-8.810	-.042	-1.279*		
Major: Social sciences	-3.325	-.019	-.580*		
Income percentile	.408	.205	6.227*		
Parental education level	39.413	.134	4.020**		
Student goal: Bachelor degree	-.667	-.005	-.156		
High school grad track: HS diploma	4.522	.018	.539		
Delay postsecondary enrollment	-.038	-.023	-.699		
Attended multiple institutions	-1.075	-.009	-.277		
Type of institution: Private for-profit	-6.133	-.022	-.691		
Enrollment status: Full-time	-.212	.223	2.34*		
Model 2				.352**	.337**
Intercept	90.697				
Academic preparation	.051	.052	1.156*		
Academic integration index	.022	.040	1.251*		
Social integration index	-.002	-.009	-.278		
Model 3				.353**	.337**
Intercept	79.293				
Studied Abroad	-4.166	-.024	-.735*		

Model 4				.453**	.438**
Intercept	90.293				
Earned credits abroad	5.666	.025	.767*		

Note. Betas reported are those from the step at which the variable was entered into the equation. *p<.05. ***p<.001.

In the first step, twelve variables were included: income percentile, delayed postsecondary enrollment, gender, and dummy coding for age, race, major, parental education, student goal, high school graduation track, attendance of multiple institutions, type of institution, and enrollment status. These variables accounted for a significant amount of variance in persistence of undergraduate students, R^2 = .351, F (13, 640) =26.58, p = .000. Age, b=-.504, t (640) = -14.99, p=.01, race, b=-.106, t(640)= -3.13, p=.01, major in Humanities, b=-.042, t(640)=-1.279, major in social sciences, b=-.019, t(640)=-.580, income percentile, b=205, t(640)=6.22, p<.01, parental education level, b=.134, t(640)=4.02, p<.01, and full-time enrollment status, b=.223, t(640)=2.34, p<.05 were significant predictors of time-to-degree in the first model.

Academic preparation scores, academic integration index, and social integration index were entered into the regression equation. These variables accounted for a significant amount of the variance in time-to-degree ΔR^2 = .33, F(2, 638) = 23.82, p<.01. Age, b=-.503, t (638) = -14.99, p=.01, race, b=-.106, t(640)= -3.13, p<.01, income percentile, b=205, t(640)=6.22, p<.01, parental education level, b=.132, t(640)=3.96, p<.01, academic preparation, b=.052, t(640)=1.156, p<.05, and academic integration, b=.040, t(640)=1.251, p<.05 were significant predictors of time-to-degree in the second model.

In the third step, study abroad (participated in study abroad = 1, other = 0) was entered in the regression analysis. The model was significant, but did not add to the variance of persistence, ΔR^2 = .337, ΔF(2, 635) = 15.255, p < .001. In the fourth and final step of the regression analysis, earned credits abroad (earned credits abroad = 1, other = 0) scores were entered. Earned credits abroad significantly added to the proportion of variance in time-to-degree of undergraduate students, ΔR^2 = .438, ΔF(2, 636) = 20.55, p = .001. In the fourth and last model, only age, b=-.499, t(636)=14.70, p<.01, income percentile, b=-.105, t(636)=-3.11,

p<.05, income percentile, b=.207, t (638)=6.18, p<.01, parental education level, b=.132, t(636)=3.93, p<.01, study abroad, b=-.024, t(638)=-.735, p<.05, and earned credits abroad, b=.025, t(638)=.767, p<.05 accounted for a significant proportion of the variance in time-to-degree of U.S. undergraduate students.

Conclusion and Recommendations

The findings in this study confirmed that participation in study abroad programs is significantly associated with persistence, degree attainment, and time-to-degree of undergraduate students in the United States. More specifically, the findings indicated that participation in study abroad programs did not negatively affect whether a student persisted or obtained a bachelor degree. However, students who earned credits abroad attained their degree at a higher rate than those who did not. Furthermore, participation in study abroad or earning credits abroad significantly shortened the time it takes for a student to obtain a bachelor degree. Previous inquiries found that participation in study abroad is associated with student's persistence. Data published by the University of Minnesota-Twin cities (Office of Institutional Research, 2009) and the University of California San Diego (Student Research Information, 2009) showed that participants in study abroad programs are more likely to remain enrolled in their institution. The data mentioned was not analyzed to confirm any statistically significant differences between participants and non-participants in study abroad. However, such data suggested a trend corroborated by Young (2003) at the University of North Texas, and Hamir (2011) at the University of Nebraska-Lincoln. While the persistence rate was slightly higher for students who participated in study abroad or earned credits abroad, our analysis suggested that the differences was not significant.

Posey (2003) conducted a study, using data from the Florida State Systems, and found statistically significant association between participation in study abroad and degree completion. Furthermore, a study at the University of Wisconsin Madison (Milner, 2006) found that studying abroad had no significant effect on delay graduation. To the contrary, a multi-year research on participation in study abroad at the University System of Georgia

found that study abroad significantly contributed to shorten the time-to-degree of students (Sutton & Rubin, 2010). Our analysis confirmed the findings from Sutton and Rubin (2010). Given the nationally representativeness of the sample used in this study, the findings confirm that national data sets reflect the general positive effect of participation in study abroad on persistence, degree completion, and shorter time-to-degree. Such findings dispel the concerns that study abroad negatively affects persistence and degree completion, and contributes to delay graduation. In other words, the study revealed that studying abroad contributes to academic performance measures, in addition to student personal growth, career development, cross-cultural competence, and global leadership skills that students acquire while staying abroad for a short or long-term period.

Over the past decades, there has been an increase in student access to higher education (NCES, 2011). However, the academic success of such students has not increased at the same pace. Since 1972, there is little change in graduation rates among U.S. undergraduate students (Adelman, 2006; Horn & Nevill, 2006). Consequently, U.S. postsecondary institutions seek to increase their rate of degree completion, because access without success is a failure for both the society and the student (Gladieux & Perna, 2005). Therefore, understanding additional factors that can increase the probability of persistence, degree completion, and shorter time-to-degree is a key to respond to the ability of postsecondary institutions to meet the educational needs of the community at large. The findings in this is study provide evidence of association among persistence, degree attainment, and time-to-degree patterns of student participation in study abroad programs, and help validate the role of study abroad in shaping student postsecondary experience. Despite the presence of student characteristics, academic preparation, and social integration, participation in study abroad and earned credits abroad were significant significantly associated with shorter time-to-degree among U.S. undergraduate students.

This study has serious implications for administrators of postsecondary institutions and policy makers. This research informs post-secondary institution policy-makers and administrators on the specific effect and the directionality of the effects of participation in study abroad on

student persistence, degree attainment, and time-to-degree. Policy makers can rely on the findings from this study to work on policies that are more supportive of study abroad programs in colleges and universities. This study can partly serve as a basis to develop focused and targeted policies on study abroad programs to support, recruitment, and retention. Targeted participation in study abroad as an asset for persistence, degree attainment, and shorter time-to-degree can help maximize benefits to both institutions and students. Leaders of higher education institutions may include participation in study abroad as not just an activity, but as part of their overall strategies for student persistence and success. Moreover, this study provides additional empirical evidence to support educational policies regarding legislative funding that aims to increase participation in study abroad programs.

Furthermore, this study used data available as part of a long term effort by the National Center for Education Statistics to provide research databases that allow for examination of student success. This finding is relevant not only because it is based on data from national sample data sets (BPS and B&B), but also because it confirmed findings from smaller scale studies that found signification association between study abroad and persistence, degree attainment, and time-to-degree. This study supplements existing research on persistence, degree attainment, and time-to-degree, and provides further evidence of relationships between participation in study abroad and the probability to finish post-secondary degrees.

However, the interpretation of the findings is limited to undergraduate students, because the study did not concern post-baccalaureate education. Finally, the findings in this study report only about the general effect of study abroad on persistence, degree attainment, and time-to-degree. Further research should examine the effect of study abroad on persistence, degree attainment, and time-to-degree based on study abroad destination, length of program, type of immersion, the level of diversity of students' home university campus, and the type of earned credits abroad (credits earned from study abroad versus credits earned based on prior country of residence).

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The Suggestion of Some Comparative European Group Corporate Governance Standards after Financial Crisis, Corporate Scandals and Manipulation

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Abstract:

In past few years, corporate scandals and bankruptcy in US and Europe and other parts of the world show some certain evidence on weak corporate governance, weak internal control system and weak audit. Though there are a few researches which have been done in the field of international corporate governance standards, we believe that this field with more rooms to explore. Therefore, this paper chooses a different analytical approach and among its aims is to give some systematic opinions.

