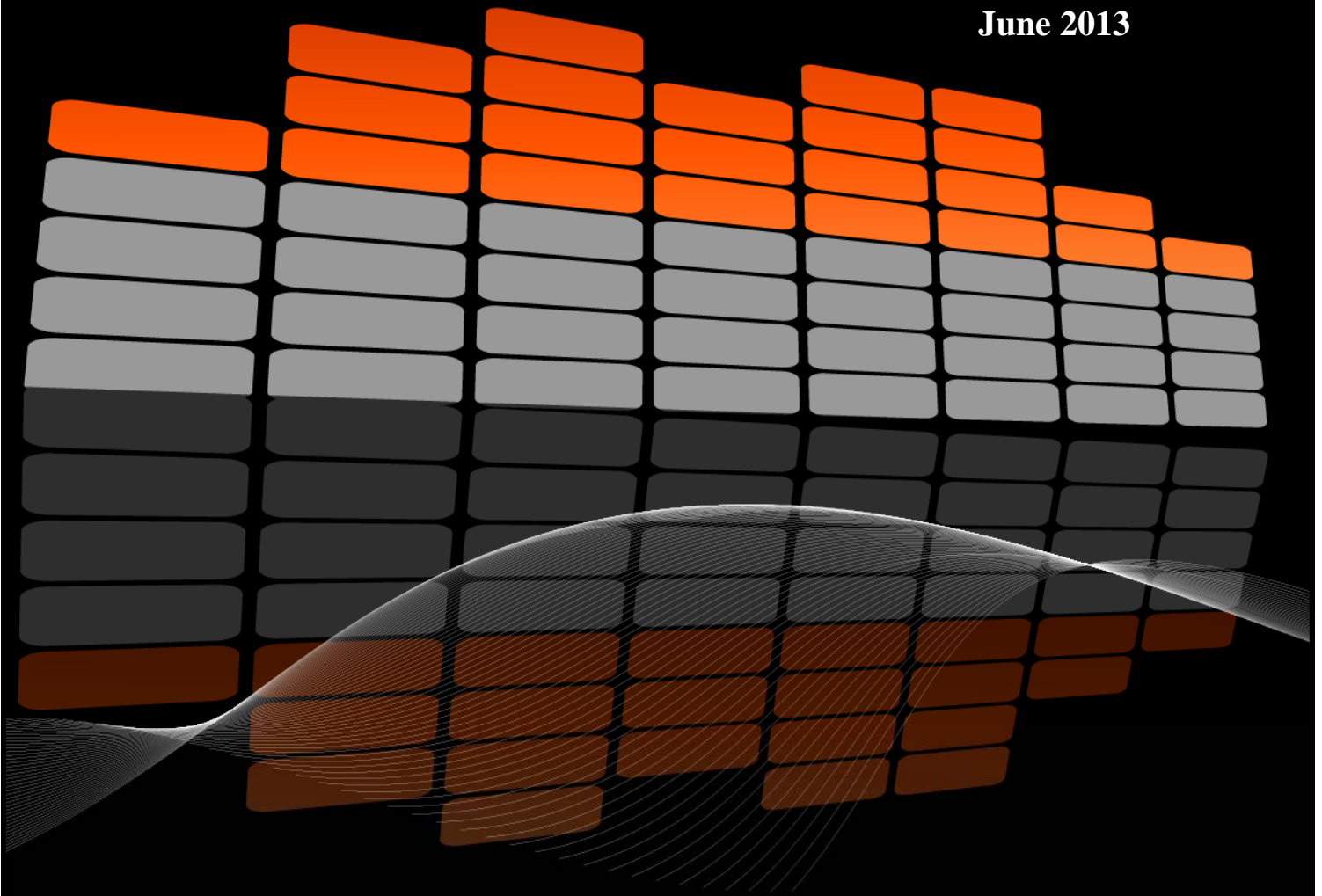


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# Cross Country Evidence on Consumption Persistence

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**Abstract** - The main focus of this article is the detection and measurement of the level of persistence in aggregate and disaggregate private consumption in Italy, Norway and the United Kingdom. Using a non-parametric methodology, we conclude that the presence of a significant degree of persistence in aggregate and disaggregate consumption in those three countries cannot be rejected.

These results are essential from a policy point of view. Persistence in consumption does exist and cannot be ignored, whether the goal is to stabilize the level of output via consumption or to boost output via long-lasting increases in consumption. One instrument that might be useful in addressing this issue is interest rates.