First, it classifies European Group representative corporate governance (CG) standards into two (2) groups: EASD and ECODA CG principles covered in group 1 and, group 2, including EFAMA Code and Corporate Practices from EBRD, so-called relative good CG group, while it uses ACCA and CFA principles as reference.

Second, it , through analysis, shows differences between above set of standards which are and have been used as reference principles for many relevant organizations.

Third, it establishes a selected comparative set of standards for European group representative corporate governance system in accordance to international standards.

Last but not least, this paper covers some ideas and policy suggestions.

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Keywords: corporate governance standards, board structure, code of best practice, financial crisis, corporate scandals, market manipulation, internal audit

1. Introduction

The nature of the environment in which contemporary businesses function is systemic which is described in corporate governance practices or codes.

The Bulgarian 2012 Code for Corporate Governance mentioned corporate governance is understood as the relations between the boards, shareholders, and stakeholders of the company. Over years, the Code has been effective in public companies. In the light of different views on Corporate Governance and Company Acts, which are among interests of many organizations, after financial crisis 2007-2009, this paper mainly concentrates on analysis of Code of Best Practices for Corporate Governance in selected European groups and separates it from the analysis of relevant Company Act and Accounting regulations, which can be used as reference for further scopes. Despite of trying to select an easy-reading writing style, there is still some academic words need to be explained in further.

The organization of paper contents is as following. As our previous series of paper, Research literature and theories are covered in the first two sessions. Next, it followed by introduction of our research methodology in session 3 (3rd). Continuously, session four (4) covers our familiar four (4) groups of empirical findings. And our conclusion and policy suggestion is covered in the fifth (5th) session. Before last, there are exhibit session which covers some summary of this paper's analysis and comparison. And lastly, a glossary notes is provided with information for reference and because of reducing repeating terminology.

2. Research literature review

There are many and controversial opinions on corporate governance theories and practices. For example, Jensen and Meckling (1976) presented their conceptual agency theory on the separation of ownership and management. Lin, Andrew Jen-Guang (2007) pointed that

Corporate Governance will maintain its vital position in corporate law and securities law with the simple focus on investors.

Besides, Commonwealth Association (1999) pointed the fact that every country and businesses nowadays need good corporate governance practices and theories as a necessity.

Moreover, the South Africa King Code (2009) mentioned the terms of "corporate citizenship" and CSR or Corporate Social Responsibility and stated Corporate responsibility is the responsibility of the company for the impacts of its decisions and activities on society and the environment, through transparent and ethical behaviour that: contributes to sustainable development, including health and the welfare of society;

Furthermore, Exhibit 4 shows us different parties and components, internal and external, should be involved in a policy or system of corporate governance. And certainly, global crisis and scandals recently such as Enron, Tyco, and Phidelphia partially signify the importance of corporate governance. As Demirag and Solomon, 2003 stated, The Asian crisis in 1997-1999 and corporate scandals such as Barings and WorldCom enhanced the need for corporate governance reform at a global level.

Additionally, Becht, Marco., Bolton, Patrick., Roel, Ailsa., (2005) developed corporate governance, the term is related with the resolution of collective action problems among dispersed investors, as well as the reconciliation of conflicts of interest between various corporate claimholders. They also pointed that when the outside investors have conflicts of interest with and want to exercise control differently from what the managers do, it will be among causes of corporate governance problems. Moreover, Adams, Renee B., Hermalin, Benjamin E., and Weisbach, Michael S., (2009) realized that as a consequence of corporate scandals and relevant corporate governance issues, boards have been at the center of the policy debate concerning governance reform and many further researches should deal with it. Then, Fong (2013) stated disclosure of corporate information forms an integral part of the corporate governance framework. And Edmans (2013) pointed blockholders (large

shareholders) may also worsen governance by extracting private benefits of control or pursuing objectives other than firm value maximization.

Because there are not many researches and surveys done in European groups, next, what is the limited comparative standardized set of so-called comparative European group corporate governance standards?

Theory of Corporate Governance, Scandal and Market Manipulation

Theory of manipulation

There are different views on Manipulation subjects because of different types of it.
Besides, the involvement of financial intermediaries and brokers may contribute to manipulate market price while maintaining their credibility.

Also there were several corporate scandals around the world, happening together with market manipulation with reasons coming from artificially inflating accounting revenue or income, as well as the share prices of distressed companies to benefit the values of shareholders and investors and MGT team, and strengthening the co.'s financial statements as well. Regarding to reasons for corporate scandals, such as Enron, there is a matter relevant to external auditor roles, responsibilities in general and in their communication and transparency with the Board and with the company, as well as full duties to shareholders. Last but not least, there is a role of speculators in manipulation transactions to cause the increasing in investment flow into the invested company when speculators produce enough, or as much and sufficient as possible, information.

Theory of corporate governance and financial crisis

First, Exhibit 4 showed us a general model of corporate governance with main parties such as: shareholders, board, committees, financialist, other stakeholders and community in a market

economy and society. It identifies several criteria to build a good CG in organization such as: stakeholder involvement, policies and procedures which we aim to analyze in later sessions. And, as Shleifer and Vishy (1997) stated corporate governance regarding to the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment.

Also, Rachel., IFC (2009) stated that good CG is in companies with longer term sustainability and moreover, we need companies achieving environmental, social and economic value for society.

Last but not least, corporate governance nowadays is researched in a total picture of globalization. While globalization deals with the ways in which goods, products and services are exchanged in cross-countries, corporate governance pays attention on how the company structure and governance mechanisms are enhanced to meet the demands of such these trends. In other words, corporate governance in a globalization trend has many things to work with building a good internal system and quality flows of information inside the business to face the challenges which comes from the external factors of globalization.

Hence, we can see, there exist various views on corporate governance and its importance.

3. Research methodology

Firstly, we analyze and compare corporate governance principles in each of two (2) different groups including: 1) Group 1 – European group CG representative standards including EASD CG 2000 and ECODA 2010 Corporate Governance Principles; and 2) Group 2 - Relatively good corporate governance group including EFAMA Code 2011 and EBRD Corporate Practices 1997;

We also use, but not limited to, international standards of corporate governance such as: World Bank, and Mc Kinsey corporate governance principles and surveys as reference, as

well as ICGN and OECD Corporate Governance Principles which have many modifications in corporate governance principles after the crisis period.

Then, we suggest on what so-called limited comparative European Group corporate governance principles which is aiming to create a basic background for relevant corporations interesting in different aspects of corporate governance subjects and functions as the recommendation to relevant countries' government and other relevant organizations for public policy and necessary evaluation.

Last but not least, for a summary of our standards, see Exhibit and the below table 1 and 2 in relevant sessions.

4. Empirical findings

A- Findings on Corporate governance issues after financial crisis, corporate scandals and market manipulation

Several popular issues including: the responsibility of the Board of Directors, both as a whole and as individual, to the mission of protecting and growing net value of total company asset. This is clearly identified after many crises and scandals recently. To break this issue in more details, we can see there is the un-effectiveness of Board, CEO and Board processes, as well as the inefficiency roles of audit function in dealing with matters relevant to Board effectiveness.

Also, we can find out another corporate governance (CG) issue. It is, the lack of effective mechanism to protect well net value of company and investors and shareholders' asset and investment. Another one is the transparency mechanism still existing with errors that lead to declining company's credibility to investors.

Moreover, the lack of an effective Code of Ethics and Code of Conduct might be a cause contributing to failures, frauds and bankruptcy recently and after financial crisis time.

B- Findings on Ways of Manipulation during Corporate Scandals

Several Manipulation Techniques found out during corporate scandals involve, but not limited to:

B.1 – The manipulation techniques in the income statement:

Here, the technique is used to manipulate either income or expense or profit to maximize benefits for both Board and investors.

Or, the company may establish a subsidiary to hide the actual losses in its business. For example, in the scandal of a financial giant in Japan, Yamaichi securities co., in 1992, the Yamaichi subsidiary used dummy companies to generate earnings for customers while eventually receiving losses of 158.3 billion yen.

B.2 - The manipulation techniques in both the income statement and balance sheet:

In the case of BCCI, Bank of Credit and Commerce International, found in Pakistan, there is accounting falsification of an amount of $13 b which is unaccounted.

Furthermore, in the scandal of Riccar, a leading Japanese sewing machine manufacturer, there is a manipulation of earnings. The company had bad inventory and gave a fictitious sale invoice to false customers and hid the corresponding merchandise in warehouse, which are treated as sold merchandise, then, the inventory was not recorded in the books and was, in effect, an off-balance sheet asset. Riccard reported a fictitious revenue of 53.6 billion yen in total from 1976 to 1984.