**Keywords** - Consumption, Persistence, Italy, Norway, the United Kingdom.

## 1. Introduction and Motivation

This paper addresses the issue of the degree of persistence in both aggregate and disaggregate private consumption and identifies its economic policy implications. Persistence can be thought of as a measure of the speed at which a variable returns to its baseline after a shock. In this sense, when the degree of persistence is small, a shock tends to have more temporary effects and conversely when the degree of persistence is high, a shock tends to have more long-lasting effects.

The recent world economic and financial crises are being mitigated by a massive fiscal countercyclical stimulus trend that mainly functions through private consumer spending. The economic rationale for this pattern is well known, as are the (macro-) economic reasons why some countries are recovering faster and better than others. However, these (macro) economic considerations are not the only (or the most important) factors in households' consumption behavior, even under the present economic circumstances. The

structure of preferences might be a factor, particularly if consumers have inter-temporally dependent preferences. Indeed, this might be a reason for consumption to display some sort of persistence or inertia.

The presence of inertia can substantially change the reaction of households to a policy shock or to innovations. This is particularly problematic for the formulation and the effectiveness of the present countercyclical policies that function through consumption. Persistence can reduce the incidence, length, and severity of shocks and changes in economic conditions. Furthermore, measuring the response of consumption to a shock is also important because it may show when it is more essential to act to overcome the harmful effect of a shock.

Traditionally, macroeconomic policies play the dominant role in smoothing the business cycle, but the effectiveness of those policies depends upon the economy's resilience. That is, the success of those policies depends upon the ability of the economic system to absorb the shock and to return to the baseline. Therefore, given the presence of persistence in consumption, the key question is whether it is viable and effective to design countercyclical policies that act through consumption expenditures, even if they are optimal.

The literature on the importance of persistence in macroeconomics is inexplicably insufficient. The first macroeconomic studies incorporating the issue of persistence appeared only in the early 1980s, and only recently did a factual interest, from an empirical point of view, in the phenomenon emerge. The importance and the need to (theoretically and empirically) study the phenomenon are further strengthened by the current economic and financial crisis, in which the persistence of the recession is a central issue. In addition, the literature on the persistence of

consumer habits has recently also gained some relevance in psychology and marketing.

The first studies that explicitly considered the importance of persistence were of a macroeconomic nature and began by highlighting the role of both staggered wage-setting and staggered price-setting as a source of persistent real effects of monetary shocks (Taylor 1980; Rotemberg and Woodford 1997; Huang and Liu 2002)<sup>1</sup>. On the other hand, given the alleged inability of standard real business cycle models to reproduce the evolution of output shown under real-world conditions (Cogley and Nason 1995), the inertial hypothesis was also used to explain the (strong) persistence of output that was observed in reality (Bouakez and Kano 2006; Maury and Tripier 2003). However, this development did not lead to a consensus, and the possibility of monetary policy shocks affecting aggregate output remained central to the debate. Indeed, the persistence of shocks on aggregate output has been, and still is, one of the issues most often subject to examination, and this will probably be the case for some time.

Multiple theoretical explanations have been proposed for the empirical evidence that monetary policy shocks can have a permanent effect on aggregate output (or unemployment). These explanations include imperfect information and short-run nominal price stickiness (Kiley 2000; Wang and Wen 2006). Furthermore, Jonsson (1997), Lockwood (1997) and Svensson (1997) have analyzed the consequences of inflation contracts on output or unemployment persistence. All these studies share the idea that, whether or not price rigidity is responsible for output or unemployment persistence, this should be seen as an empirical issue rather than a theoretical one.

Another interesting consequence of output persistence is that it may invert the political business cycle, which is typically associated with depressions at the beginning of the mandate followed by pre-election inflationary expansion (Gärtner 1996,1999; Caleiro 2009). Quite recently, increased interest in analyzing the persistence of output and inflation has been registered, and this has included studies of their relationship with the degree of openness of the economies (Guender 2006), the exchange-rate regime (Giugale and Korobow 2000) or the structural changes in the preferences of consumers, firms or policy-makers.

The literature on inter-temporally dependent preferences is a well-built microeconomic theoretical basis for inertial behavior and, therefore, for persistence. Indeed, in a seminal work, Dusenberry (1949) called attention to the importance of past consumption on the current consumption level of households. Ryder and Heal (1973) and Constantinides (1990) show that when instantaneous well-being is determined by both the current level of consumption (through the level effect) and its past level (through the habit or persistence effect) throughout a process of 'learning-by-consuming', the inter-temporal dependent preferences might cause permanent cyclical consumption behavior along its time path. This hypothesis, built upon the importance of habits, has also been tentatively used to explain the behavior of the growth rate and of the savings rate during a recession (Carroll 2000; Wendner 2000). Moreover, Belbute and Brito (2008) show that the presence of the inertial effect can not only lower the long-run equilibrium level for natural capital and the growth rate of the economy but also reduce the effectiveness of an environmental policy that is meant to improve environmental quality as well as sustainability.

In addition, in the literature in the fields of psychology and marketing, the study of habits has gained relevance but has not, to the best of our knowledge, been explored in terms of its relationship with persistence. Belbute and Caleiro (2009) may be viewed as a first step towards explaining how the behavior of consumers in a country with specific psychosocial consumption habits may lead to the persistence of consumption at an aggregate level.

The goal of our article is to contribute to the design of public countercyclical policies that act through private aggregate and disaggregate consumption. We do so by measuring the degree of persistence associated with private consumption (by type) for Italy, Norway and the United Kingdom. This allows us to highlight the influence that differences in preferences and cultures (Latin, Nordic and Anglo-Saxon) might have on the level of persistence.

Our article extends the literature by measuring the degree of private consumption persistence using one of two different approaches, depending on whether the corresponding time series exhibits stationary or non-stationary behavior. In the first case, persistence is

<sup>1</sup>See also Ascari (2003) for a critique of the real role of staggered wage-setting and staggered price-setting as sources of inertia.

measured by estimating the sum of the auto-regressive coefficients of the appropriate autoregressive models. However, when the null hypothesis of a unit root cannot be rejected, persistence cannot be measured using the standard time series analysis. By definition, when the time series exhibits nonstationary behavior, it does not revert to its mean, and thus, it does not exhibit inertial behavior. In this case, we will measure persistence using a nonparametric methodology proposed by Marques (2004) and Dias and Marques (2010). This new measure of persistence can be defined as the unconditional probability that a stationary stochastic process will not cross its mean during time  $t$ .

Our results show that we cannot reject the presence of a significant level of persistence in aggregate consumption in the three countries. We also find a statistically significant level of persistence of disaggregate private consumption in each country, although, in some cases, there are statistical differences between items within and among countries. Clearly, these results are imperative from a policy point of view. Persistence in consumption does exist and cannot be ignored, whether the goal is to stabilize the level of output via consumption or to boost output via long-lasting increases in consumption.

This article is organized as follows. In Section 2, a theoretical model of optimal consumption leading to persistence is presented. Section 3 offers some methodological notes about persistence. Section 4 presents the data. Section 5 details the empirical results as contrasted with the expected results from the model in Section 2. Section 6 concludes the article.

## 2. A Model of Consumption Persistence

Let us consider a consumer who possesses an instantaneous utility function defined as  $U_t = \ln(c_t)$ , where  $c_t$  denotes the level of consumption in moment  $t$ . As usual, let us assume that the consumer consumes until moment 2, such that his/her objective function is

$$U = \sum_{t=0}^2 \beta^t \ln(c_t) \quad (1)$$

where  $\beta$  is the discount factor.

To support the consumption expenditures, the consumer has some monetary resources available that can be capitalized at an interest rate  $r$  if not spent. This

means that the maximization of (1) must consider the inter-temporal restrictions:

$$a_{t+1} = (1+r)a_t - c_t \quad (2)$$

for  $t = 0, 1, 2$  where  $a_0 = \bar{a}_0$  denotes the initial level of (monetary) resources. Clearly, given the time horizon of the consumer, it makes no sense not to spend all of the resources on the last period. Therefore,  $a_3 = 0$  which means  $c_2 = (1+r)a_2$ .