B.3 - The manipulation techniques relevant to international accounting practice code:

There is also a going controversial concern between some different practices in IFRs and GAAP standards, although we know that IFRS has quality requirements for recognition, measurement. Moreover, in the scandal of ABB in Sweden, the company switched from IAS

to US GAAP accounting in order to be listed on NYSE in 2001. Whereas IAS allowed the loss could be distributed over many years, under US GAAP, gains and losses of business transactions were allocated for the financial years they occurred.

B.4 - Other manipulation techniques net belong to above classifications:
Insider trading can be a source of market manipulation. For example, information on good business opportunities, which contains uncertainty and risks in future, or information on probability of winning auction of company can be an attribute to market price manipulation.
In the case of Martha Stewart scandal in 2001, the responsible manager is accused of using insider trading to trade nearly four thousand shares of stocks after receiving non-public information from one broker in order to avoid a big loss, just one day before that firm's stock price plummeted.

C- Actions on Preventing or Controlling negative manipulation
As management can perform false accounting and manipulation because of their own benefits or satisfying investors' expectation, a governance mechanism need to be established to control or prevent these actions.
Beside, in order to control negative market manipulation, necessary actions are enhancing mechanisms of internal audit and internal control.

D- Findings on Construction of Comparative International Corporate Governance Standards

These findings will be shown in a detailed analysis of a model indicated in the later sessions.

<D.1> - Group 1 – European Group Corporate Governance standards analysis

The EASD Principles of Corporate Governance 2000

This is the Code of European Association of Securities Dealers.

Among its advantages are, but not limited to, the concentration on the substance of GM discussion.

Additionally, it is good to state that shareholders as individuals or groups have different objectives which differ from companies that perform roles in societies.

Besides, it identifies distinction between interests of the company and those of shareholders. Generally speaking, The Code considers CG as a concept evolving over time and space. However, it would be better to address disclosure and transparency (see Exhibit 1).

The Corporate Governance Principles for Unlisted Companies in Europe 2010

The Code is developed by The European Confederation of Directors Association (ECODA). The Code identified the global crisis highlighted the importance of applying good practices. One of its distinctions is mentioning shareholders set proper governance framework for the company. And it also pointed conflicts of interest can undermine CG.
For more information, please see Exhibit 3. However, it would be better to clarify roles of a compliance officer.

Comparison between the ECODA and EASD Corporate Governance Principles

There is a focus in EASD Code on BD meeting with background information should be given for the meeting. Moreover, it states directors could propose agenda items. Also, it makes a sound point when it recpmmended price-sensitive information be withheld by the company.

On the other hand, the ECODA Code considers a proactive relationship between shareholders and BD at crisis time and normal business time. Besides, it also considers risk in case the company does not incorporate interests of stakeholders into CG.

Table 1 – A so-called European group CG representative standards

Subjects or parties	**Main quality factors**	**Sub quality factors**
Audit committee	Chairman be non-executive board member;	Advisory authority delegated by BD; BD delegate responsibilities;
CEO and The Chair	Chair ensure effectiveness of communication b.t shareholders and BD;	Chair ensure BD operate efficiently;
Corporate Secretary	Record the minutes, monitor conformity with BD procedures, implementation of policy decisions;	Ensure board receive information in a timely way;
Compliance officer	N/A (for further research and implementation)	N/A (for further research and implementation)
Board of Directors	Independent of MGT, influential shareholders; Set the company values and standards;	Must meet at least once every 6 months or at least once every 3 months;
Independent director	Ensure MGT team take correct step and use resources in the most efficient manner;	Independent BD member may own some shares but not join in pension plans or stock option;
Supervisory board to the Management	BD supervise MGT;	N/A (for further research and implementation)
Supervisory to the Board of Directors	Advisory board may be an interim step of BD;	Over time advisory board members can join BD;
Internal control	Provide for integrity of corporate data;	Supported by procedures of Authorization limits, Control over assets;
Internal audit	BD take care of;	Reliable and understandable information;
External audit	Shareholders approve EA; present at GM;	Inform BD findings regard to IC;
Disclosure and transparency	Establish the legitimacy of firm as a responsible firm in society;	Relevant, timely, understandable;
Shareholders	Elect/remove board members;	Have prompt access to information on the substance of the discussion;
The corporation as a whole entity	Develop company manual with anti-fraud, record MGT;	Scale and complexity of firm affect board size and composition;

<D.2> -Group 2 – Relative Good Corporate governance group analysis

2011 EFAMA Code for External Governance analysis:

Good recommendations involved in the 1999 CACG Code include, but not limited to, a strong link between CG and investment process. And it is based on good judgment rather than description.

A minor point might be noted here is that the audit and control system are not described. For a summarized analysis on corporate governance factors, please refer to the Exhibit 5.

In summary, the 2011 Code paid well attention to enhancing quality of communication with clients or investee companies.

Sound business standards and corporate practices 1997 analysis:

These practices are prepared by EBRD (European Bank for Reconstruction and Development).

In the 1997 Code, we recognized it pays attention to establishing stable relationship with stakeholders based on sound behaviour and practices.

And among its advantages is that it mentions as the key aspect of CG, shareholders can oversee MGT performance and join in key decisions. Please refer to Exhibit 6.

On the other hand, it has a disadvantage as it does not describe well duties of CEO and the Chair.

Comparison between the EFAMA Code and 1997 Corporate Practices

First of all, there is a focus in the 2011 EFAMA Code encourage meeting with CEO, supervisory board chairman of investee companies to enhance value.

Beside, The 1997 Corporate Practices pointed Shareholder Assembly role is to approve changes in activities or decision in reorganization.

The 1st Establishment of so-called relatively Good Corporate Governance standards

This following table is built with the summary of above CG standards.

Table 2 – A relatively Good Corporate Governance standards

Subjects or parties	**Main quality factors**	**Sub quality factors**
Audit committee	N/A (for further research and implementation)	N/A (for further research and implementation)
CEO and The Chair	BD select CEO and monitor his/her performance;	N/A (for further research and implementation)
Corporate Secretary	N/A (for further research and implementation)	N/A (for further research and implementation)
Compliance officer	N/A (for further research and implementation)	N/A (for further research and implementation)
Board of Directors	Active dialogue with investee companies;	Independent from MGT; elected for a strict term of office;
Independent director	N/A (for further research and implementation)	N/A (for further research and implementation)
Supervisory board to the Management	N/A (for further research and implementation)	N/A (for further research and implementation)
Supervisory to the Board of Directors	N/A (for further research and implementation)	N/A (for further research and implementation)

Internal control	Report conflicts of interest affecting BD, MGT;	Processes to secure effective control of business;
Internal audit	Auditing the compliance with internal procedures;	Monitor professional good business practice;
External audit	Examine the integrity of financial system;	Independent; audit the accounts;
Disclosure and transparency	Have a policy on external governance disclosure;	Not make disclosure that might be counterproductive;
Shareholders	Adequate policy on voting rights;	Oversee MGT performance; join in key decision;
The corporation as a whole entity	enhancing quality of communication with clients or investee companies	Have a fiduciary duty to clients/investors;

D.3- The 1st Establishment of so-called limited comparative European Group Corporate Governance standards

Comparison of corporate governance standards between<D.1> and <D.2> group

Before we come to set up a set of general limited standards of corporate governance, we need to review the standards combined in the previous two (2) groups

The advantages of Group 1, but not limited to, roles of Chair and CEO (see above Table 1).

On the contrary, the relative Good Corporate Governance Group standards states the company need to identify problems at early stages to minimize any loss of value.

A so-called Limited Comparative European Corporate Governance Set of standards

Based on the above analysis, we consider building comparative standards for a comparative European Group Corporate Governance system.