For the moment, let us ignore the persistence of consumption, which is understood as the influence of prior consumption,  $\gamma c_{t-1}$ , on current consumption  $c_t$ . The higher  $\gamma$  is the greater the influence of past consumption experiences on the current level of consumption and, thus, the greater the degree of persistence. Under these circumstances, it is straightforward to demonstrate that the optimal levels of consumption can be given by

$$\begin{aligned} c_0 &= \frac{(1+r)}{1+\beta+\beta^2} \bar{a}_0; \quad c_0 \\ &= \beta \frac{(1+r)^2}{1+\beta+\beta^2} \bar{a}_0, \quad c_0 \\ &= \beta^2 \frac{(1+r)^3}{1+\beta+\beta^2} \bar{a}_0 \end{aligned}$$

From these expressions, it is easy to see that the relationship between the present and past consumption levels is given by

$$c_t = \beta(1+r)c_{t-1} \quad (3)$$

This shows that the persistence of consumption is a factor and should always be considered. As a matter of fact, one can restate the above problem in terms of the optimal level of persistence of consumption,  $\gamma$ , which is given by

$$\gamma = \beta(1+r). \quad (4)$$

Clearly, for a given interest rate, the optimal level of persistence increases according to how much the consumer cares about the future. This result has obvious implications: (a) it has to do with the time horizon of consumers, therefore making it possible to differ in accordance with the characteristics of different cultures; and (b) it has to do with the durability (or not) of the consumption of goods,

therefore making it possible to differ in accordance with the characteristics of the different goods.

### 3. Persistence: Definitions and Methodological Notes

Persistence can be broadly defined as the speed with which a variable (e.g., consumption) returns to its baseline (or its previous level) after, say, a shock (for instance, a macroeconomic policy measure) or an “innovation.” In other words, consumption is said to be more inertial when it more slowly converges (or returns) to its previous level after the occurrence of a stimulus. Persistence is thus inversely related to the concept of mean reversion.

The implication of that definition is that the degree of persistence can be associated with both the speed with which consumption responds to a shock and the length (permanent or temporary) of the shock effects. When the value is small, consumption responds quickly to a shock and returns quickly to its trend. Conversely, when the value is high, the speed of adjustment is low, and consumption will tend to converge more slowly to its baseline. Therefore, if the degree of persistence is small, a shock tends to have temporary effects and conversely if the degree of persistence is high, a shock tends to have more long-lasting effect.

Quantifying the response of consumption to a shock is indeed important not only because it may allow one to assess the effectiveness of economic policy measures but also because it may show at what point it is more appropriate to act to overcome a harmful effect of a shock to consumption. By definition, quantifying the response of consumption to shocks implies evaluating the persistence of consumption.

Some authors have proposed that obtaining those estimates via the use of *autoregressive models* as estimates of persistence at time  $t$  will indicate how long we expect a shock to take to die off (if it ever does). A univariate AR(k) process is characterized by the following expression:

$$y_t = \alpha + \sum_{j=1}^k \beta_j y_{t-j} + \varepsilon_t \quad (5)$$

where  $y_t$  denotes the aggregate and disaggregate private consumption at moment  $t$ , which is explained by a constant  $\alpha$ , by past values up to lag  $k$ , and by a

number of other factors whose effect is captured by the random term  $\varepsilon_t$ . Alternatively, (5) can also be re-parameterized as follows:

$$\Delta y_t = \alpha + \sum_{j=1}^{k-1} \delta_j \Delta y_{t-j} + (\rho - 1)y_{t-1} + \varepsilon_t \quad (6)$$

where

$$\rho = \sum_{j=1}^k \beta_j \quad (7)$$

is the “sum of the autoregressive coefficients” and  $\delta_j = -\sum_{i=j+1}^k \beta_i$ .

Again, the AR(k) process (5) (or (6)) can also be re-parameterized and written as

$$(y_t - \mu) = \sum_{j=1}^{p-1} \delta_j \Delta (y_{t-j} - \mu) + \rho (y_{t-1} - \mu) + \varepsilon_t \quad (8)$$

or equivalently

$$\Delta y_t = \sum_{j=1}^{p-1} \delta_j \Delta (y_{t-j} - \mu) + (\rho - 1)(y_{t-1} - \mu) \quad (9)$$

with

$$\mu = \frac{\alpha}{1 - \rho} \quad (10)$$

being the “unconditional mean” of the  $y_t$  series.

This formulation has the advantage of showing that persistence is related to the concept of “mean reversion” present in equation (8) or (9) by the term  $(\rho - 1)(y_{t-1} - \mu)$ . As long as  $(\rho - 1) < 0$  (or alternatively,  $\rho < 1$ ), i.e., as long as the time series is said to be stationary, any unit deviation from the mean in period  $t - 1$ ,  $(y_{t-1} - \mu)$ , will force the series in the next period to display (positive or negative) change in the amount  $(\rho - 1)$ , thus bringing it close to the mean.

Andrews and Chen (1994) propose the “sum of the autoregressive coefficients” (7) to be a measure of persistence, while other authors have proposed alternative measures of persistence, such as the largest



autoregressive root, the spectrum at zero frequency, or “half-life.” For a technical appraisal of these other measures, see, for instance, Marques (2004) and Dias and Marques (2010). The rationale for this measure comes from the fact that for  $|\rho| < 1$ , the cumulative effect of a shock on  $y_j$  is given by  $\frac{1}{1-\rho}$ .

One important implication of stationary autoregressive processes (that is,  $\rho < 1$ ) is that any shock has transitory effects, whereas under the autoregressive unit roots (or nonstationary) hypothesis (that is  $\rho = 1$ ), random shocks have a permanent effect on the system. Therefore, fluctuations are not transitory, and the system has no tendency to return to a stable value.

Unfortunately, the procedure described above is inappropriate when a data series is a “non stationary” process, i.e. when a series that has moved away from its mean does not reveal a tendency to return to it. Therefore, the existence of a unit root in the data generation process makes it impossible to accept the results of a traditional OLS estimation.

Marques (2004) and Dias and Marques (2010) have suggested a nonparametric measure of persistence,  $\gamma$ , based on the relationship between persistence and mean reversion. In particular, Marques (2004) and Dias and Marques (2010) suggested using the statistic

$$\gamma = 1 - \frac{n}{T} \quad (11)$$

where  $n$  stands for the number of times the series crosses the mean during a time interval with  $T + 1$  observations—the ratio  $n/T$  provides the degree of mean reversion—to measure the absence of mean reversion in a given series, given that it may be seen as the unconditional probability of that given series *not crossing* its mean in period  $t$ . In short, (11) measures how often the series does not revert to its mean, and (high/low) persistence indicates whether, after a shock, the series *reverts* to (or *crosses*) its mean more seldom or frequently. To put it differently, the less often a time series crosses its mean, the greater the degree of persistence and, thus, the higher the value of  $\gamma$ .

As Dias and Marques (2010) have shown, there is a one-to-one relationship between the sum of the

autoregressive coefficients  $\rho$  given by (7) and the non-parametric measure  $\gamma$  given by (11) when the data are generated using an AR(1) process. However, such a relationship no longer exists once higher-order autoregressive processes are considered, therefore giving rise to possibly crucial differences when measuring persistence in the series.

Expressions (8) or (9) are also useful because they help one to understand the importance of the mean and, in particular, what mean one should use to measure persistence. Clearly, to compute the estimate of persistence for each kind of consumption, the mean of each series must be computed, and therefore assumptions must be made about its behavior over time. As suggested in Marques (2004) and Dias and Marques (2010), a time-varying mean is more appropriate than the simple average for all the period under investigation.

One possibility is to consider whether the mean follows a linear deterministic trend given by  $\mu_t = \bar{\mu} + \delta t + \varepsilon_t$  (with  $\varepsilon_t$  being a white noise process) and use the de-trended time series to measure persistence, as in (3). Again, however, this method is only viable when the time series represents a trend-stationary process and the residuals represent a white noise process.

Using the alternative measure of persistence  $\gamma$  given by (11) also has advantages because it does not impose the need to assume a particular specification for the data generation process and, therefore, does not require a model for the series under investigation to be specified and estimated  $\gamma$  is indeed extracting all the information about the persistence from the data.<sup>2</sup>

#### 4. Data and Preliminary Data Analysis

This section describes the basic data set, presents the results of the unit root tests, and discusses the implications of the nonstationary nature of the data for persistence.