Table 2 - The Comparative European Group Corporate Governance standards

Subjects or parties	Main quality factors	Sub quality factors
Audit committee	Chairman be non-executive board member;	Advisory authority delegated by BD; BD delegate responsibilities;
Nominating committee	evaluate the balance of skill, knowledge, experience of board; Advisory authority delegated by BD;	Lead the process for board appointment; BD delegate responsibilities;
Numeration or Compensation Committee	Define and monitor structure of remuneration for senior MGT;	Advisory authority delegated by BD; BD delegate responsibilities;
CEO and The Chair	Chair recognize strengths and address weakness of the board, propose new board member;	Chair ensure BD operate efficiently, ensure BD receive timely, clear information;
CFO	N/A (for further research and implementation)	N/A (for further research and implementation)
Corporate Secretary	Ensure board receive information in a timely way;	Record the minutes, monitor conformity with BD procedures, implementation of policy decisions;
Compliance officer	N/A (for furtherresearch and implementation)	N/A (for further research and implementation)
Board of Directors or Management Board	Set the company values and standards; smaller size increases communication quality;	Must meet at least once every months or at least once every 3 months;
Independent director	Ensure MGT team take correct step and use resources in the most efficient manner;	Independent BD member may own some shares but not join in pension plans or stock option;
Supervisory board to the Management	Over time , advisory board members can join BD;	BD supervise MGT;
Supervisory to the Board of Directors	Advisory board may be an interim step of BD;	Over time advisory board members can join BD;
Internal control	Provide for integrity of corporate data; Report conflicts of interest affecting BD, MGT;	Supported by procedures of Authorization limits, Control over assets;
Internal audit	BD take care of; Auditing the compliance with internal procedures;	Reliable and understandable information;
External audit	Shareholders approve EA; present at GM;	Inform BD findings regard to IC;
Disclosure and transparency	Have a policy on external governance disclosure; Not make disclosure that might be	Establish the legitimacy of firm as a responsible firm in society;

	counterproductive;	
Shareholders	BD have satisfactory dialogue with shareholders;	Respect shareholder interests; may require ongoing dialogue with BD;
Stakeholders	BD establish a suitable program for stakeholder engagement;	BD take care of CG and stakeholder policy;
Accountability	Directors usually declare potential conflicts of interest to BD;	Insider trading is prohibited;
Leadership	Act by BD, Chair, CEO;	BD is the primary decision-making body;
Employee	Justify their action to someone else; report unethical behaviour;	Company organs properly address concerns of legitimate people;
Family governance	Family members may develop preferences for business;	Outline vision, objectives of the family for business; prevent potential conflicts;
3rd parties and conflicts of interests	Handle issues around insider information;	May appoint lawyer, accountant to ensure BD fulfill statutory duties;
The corporation as a whole entity	Have a fiduciary duty to clients/investors;	Develop company manual with anti-fraud, record MGT;
The Code	Based on good judgement rather than description;	Align interests of MGT with shareholders and stakeholders;

(Note: source are based on corporate governance standards of group <D.1> and <D.2> and the appraisal of these standards)

5. Conclusion

Among several key corporate governance issues is, but not limited to, the leadership roles and the effectiveness of top management team, including CEO, chair, Board and outside directors. To reduce its impacts, The EASD Code suggested BD not only take care of stakeholder policies but also corporate ethics and behavior.

Besides, the ECODA Code included a direct guidance for shareholders and directors as foundation for individual EU member. On the other hand, EFAMA Code 2011 mentioned effective policy for procedures for monitoring corporate events is needed. And 1997 Corporate Practices stated BD roles including recommendations to shareholders on issues for voting.

Past surveys from McKinsey in 2000 showed results such as investors willing pay 24% premium for good CG in South Korea and 18% premium for that in UK.

In consideration of corporate governance issues analyzed in the previous sessions, we proposed the main and sub quality factors in this paper **a set of general comparative European group corporate governance standards** in a limited model with selected codes. Though limited, it has some implications for further research and proper recommendations to relevant government and organizations. And it also provides relevant academic and non-academic, lawyer and consultant, board and non-board people with minimum information for further researches.

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Exhibit

Exhibit 1 – The EASD Principles of Governance for South Africa (a short summary evaluation)

Subjects or parties	**Main quality factors**	**Sub quality factors**	**Responsibilities**	**Objectives**	**Note**
Audit committee	Not mentioned clearly in the code;	Chairman be non-executive board member;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	As understood from the Code;
Nomination committee	Not mentioned clearly in the code;	Balanced;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	As understood from the Code;
Compensation or Remuneration committee	Not mentioned clearly in the code;	Chairman be non-executive board member;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	

CEO or Lead director;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	
The Chair	Set BD meeting agenda;	Ensure BD operate efficiently;	Present at GM to answer questions or refer to BD;	Not mentioned clearly in the code;	
CEO and The Chair relationship	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Separate in one-tier board system;	Not mentioned clearly in the code;	As understood from the code;
Corporate Secretary (CS)	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Record the minutes, monitor conformity with BD procedures, implementation of policy decisions;	Not mentioned clearly in the code;	
Compliance officer (compliance)	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	
Board of Directors	Good faith, due diligence, care and loyalty;	Balanced;	Orientation/ Monitor functions; Present at GM to answer questions;	Long term interests of the co.;	
Executive director (EDs)	Outside business activities approved by BD;	On-going conflicts of interest must be avoided;	Take care of senior executive nomination;	Not mentioned clearly in the code;	
Non-executive director (NEDs)	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Remuneration based on BD policies;	Not mentioned clearly in the code;	
(Senior) Independent director	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Independent BD member may own some shares but not join in pension plans or stock option;	Not mentioned clearly in the code;	
CFO (senior financial officer)	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	

Management team (senior)	Accountable to BD, company, shareholders;	Sufficient latitude;	Present at GM to answer questions; delegation of power and decisions by BD;	Not mentioned clearly in the code;	
Supervisory board	Not mentioned clearly in the code;	Not mentioned clearly in the code;	BD supervise MGT;	Not mentioned clearly in the code;	
Internal control	Not mentioned clearly in the code;	BD take care of;	Provide for integrity of corporate data;	Not mentioned clearly in the code;	
Internal audit	Not mentioned clearly in the code;	BD take care of;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	
External (Independent) audit /registered public accounting firm;	Inform BD findings regard to IC;	BD take care of;	Shareholders approve EA; present at GM;	Not mentioned clearly in the code;	
Disclosure and transparency	Not mentioned clearly in the code;	Relevant, timely, understandable;	Not mentioned clearly in the code;	Not mentioned clearly in the code;	
Shareholders and Minority Stockholder	Controlling shareholders give due consideration to minority;	Minority not restrain corporate action;	Elect/remove board members;	Not mentioned clearly in the code;	
Accountability	Insider trading is prohibited;	BD accountable to shareholders;	Avoid/disclose conflicts of interests;	Not mentioned clearly in the code;	
Leadership	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Act by BD, Chair, CEO;	Not mentioned clearly in the code;	
Employee	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Company organs properly address concerns of legitimate people;	Not mentioned clearly in the code;	
3rd parties and	Not mentioned	Related party	Not mentioned	Not mentioned	

conflicts of interests	clearly in the code;	transaction disclosed;	clearly in the code;	clearly in the code;	
Code of ethics (conduct)	Not mentioned clearly in the code;	Not mentioned clearly in the code;	BD take care of;	Not mentioned clearly in the code;	
Group and subsidiaries	Not mentioned clearly in the code;	Not mentioned clearly in the code;	Institutional investors state their voting policies;	Not mentioned clearly in the code;	
Note			The underlined part is describing some more works needed to be done for relevant subjects and parties.		

Exhibit 2 – Corporate Governance system
(source: Brazil Code of Best Practice of CG)

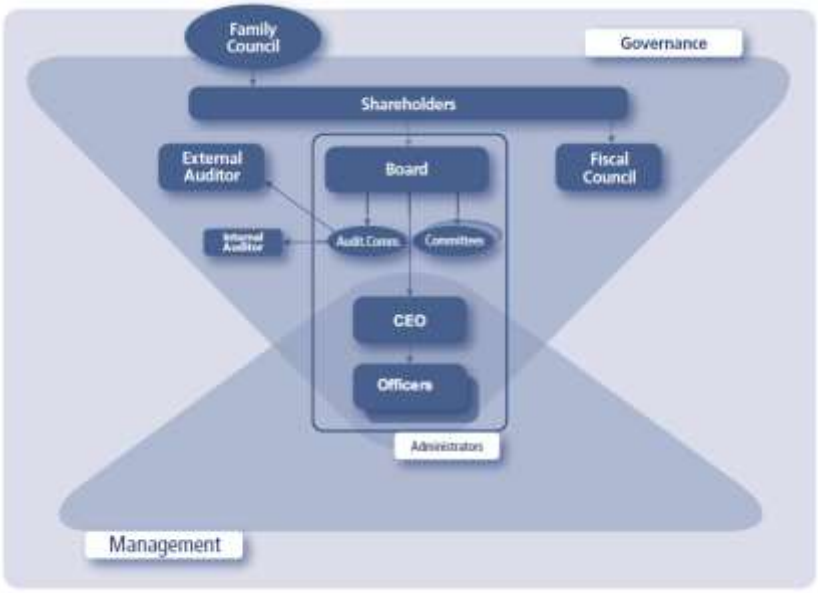

Exhibit 3 – Evaluation of 2010 ECODA Code Corporate Governance

Subjects or parties	Main quality factors	Sub quality factors	Responsibilities	Objectives	Note
Audit committee	Advisory authority delegated by BD;	BD delegate responsibilities;	BD set appropriate BD committees;	More effective discharge of its duties;	
Nomination (HR) committee	Lead the process for board appointment;	Clear distinction b.t ED and NED;	BD delegate responsibilities; evaluate the balance of skill, knowledge, experience of board; Advisory authority delegated by BD;	Not mentioned clearly by the Code;	
Compensation or Remuneration committee	Propose remuneration for all executives;	Define and monitor structure of remuneration for senior MGT;	BD delegate responsibilities; Advisory authority delegated by BD;	Not mentioned clearly by the Code;	
CEO	BD supervise CEO;	Exercise executive authority over operation;	Leading executive MGT; consider as chief risk officer; board evaluate CEO;	Not mentioned clearly by the Code;	
The Chair	Prepare an agenda; too close to MGT will lack of objectivity and credibility;	Lead board ; set agenda of annual meeting ;	Welding capable individuals into board team; Chair recognize strengths and address weakness of the board, propose new board member;	High performing board team;	
CEO and The Chair relationship	Chairman encourage BD members to take certified director qualification;	After consultation with CEO and chairman, BD may find extra information from MGT;	Responsibilities separated;	Not mentioned clearly by the Code;	