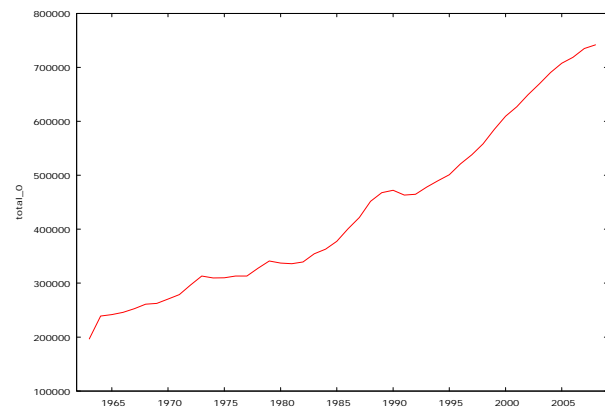
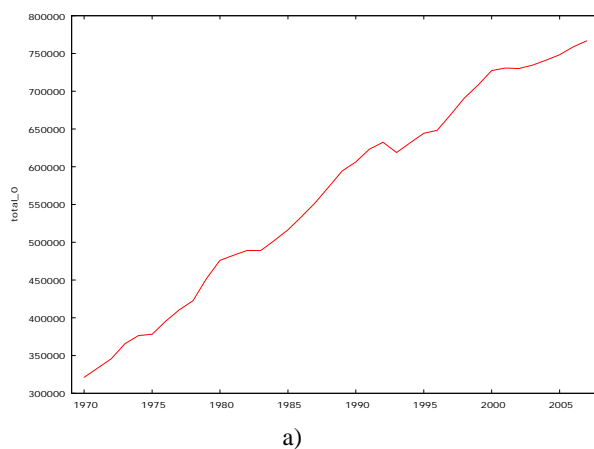
##### 4.1 Brief description of data set

We use annual data for both aggregate and disaggregate private consumption for Italy (1970 to 2007), the United Kingdom (1963 to 2008) and Norway (1980 to 2006). Data for aggregate and disaggregate private consumption for each country were obtained from Eurostat, which classifies

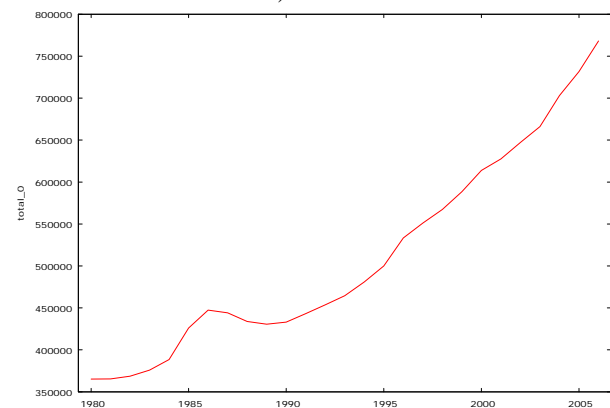
<sup>2</sup>The statistical properties of  $\gamma$  are extensively analysed in Marques (2004) and in Dias and Marques (2010).

household consumption expenditure by consumption purpose according to the Classification Of Individual Consumption by Purpose, COICOP (see Commission Regulation 113/2002 of January 23, 2002). Aggregate private consumption is defined as the sum of private consumption levels for the 12 categories at the two-digit level, as shown in Table 1.

Each one of these 12 categories includes household expenses that can be aggregated into four one-digit level groups: services, non-durables, semi-durables and durables. For example, expenses with “housing” include “services” (actual rentals paid by tenants, including other actual rentals, services for the maintenance and repair of the dwelling, refuse and sewerage collection, etc.) as well as non-durables, such as materials for the maintenance and repair of the dwelling, water supply, electricity, liquid and solid fuels, gas, heat energy, etc. On the other hand, “transport,” for example, includes services (maintenance and repair of personal transport equipment), semi-durables (spare parts and accessories for personal transport equipment), and durables (motor cars, motor cycles, bicycles, etc.). For this reason, it is impossible to isolate any direct association between the two categories. In particular, it would be impossible to develop a precise outlook about these four aggregate household expenses using the three-digit variables. This prevents us from measuring the persistence of these four important categories of household expenses.



b)



c)

Figure. 1. Aggregate private consumption for Italy (panel a), the United Kingdom (panel b) and Norway (panel c)

Clearly, “Food and non-alcoholic beverages” (hereafter, “food”), “Furnishing, household equipment and routine maintenance of the house” (hereafter, “furnishing”) and “Communications” are the three most important components of aggregate consumption. Together, they represent almost 50% of all private consumption but, in recent years, these three groups have consistently reduced their relevance in the three countries. However, the relative importance of these groups is different, with Norway being the country in which these items have more weight. On the other hand, we also detect differences across these countries when we consider each item. For United Kingdom, Food has less weight than for the other two countries.

#### 4.2 Testing Stationary

We test the unit roots hypothesis for aggregate and disaggregate private consumption data for Italy, United Kingdom and Norway by using the modified Dickey–Fuller t test (also known as the Dickey–Fuller Generalized Least Squares test (DF-GLS) proposed by

Elliott et al. (1996). Essentially, the DF-GLS test is an augmented Dickey–Fuller test in which the time series is transformed via a (GLS) regression before performing the test. Elliott et al. (1996) and later studies have shown that this test has significantly greater power than the previous versions of the augmented Dickey–Fuller test. The AD-GLS  $t$ -test suggests that the null hypothesis of a unit root cannot be rejected for all variables at the 5% significance level (see Tables 1A, 2A and 3A in appendix).

of these two countries to leave the European Monetary System (EMS) in the summer of 1993.<sup>3</sup> For Norway, the breaking point is 1994 and coincides with the moment when the European Economic Area. (EEA) came into effect.<sup>4</sup> We used the Chow (1966) test to confirm these dates as a structural break. For all cases, we have used Perron (1989)'s strategies to test the null hypothesis that the time series have a unit root with a possibly nonzero constant against the alternative that the process is "*trend-stationary*."

**Table 1. Structure of private consumption**

Country	Period	Food and non-alcoholic beverages	Clothing and footwear	Housing, water, electricity, gas and other fuels	Furnishings, household equipment and routine maintenance of the house	Health	Transport	Communications	Education	Alcoholic beverages, tobacco and narcotics	Recreation and culture	Restaurants and hotels	Miscellaneous goods and services
Italy	Overall Sample	18.2%	3.5%	9.1%	19.7%	7.9%	2.5%	12.3%	1.7%	0.8%	6.3%	9.1%	8.9%
	1970-1993	19.9%	4.1%	9.4%	20.1%	7.7%	1.9%	11.6%	1.0%	0.8%	5.9%	9.1%	8.5%
	1994-2008	15.2%	2.5%	8.7%	18.9%	8.2%	3.5%	13.6%	2.7%	0.9%	7.0%	9.2%	9.5%
United Kingdom	Overall Sample	12.2%	7.0%	4.9%	22.0%	5.4%	1.8%	14.5%	1.4%	1.3%	6.0%	12.4%	11.0%
	1963-1973	16.0%	10.4%	4.2%	25.4%	5.4%	1.8%	12.7%	0.7%	1.2%	0.9%	12.5%	8.8%
	1974-1993	12.2%	7.4%	4.3%	23.3%	5.1%	1.9%	15.0%	1.1%	1.4%	4.6%	13.4%	10.5%
	1994-2008	9.4%	4.1%	6.3%	17.7%	5.8%	1.6%	15.2%	2.2%	1.4%	11.8%	11.1%	13.5%
Norway	Overall Sample	16.0%	5.9%	5.7%	21.7%	6.0%	2.6%	15.7%	1.5%	0.5%	11.3%	5.6%	7.6%
	1980-1987	17.7%	7.1%	5.5%	23.0%	6.0%	2.1%	18.0%	0.6%	0.5%	8.5%	4.9%	6.0%
	1988-1994	16.4%	6.5%	5.2%	24.0%	5.7%	2.8%	14.5%	0.9%	0.6%	9.7%	5.6%	8.0%
	1995-2006	14.7%	4.6%	6.1%	19.5%	6.1%	2.7%	14.7%	2.5%	0.5%	14.0%	6.1%	8.5%

One major problem with unit root tests is the implicit assumption that deterministic trends are well determined. However, as Perron (1989) has argued, if there is a break in the deterministic component of the time series, then unit root tests will lead to misleading conclusions about the presence or absence of a unit root.

The literature on trend breaks in unit roots is vast and sometimes controversial but converges to the need to test the null hypothesis of a unit root with a possible known and/or unknown breaks in the series. In our empirical analysis below, we fully consider the possibility of both known and unknown structural breaks for aggregate consumption for the three countries. The known turning point is 1992 for Italy and the United Kingdom coincides with the decision

We find evidence for a stationary trend under the assumption of a process with known structural breaks in the trend (model B - "growth model") for Italy and in both the mean and the trend (model C - "crash and growth model") for the United Kingdom and Norway (see Table 2). In these cases, conventional parametric tests are appropriate for testing and measuring persistence.

<sup>3</sup>The Chow test did not confirm these dates as possible structural breaks because these sample periods include years before, and after the integration of the European Economic Community and the Euro Zone. We also considered a possible structural break in 1973 for the United Kingdom (at

the time of its integration into the EEC) and 1999 for Italy (with its entrance into the Euro Zone).

<sup>4</sup>In 1992, the EFTA countries – Norway, Iceland, Switzerland and Liechtenstein - and the European Union established the European Economic Area.