Corporate Secretary (Board)	Not mentioned clearly by the Code;	Report to chair and CEO;	Help BD fulfill compliance schedule;	Ensure board receive information in a timely way;	
Compliance officer	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	
Board of Directors	Clear division b.t running BD and running co. business;	Directors receive induction on joining BD, update skill/knowledge ;	Risk oversights; define corporate strategy;	For long term success of firm;	As understood from the code;
Executve director	Not mentioned clearly by the Code;	Full time;	1 or more may join one tier board;	Not mentioned clearly by the Code;	
Non-executive (external) director	Part time; add new skill /knowledge not available within firm;	BD ensure NED have access to independent professional advice;	Involve in one tier board; outside perspective on strategy and control;	Not mentioned clearly by the Code;	
Independent director	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	Joining: A key step in development of unlisted firm;	Ensure MGT team take correct step and use resources in the most efficient manner;	
CFO	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	
Management team (senior)	Too much power, MGT will lose touch with BD;	Not the firm key decision makers;	BD delegation authority to MGT; access to NED;		
Supervisory board	Over time , advisory board members can join BD;	w/o formal decision making duties;	Advisory board may be an interim step of BD; include NED in 2 tier board;	Not mentioned clearly by the Code;	
Internal control	Take into account of financial,	BD responsible for a sound formal IC and	MGT establish IC and RM	Not mentioned clearly by the	

	operational, strategic risks;	RM;	(delegated);	Code;	
Internal audit	Not mentioned clearly by the Code;	Reliable and understandable information;	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	
External (Independent) audit	Not mentioned clearly by the Code;	Reliable and understandable information;	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	
Disclosure and transparency	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	ED and NED compensation is transparent;	Establish the legitimacy of firm as a responsible firm in society;	
Shareholders and Minority Stockholder	Respect shareholder interests; may require ongoing dialogue with BD;	BD have satisfactory dialogue with shareholders;	set proper governance framework; enter agreements among themselves;	Notmentioned clearly by the Code;	
Accountability	Not mentioned clearly by the Code;	Directors usually declare potential conflicts of interest to BD;	Each employee, manager, BD member understand scope of their duties;	Not mentioned clearly by the Code;	As understood from the code;
Leadership	Not mentioned clearly by the Code;	BD is the primary decision-making body;	Act by CEO;	Not mentioned clearly by the Code;	As understood from the code;
Employee	Staff recruitment and remuneration delegated to MGT;	Justify their action to someone else;	As one of key external stakeholders;	Not mentioned clearly by the Code;	
3rd parties and conflicts of interests	Not mentioned clearly by the Code;	Academics, external think-tanks may support information for BD;	May appoint lawyer, accountant to ensure BD fulfill statutory duties;	Not mentioned clearly by the Code;	
Code of ethics (conduct)	Not mentioned clearly by the Code;	Support for employee personal development;	CG align interests of MGT with shareholders and	Not mentioned clearly by the Code;	

			stakeholders;		
Group and subsidiaries	Not mentioned clearly by the Code;	Group appraisal examine how boardoperates as a collective decision-making body;	Not mentioned clearly by the Code;	Not mentioned clearly by the Code;	
Note			The underlined part is describing some more works needed to be done for relevant subjects and parties.		

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The Role of Discrete Emotions on Athletes' Religiosity

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Abstract

The purpose of the present study was to investigate the influence of discrete emotions in sport settings on religiosity athletes', as well as the effect of gender, experience, and type of sport in shaping religiosity and discrete emotions. For the purpose of the study 258 athletes (male, n = 180; female, n = 78) were used. They participated a at team and individual sports, with their age ranging from 18 to 27 years (M = 19.78, SD = 1.87) and their experience ranged from 2 to18 years (M = 10.19, SD = 3.23). Participants filled out three questionnaires: Sport Emotion Questionnaire (SEQ), Santa Clara Strength of Religious Faith Questionnaire (SCSRFQ), and Religious Schema Scale (RSS). Results did not show any influence of emotions on the strength religious faith of athletes' except on religious styles that are related to fairness, tolerance & rational choice, and xenosophia & inter-religious dialog.

Key words: Discrete emotions, Religious faith, Religious schemas, Sport

Introduction

According to Jones (2003) sport is an emotional experience for many athletes. Possibly this is the reason why emotions in sport have received increased attention in research and practice (e.g., Hanin, 2000; Lane, Beedie, Jones, Uphill, & Devonport, 2012; Lazarus, 2000a; Martinek & Ferrand, 2009; Nicholls, Polman, & Levy, 2012).

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In psychology and philosophy emotion is a subjective, conscious experience characterized primarily by psycho-physiological expressions, biological reactions and mental states. Lazarus (2000a) defined emotions as "an organized psycho-physiological reaction to ongoing relationships with the environment, most often, but not always, interpersonal or social" (p. 230). While, Cognitive-Motivation Relational (CMR) theory states that emotions are generated by the evaluation a person makes about his or her environment in relation to personal goals (Lazarus, 1991, 1999, 2000a, 2000b). This refers to the cognitive element of the CRM theory of emotions.

Sporting experience is characterized by positive (e.g., joy, hope) and negative (e.g., anxiety, disappointment) emotions (Hanin, 2007; Jones, 2003; Lazarus, 2000b). The significance of most discrete emotions in cognitive outcomes such as judgment and decision making attracted the interest of researchers concerning their assessment (for more information, see Angie, Connelly, Waples, & Kligyte, 2011). Thus, Jones, Lane, Bray, Uphill, and Catlin (2005) developed the Sport Emotion Questionnaire (SEQ) for the assessment of emotions in sport settings. They claimed that at least five emotions are particularly related to sport settings, which cover a range of pleasant (happiness and excitement) and unpleasant states (anger, anxiety and dejection).

Emotions as a psychological notion with cognitive elements are a central topic in the study of religion. Emotions may lead to changes in a range of cognitive functions (Jones & Uphill, (2004). Fuller (2007) mentions that "Humans are a complex mixture of emotions and all would play some part in shaping our overall religious sensibility" (p. 36). Research on discrete emotions helps us appreciate the evolutionary-adaptive reasons why humans are motivated to adopt an apocalyptic orientation to life (Fuller, 2007), as the religiosity of individuals.

Religion is a multidimensional construct that has been variously defined. Religion involves the co-presence of beliefs, ritualized experiences, norms, and groups connected to what people perceive as a transcendent entity (e.g., Koenig, 2012; Saroglou, 2014). The genesis of religious beliefs has occupied quite intensely the researchers on religion who investigate its relation to emotions (Fuller, 2007). Research on the relation between religiosity and emotions has showed mixed results, with some providing consistent support for a positive association (e.g., Abdel-Khalek, 2006; Myers, 2002), while others have not (e.g., Abdel-Khalek & Nacuer, 2007; Janssen, Banziger, Dezutter, & Hutsebaut, 2006). Such a contradiction of results may be due to the variety of different measures of religiosity (Lewis & Cruise, 2006).

In an attempt to avoid such methodological concerns in the present study, two different approaches for the examination of religion were used. The first, that of religiosity, will be done through the assessment of the strength of religious faith through the use of Santa Clara Strength of Religious Faith Questionnaire (SCSRFQ; Plante & Boccaccini, 1997a,b). The SCSRFQ is a brief 10 item self-report measure assessing strength of religious faith and engagement suitable for use with multiple religious traditions, denominations, and perspectives (Plante, 2010). The second approach will take place through the assessment of religious schemas through the Religious Schema Scale (RSS; Streib, Hood, & Klein, 2010). The study of religious schemata is rather interesting since it presents us with a cognitive interpretation pattern which a person seeks and prefers in order to cope with everyday issues.

In the sport domain emotions as a cognitive element, according to CRM theory, have occupied researchers mainly for their relation to performance (e.g., Lane, Devonport, Soos, Karsai, Leibinger, & Hamar, 2010, Nicholls et al., 2012) and morality (e.g., Cameron, Linquist, & Gray, 2015; Proios, 2012, 2014a,b; Sarkar, Hill, & Parker, 2015; Stanger, Kavussanu, Willoughby, & Ring, 2012). The importance of the present study is focused on how discrete emotions affect the way that a person's mode of religiosity affects his. The way religiosity is formed is important since it holds an important role in enhancing sport performance and contributes to personal growth and well-being (Dillon & Tait, 2000; Vernacchia, McGuire, Reardon, & Templin, 2000). Since this is a cognitive element it may

contribute in the shaping of psychological and social processes. Frijda, Manstead, and Bem (2000) stressed the existence of scant attention in the study of influence of emotion on cognition, a fact that further strengthens the present study.

The purpose of the present study is to investigate the influence of discrete emotions in sport settings on religiosity athletes'. In addition, this study investigates the impact of gender, experience and type of sport in shaping religiosity and discrete emotions. The main hypothesis in the present study is the existence of a relationship between the examined variables of religiosity and discrete emotions as well as the differences in the religiosity and discrete emotions in relation to gender, experience and type of sport. Smith and Denton (2005), Wallace, Forman, Caldwell, & Willis (2003) supported that gender is a variable where religiosity seems to show differences in adolescents. Cerin, Szabo, Hunt, and Williams (2000) suggest that gender (personal factor) and type of sport (situational factor) are factors that moderate emotional states.

Method

Participants

The participants were 258 athletes (male, n = 180; female, n = 78) who were involved in competitive sport at the time of data collection. More specifically, 163 athletes in team sports (football, basketball, volley and rowing), and 95 in individual sports (track and field, swimming, gymnastics,, martial arts, tennis, cycling, sailing, ski, and weightlifting). Their age ranged from 18 to 27 years (M = 19.78, SD = 1.87). Experience of athletes ranged from 2 to18 years (M = 10.19, SD = 3.23). For the needs of the present study years of experience were divided in two categories: small (2-10 years) and large (11-18 years).

Procedures

The questionnaires were given to the athletes during team practices with coach permission. Before the athletes completed the questionnaires, we told them that their participation was voluntary and that there was no right or wrong answers to the questions. Furthermore, we assured them that their answers would remain confidential and anonymous and that their

coaches would not be permitted to see their responses. Therefore, we asked the athletes to answer the questionnaire honestly and ask for assistance if needed. Most of the athletes took 20-25 min to complete the questionnaire.

Measurements

Emotions. A validated Greek version (Proios, 2014a,b) of the Sport Emotion Questionnaire (SEQ; Jones et al., 2005) was used to measure the emotions appearing during the competition. The SEQ contains 22 items that are scored on a 5-point Likert-type scale ranging from 0 (not at all) to 4 (extremely). This scale has shown good validity and reliability when used after competition, with internal consistency scores for the five emotions ranging from .77 to .94 and .77 to .91 (Allen, Jones, & Sheffield, 2010; Dewar & Kavussanu, 2011). Participants were asked to read each of the items and indicate the extent to which they experienced each emotion during the round of golf they had just played. The statement was "During competition I usually feel . . . ," and the emotions measured were happiness (four items; e.g., "pleased"), excitement (four items; e.g., "exhilarated"), dejection (five items; e.g., "unhappy"), anxiety (five items; e.g., "nervous"), and anger (four items; e.g., "furious"). The reliability of the SEQ was calculated using alpha coefficient. Alpha coefficients for happiness were (α = .80), excitement (α = .60), anger (α = .86), anxiety (α = .73), and dejection (α = .83), indicating good reliability for each. The aforementioned value (.60) can be considered as satisfactory, as this factor comprises of fewer than 10 items (viz., three items; Ntoumanis, 2001; Pallant, 2010).

Religiosity. A validated Greek version (Dianni, Proios, & Kouthouris, 2014) of the Santa Clara Strength of Religious Faith Questionnaire (SCSRFQ; Plante & Boccaccini 1997a, b) was used in order to assess religiosity. SCSRFQ is a 10-item self-report measure. The SCSRFQ uses a 4-point Likert response format, ranging from (1) Strongly disagree to (4) Strongly agree. The SCSRFQ was found to have high internal reliability, with Cronbach's alphas ranging between .94 and .97 and split-half reliability correlations between .90 and .96. In the present study, the alpha coefficient was (α = .94).

Also, a validated Greek version (Proios, 2015) of the Religious Schema Scale (RSS; Streib et al., 2010) consisting of three subscales of 5 items each was used. The RSS uses a 5-point Likert-type format from strongly agree to strongly disagree. Reliabilities of the three subscales in the current sample are: α = .85 for subscale truth of texts & teachings (ttt), α = .63 for fairness, tolerance & rational choice (ftr) and α = .57 for xenosophia & inter-religious dialog (xenos). The alpha value for attraction (α =.63 and .57) appeared low, but is considered as relatively acceptable (Tabachnick & Fidell, 2007).

Data Analysis

Descriptive statistics were obtained and preliminary data analyses were conducted to estimate the responses of athletes' on constructs such as religiosity and emotions in sport settings. Simple correlations were calculated to test the relationships between variables. Inferential statistics (univariate and multivariate analysis of variance [ANOVA and MANOVA]) were used to analyze the extent to which the perception of the athlete's religiosity and emotions varied with gender, experience, and type of sport. n2 values were used to control for the level of effect of gender, experience and type of sport. Finally, a series of hierarchical multiple regressions were conducted in order to investigate the influence of several emotions (predictors) in a sequential way, within a criterion (religious faith and religious schemas; B. H. Cohen, 2001; Wampold & Freund, 1987). All analyses were completed using SPSS for Windows version 15.0.

Results

Descriptive Statistics and Correlations

Table 1 provides means and standard deviations for all the investigated variables. Regarding religiosity, on average, athletes exhibited moderate scores in the religious faith, and preferably on religious schema fairness, tolerance & rational

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Table 1 - Descriptive Statistics, Cronbach α, Differences Sig.

Variables	Gender		Type of sport		Experience		Total	Cronbach
	Males	Females	Team	Individual	Small	Large		α
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	*M(SD)*	
Religiosity								
Religious faith	**2.29**(.72)	2.27(.69)	**2.36**(.69)	2.15(.72)	2.24(.72)	**2.34**(.69)	2.28(.71)	.94
Differences (Sig.)	$p = .87$		$p < .05$		$p = .24$			
Religious schema								
ttt	**2.65**(.86)	2.55(.79)	**2.73**(.83)	2.44(.82)	2.60(.81)	**2.64**(.87)	2.62(.84)	.85
ftr	**3.96**(.54)	3.94(.59)	3.95(.58)	**3.96**(.51)	3.94(.56)	**3.99**(.53)	**3.95**(.55)	.63
xenos	**3.15**(.60)	3.08(.57)	**3.13**(.59)	3.12(.59)	3.11(.57)	**3.17**(.61)	3.13(.59)	.57
Differences (Sig.)	$p = .77$		$p < .05$		$p = .86$			
Emotions								
Happiness	**2.65**(.81)	2.37(.87)	**2.62**(.83)	2.48(.86)	2.53(.84)	**2.62**(.85)	**2.57**(.84)	.80
Excitement	**2.34**(.67)	2.29(.76)	2.32(.71)	**2.35**(.70)	**2.37**(.71)	2.29(.68)	2.32(.70)	.60
Anger	**.97**(.98)	.81(.92)	**.95**(.99)	.89(.92)	**.97**(.95)	.84(.96)	.93(.97)	.86
Anxiety	1.99(.78)	**2.12**(.79)	1.90(.79)	**2.24**(.74)	**2.13**(.79)	1.91(.75)	2.03(.78)	.73
Dejection	**.67**(.80)	.64(.63)	.62(.75)	**.74**(.76)	**.77**(.79)	.52(.70)	.67(.75)	.83
Differences (Sig.)	$p < .01$		$p < .001$		$p < .05$			

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choice. They also exhibited higher scores in pleasant emotions (happiness) and lower in unpleasant emotions (dejection). Correlations among measures are shown in Table 2. Results indicated that similar variables showed medium to high correlation, while different ones showed none to very low correlation.

Differences in religious faith, religious schemas and discrete emotions in relation to gender, experience, and type of sport

Regarding religious faith, first the descriptive statistics (Table 1) showed that scores of males dominate over these of females. Nevertheless, univariate analysis did not show significant differences in scores (F (1, 257) = .02, p = .87). Second, the descriptive statistics revealed a dominance of the scores of team sports over scores of individual sports, with statistically significant differences in scores (F (1, 257) = 5.04, $p < .05$, $n^2 = .019$). According to J. Cohen (1988), guidelines for interpreting an eta-square value (η^2) is that .01 indicates a small effect, .09 indicates a moderate effect, and .25 indicates a large effect. Therefore, our finding η^2 = .019, indicates that 1.9% of the total variance in variables of religious faith is accounted for by type of sport differences and as such it can be classified as a small effect. Third, the scores of large experience were higher than ones of small experience without though these differences in scores being statistically significant (F (1, 257) = 1.36, p = .24).

Table 2 - Correlations among for all the variables

Variables	1	2	3	4	5	6	7	8
1.Religious faith	-	-	-	-	-	-	-	-
2.ttt	.78**	-	-	-	-	-	-	-
3.ftr	.25**	.25*	-	-	-	-	-	-
4.xenos	.31**	.41**	.53**	-	-	-	-	-
5.Happiness	.11	-.07	.00	.03	-	-	-	-
6. Excitement	.01	.11	-.03	.10	.50**	-	-	-
7.Anger	.06	.04	.06	.16**	.15*	.01	-	-
8. Anxiety	-.05	.09	-.01	.03	.62**	.69**	.22**	-
9. Dejection	.03	.10	.14*	.13*	-.08	-.15*	.69**	.06

Note: Statistical significant *$p < .05$, **$p < .01$

Regarding religious schemas, first the descriptive statistics (Table 1) showed that scores of males in all three schemas dominate over these of females. The multivariate test did not reveal significant main effects for gender (Wilks' λ = .996, F (3, 254) = .37, p = .77). Second, the descriptive statistics revealed a dominance of the scores of team sports in schemas ttt and xenos over scores of individual sports, while the dominance of scores in schema ftr was opposite. The multivariate test revealed a significant main effect for type of sport (Wilks's λ = .967, F (3, 254) = 2.89, p < .01, n^2 = .033). The finding η^2 = .033 indicates that 3.3% of the total variance in variables of religious schemas is accounted for by type of sport differences and as such it can be classified as a small effect. Subsequent univariate analyses showed that type of sport diversified religious schemas only on ttt schema (F (1, 257) = 5.14, p < .01, n^2 = .028). Third, the scores of large experience were higher than those of small experience without though these differences in scores beign significant (Wilks's λ = .997, F (3, 248) = .25, p = .86).

Finally for emotions, first the descriptive statistics (Table 1) showed that scores of males in happiness, excitement, anger and dejection dominate over those of females, while in scores of anxiety the dominance is the other way round. The multivariate test revealed a significant main effect for gender (Wilks's λ = .941, F (5, 252) = 3.18, p < .01, n^2 = .059). The finding η^2 = .059 indicates that 5.9% of the total variance in variables of emotions is accounted for by gender differences and as such it can be classified as a small effect. Subsequent univariate analyses showed that gender diversified only the emotion happiness (F (1, 257) = 6.53, p < .01, n^2 = .025). Second, descriptive statistics revealed a dominance of the scores of team sports in happiness and anger over scores of individual sports, while dominance of scores in excitement, anxiety and dejection was the other way round. The multivariate test revealed a significant main effect for type of sport (Wilks's λ = .900, F (5, 252) = 5.62, p < .001, n^2 = .100). The finding η^2 = .100 indicates that 10% of the total variance in variables of emotions is accounted for by type of sport differences and as such it can be classified as a moderate effect. Subsequent univariate analyses showed that type of sport diversified only the emotion anxiety (F (1, 257) = 11.87, p < .001, n^2 = .044). Third, the scores of small experience στα emotions excitement, anger, anxiety and dejection showed higher of large experience, while

dominance of scores in happiness was the other way round. The multivariate test revealed a significant main effect for experience (Wilks's $\lambda = .952$, F (5, 246) = 2.49, $p < .05$, $n^2 = .048$). The finding $\eta^2 = .048$ indicates that 4.8% of the total variance in variables of emotions is accounted for by experience differences and as such it can be classified as a small effect. Subsequent univariate analyses showed that experience diversified only anxiety (F (1, 251) = 4.68, $p < .05$, $n^2 = .018$) and dejection (F (1, 251) = 6.90, $p < .01$, $n^2 = .027$).

Religious faith, Religious schemas and Emotions

A series of hierarchical multiple regression analyses (Table 3) were performed to test the ability of pleasant and unpleasant emotions in sport settings in the formation of religiosity of athletes. First hierarchical multiple regression: In the first step, two predictors were entered: happiness and excitement (pleasant emotions). This model was not statistical significant, F (2, 255) = 2.67, $p = .07$. After the entry of unpleasant emotions (angry, anxiety, and dejection) at Step 2 this model once again was not statistical significant F (5, 252) = 1.93, $p = .09$. Finally, this analysis revealed that emotions (pleasant and unpleasant) were not contributed in the predicting of the strength of religious faith. Nevertheless, in the final model, one out of five predictor variables were statistically significant, with happiness showing a Beta value ($\beta = .19$, $p < .05$).

Table 3 - Hierarchical Multiple Regression

Variable	*R*	R^2	R^2 *Change*	*B*	*SE*	*B*	*t*
Religious faith							
Step 1	.14	.021					
Happiness				.16	.07	.19	2.30*
Excitement				-.12	.09	-.12	-1.41
Step 2	.19	.037	.016				
Happiness				.16	.08	.19	2.11*
Excitement				-.13	.09	-.13	-1.43
Anger				.10	.07	.14	1.41
Anxiety				-.12	.07	-.13	-1.57
Dejection				.03	.08	.03	1.41
ttt							
Step 1	.11	.011					
Happiness				.13	.09	.13	1.54
Excitement				-.05	.10	-.04	-.52
Step 2	.23	.052*	.040*				
Happiness				.13	.09	.13	1.50

Excitement				-.05	.11	-.04	-.48
Anger				.09	.08	.10	1.06
Anxiety				-.21	.09	-.20	-2.45*
Dejection				.18	.10	.16	1.80
ftr							
Step 1	.14	.020					
Happiness				.12	.06	.18	2.01*
Excitement				-.05	.07	-.06	-.75
Step 2	.15	.021	.01				
Happiness				.12	.06	.19	2.08*
Excitement				-.06	.07	-.07	-.79
Anger				-.02	.06	-.02	-.20
Anxiety				.03	.06	.04	.52
Dejection				-.01	.07	-.01	-.09
xenos							
Step 1	.16	.026*					
Happiness				.02	.06	.03	.32
Excitement				.12	.07	.14	1.67
Step 2	.22	.047	.021				
Happiness				.05	.06	.06	.72
Excitement				.12	.08	.15	1.65
Anger				-.09	.06	-.15	-1.48
Anxiety				-.01	.06	-.01	-.05
Dejection				.16	.07	.21	2.32*

Note: Statistical significant *$p < .05$

Second hierarchical multiple regression: In the first step, two predictors were entered: happiness and excitement (pleasant emotions). This model was not statistically significant, F (2, 255) = 1.44, p = .24. After entering unpleasant emotions (angry, anxiety, and dejection) at Step 2, the total variance explained by the model as a whole was 5.2%, F (5, 252) = 2.74, $p <$ .05. The introduction of unpleasant emotions explained an additional 4% variance in ttt schema, after controlling for angry, anxiety, and dejection (R^2 *Change* = .04, F (3, 252) = 3.58, $p < .05$). In the final model, one out of five predictor variables was statistically significant, with anxiety presenting a Beta value (β = -.20, $p < .05$).

Third hierarchical multiple regression: In the first step, two predictors were entered: happiness and excitement (pleasant emotions). This model was not statistical significant, F (2, 255) = 2.65, p = .07. After the entry of unpleasant emotions (angry, anxiety, and dejection) at Step 2 this model and once again it was not statistical significant F (5, 252) = 1.10, p = .36. Finally, this analysis revealed that emotions (pleasant and unpleasant) were not contributing

in the prediction of ftr schema. Nevertheless in the final model, one out of five predictor variables were statistically significant, with happiness showing a Beta value ($\beta = .19$, $p < .05$).

Fourth hierarchical multiple regression: In the first step, two predictors were entered: happiness and excitement (pleasant emotions). This model was statistically significant, F (2, 255) = 3.43, $p < .05$, and explained 2.6% of the variance in xenos schema. After the entry of unpleasant emotions (angry, anxiety, and dejection) at Step 2 the total variance explained by the model as a whole was 4.7%, F (5, 252) = 2.47, $p < .05$. The introduction of unpleasant emotions explained an additional 2.1% variance in xenos schema, after controlling for angry, anxiety, and dejection (R^2 *Change* = .021, F (2, 252) = 1.18, $p = .15$). In the final model, one out of five predictor variables were statistically significant with dejection presenting a Beta value of ($\beta = .21$, $p < .05$).

Discussion

Jones and Uphill (2004) supported that an emotion can be thought of as a response to an event or stimulus. They also suggested that emotions could lead to changes in an individual's cognitive functioning. Thus, the aim of this study was to investigate, through retrospective self-report, any possible affect of discrete emotions in sport settings on cognitive functioning of religiosity. The present study also examined the existence of developmental changes in discrete emotions and religiosity of athletes.

A first finding of the present study through descriptive statistic was the dominance of pleasant emotions among athletes. Similar findings have been supported from other studies as well (e.g., Allen et al., 2010; Lane, Devonport, Soos, Karai, Leibinger, & Hamar, 2010; McCarthy et al., 2013; Proios, 2014a). This finding is possibly due to the fact that emotions such as happiness, excitement and enjoyment permeate successful endeavor in sport (McCarthy, 2011; Uphill & Jones, 2012). Finding also revealed that the strength of religious faith of athletes is found at a medium level, something enhanced by findings of other studies that revealed that religious faith ranges between low and medium level (e.g., Bell, Johnson, & Petersen, 2009; Storch, Roberti, Bravata, & Storch, 2004). The medium level of religious

faith is possibly due to the age of athletes (teenagers). Other findings supported that religiosity relents from early adolescence to late adolescence (Proios, Under review), or after the age of 17 (Smith & Denton, 2005).

Within the frame of examining athletes' religiosity through religious schemas, it seems that the cognitive pattern that is preferred by athletes in order to deal with issues of everyday life is the one expressed by the religious schema of fairness, tolerance and rational choice (ftr). This finding combined with that of the medium level of religious faith, reveals a limited presence of a religious fundamentalism amongst athletes. Nevertheless the absence of other empirical proof does not allow further discussion of this finding.

The findings of the present study on the effect of developmental variables in the formation of the aspects of religiosity and emotions of athletes, did not fully confirmed the initial hypotheses. Regarding the strength of religious faith and religious schemas, these were not found to be affected by gender and experience but only by the type of sport at a small size. Regarding gender, the present finding is enhanced by those of other studies that revealed no main effect on the three dimensions of religiosity (organizational, non organizational, and intrinsic) (Storch, Storch, Kolsky, & Silvestri, 2001) and no significant effect on religious schemas (Streib et al., 2010). The finding of type of sport strengthens the claim that the strength of religious faith may differ as a function of the type of sport (Storch et al., 2004). For experience, the significant shortage of literature assessing religiosity in athletes does not allow further discussion on this finding (i.e. the lack of effect on athletes' religiosity).

On the contrary for emotions, findings revealed that these are affected by gender, type of sport and experience at a small to moderate size. Specifically for gender, this finding enhances the claim that emotions are important across gender (Proios, 2014a; Shweder & Haidt, 2004). By separately investigating any possible differences in discrete emotions that are gender-related, they were established to be significant only in happiness. This finding leads to the assumption that gender is a weak factor in controlling emotions. Daniels, Haynes, Stupnisky, Perry,

Newall, and Pekrun (2008) established that gender was a non-significant covariate in all analyses except boredom.

Regarding type of sport, findings revealed a moderate size affect on emotions, mostly focused on anxiety. This finding strengthens findings of other studies that supported that different types of individual and team competitions elicited different levels of anxiety and anger (Proios, 2014a), enjoyment and anxiety (Cooke, Kavussanu, McIntyre, & Ring, 2013). Also, the present finding agrees with the one showing that anxiety was decreased from individual to team competitions (Martin & Hall, 1997).

Finally, the findings of the present study showed that athletic experience has a significant by small in size effect on the formation of emotions. Nevertheless, this small size effect was found to affect anxiety and dejection. Athletic experiences are special kinds of *social experiences* which for example consist of "role-taking" experiences. A result of these experiences is the development of concepts as a knowledge and appraisal which are related to emotions (Lazarus, 1991). But as was revealed by the present finding as these experiences increase anxiety and dejection are reduced.

People are possessed by a complex mixture of emotions that can play an important role in the shaping of overall religious sensibility (Fuller, 2007). Nevertheless, the findings of the present study supported in part the above mentioned claim. More specifically, the present findings revealed that emotions were independent from the strength of religious faith, with the exception of the positive relation of happiness with the strength of religious faith. This finding supports previous literature which has shown that happiness positively predicts religiosity (e.g., Abdel-Khalek, 2006; Lewis & Cruise, 2006). It is understood that discrete emotions, as an organized psychophysiological reaction to ongoing relationships with the environment, cannot affect the formation of athletes' religious beliefs with the exception of happiness that showed small effect. Up to date and from a psychological perspective no clear view has been stated on the relation between the two constructs, religious and happiness (Lewis & Cruise,

2006). Theological writings though, make an attempt to approach this relation through a series of reports (for a review, see Lewis & Cruise, 2006).

On the contrary, the present finding supported that religious schemas, i.e. the way people deal with everyday issues, show some dependence on emotions. More specifically, the finding revealed that emotions (pleasant and unpleasant) predict schemas related to truth of test and teaching (ttt) and xenosophia, inter-religious dialox (xenos), except the schema fairness, tolerance and rational choice (ftr). This finding strengthens the claim that "Emotions have a profound effect on perception and cognition insofar as they prioritize our goals and direct our attention to environmental objects that appear most relevant to our vital interests" (Fuller, 2007, p. 29). The existence of a negative relation of anxiety-ttt and the positive relation of happiness-ftr and dejection-xenos were revealed. The finding enhances the claim that emotions affect the content and strength of an individual's beliefs (Frijda et al., 2000).

Regarding the relation between religiosity and anxiety, previous studies show mixed results. On the one hand, several studies have found negative associates (see: e.g., Davis, Kerr, & Kurpius, 2003; El-Jamil, 2003). On the other hand, a number of studies have reported the absence of significant correlations between religiosity and anxiety (Francis & Jackson, 2003) and social anxiety (Kalkhoran & Karimollahi, 2007). Other studies carried out in different cultures have yielded the above mentioned results. Vasegh and Mohammadi (2007) with Muslim medical students found a negative association between religiosity and both anxiety and depression.

Happiness is a positive emotion and is characterized by the element of satisfaction which in sports refers to the satisfaction of winning (Lazarus, 2000) as a life goal with the religious schema ftr is characterized by fairness, tolerance and rational choice, which has found to have a positive correlation to purpose in life (Streib, 2010), which in religion is human happiness. This identification of the concepts of happiness and ftr is confirmed by the finding of the present study, i.e. the relation of happiness-ftr.

The finding of the positive relation of dejection with a perspective of religiosity may be accounted for the fact that people who are experiencing high levels of depressive symptoms may find a lack of pleasure in former religious involvements, which may over time erode their public and even private engagements with their religious faith (Smith, McCullough, & Poll, 2003). Especially the finding of the relation of emotion dejection with a religious style as a xenos, where way of life and habits are determined by the inter-religious dialox, may be due to the fact that people presenting depressive symptoms may present lack of energy resulting to religious pursuits (Smith, McCullough, & Poll, 2003).

Limitations

The present study presents a series of limitations. The relatively small number of sample does not allow the generalization of results. The use of various measures for religiosity as well as emotions in all studies up to date, does not allow the formation of a clear view on what exists among athletes for the above mentioned notions. It should be noted that the assessment of emotions was based on self-reports for a set of preceding settings/ competitions. Up to present, the assessment of emotions concerned how the athletes felt pre-or post competition. The absence of similar studies in sports, i.e. on the affect of emotions on athletes' religiosity, does not allow the conducting of any comparison among the present and other findings.

Conclusions

The present findings showed a series of conclusions. Strength of religious faith in athletes is found to be on a medium level, with the religious style of athletes, based on the dominant religious schema supported in fairness, tolerance and rational choice, while the dominant emotion among athletes is happiness.

The formation of religiosity of athletes seems to be affected only by the type of sport and not by gender and experience. Nevertheless, the above mentioned developmental factors seem to affect, at a small up to a medium level, affect the formation of discrete emotions in sport.

The expected influence of discrete emotions on the religious faith of athletes was not confirmed. An exception was the influence of happiness. The formation of religious schemas (ftr and xenos) of a perspective of religiosity seems to be affected by discrete emotions. The conclusion of non-influence, weakens the claim that religiosity consists a moral emotion (intuition) (Graham & Haidt, 2010), at least in sport settings. The diversity among the present conclusion and the claim of Haidt and colleagues, is probably due to different measures of religiosity. Graham and Haidt measured religiosity on just the element of purity/sanctity, which they believe that it is the psychological foundation of the ethic of divinity (see Haidt, 2006, ch. 9). Finally, it is concluded that each discrete emotion seems to affect in a different way each perspective of religiosity of athletes.

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