**Table 2. Unit root  $t$ -tests accommodating for the presence of a known structural break**

Country	Break Point	Method <sup>(1)</sup>	Lag	ADF <sub>t</sub> (5%)
Italy	1992	Model B	2	-3,950
The United Kingdom	1992	Model C	1	4,080
Norway	1994	Model C	0	-4,240

<sup>(1)</sup> See Perron's 1989 models A (crash model), B (growth model) and C (crash and growth model)

## 5 The Level of Persistence of Private Consumption

This section measures the level of persistence of aggregate and disaggregate private consumption for Italy, Norway and the United Kingdom. A simple visual inspection of the graphs for a sample including all time series suggests that one should measure the level of persistence using a time-varying mean framework.

We will measure persistence using two distinct methodologies. First, for the trend-stationary cases the residuals of the regressions of models B and C in Table 2 are used to compute the degree of persistence (or the sum of the autoregressive coefficients  $\rho$ ). We restrict this method to the aggregate private consumption of each country. Secondly, the level of persistence for aggregate and disaggregate private consumption is measured using the nonparametric strategy statistic (7) proposed by Marques (2004) and Dias and Marques (2010). We use the residuals of the regressions of models B and C (Table 2) and the cyclical component extracted using the Hodrick-Prescott filter. In both cases, we compute the degree of persistence of the overall period and corresponding sub-periods and perform simple tests on the statistical significance of the estimated level of persistence as well as of the differences between countries and between disaggregate private consumption items.

### 5.1 A parametric measure of the degree of persistence

The parametric level of persistence for each country is estimated for the aggregate private consumption of each country and for the overall sample period, the identified sub-periods and only the stationary cases. The sum of the auto-regressive coefficients  $\hat{\rho}$  is estimated using the following regression:

$$\epsilon_t = \sum_{j=1}^{p-1} \delta_j \Delta \epsilon_{t-j} + \rho \epsilon_{t-1} + \epsilon_t \quad (12)$$

where  $\epsilon_t$  are the residuals of models B and C presented in Table 2 in the Appendix.

The results are presented in Table 3 and suggest a high degree of persistence of private aggregate consumption for the three countries given that one cannot reject the null hypothesis of equal persistence at a 5% significance level for any of them. Lags are included to account for serial correlation, and  $t$ -statistics are heteroskedastic-consistent for the persistence coefficient.

**Table 3. Measuring persistence of private aggregate consumption: the parametric case**

Countries	Break Points	Method	Lags	$\rho$	$t_\rho$
Italy	1992	Model B	2	0,728	6,996
The United Kingdom	1992	Model C	1	0,784	10,750
Norway	1994	Model C	0	0,688	4,359

To test the possibility of a change in persistence in the two sub-periods, we estimated the following model proposed by Marques (2004):

$$\begin{aligned} \epsilon_t = & \sum_{j=1}^{p-1} \delta_j \Delta \epsilon_{t-j} \\ & + \sum_{j=1}^{p-1} \lambda_j D_t \Delta \epsilon_{t-j} + \rho_1 \epsilon_{t-1} \\ & + \rho_2 D_t \epsilon_{t-1} + \epsilon_t \end{aligned} \quad (13)$$

where  $D_t$  is a dummy variable that is zero for  $t < T_B$  ( $T_B$  being the break time) and 1 otherwise. Parameter  $\rho_2$  is basically used to test the change in persistence between the two periods. Because heteroskedasticity across sub-periods might be a problem (even though not within sub-periods), the corresponding  $t$ -statistics for this parameter in Table 4 were computed using heteroskedastic-consistent standard errors.

**Table 4. Test for a change in persistence**

Country	Break Points	Method	Lags	$t_{\rho^2}$	Result
Italy	1992	Model B	1	1,578	No Change
United Kingdom	1992	Model C	1	-0,3195	No Change
Norway	1994	Model C	1	-0,028	No Change

In summary, the estimation of the autoregressive coefficients suggests statistically significant evidence of a strong degree of persistence in the three countries. An exogenous and random shock will basically have the same permanent effect on aggregate private consumption in the three countries. In accordance with the model presented in Section 2, these results suggest that there are no significant differences among the three countries' discount factors and/or interest rates.

The results also suggest no statistical evidence of a change in the level of persistence between the two sub-periods of the sample for the three countries.

## 5.2 The non-parametric measure of the degree of persistence

In this section, the non-parametric approach is used to measure the degree of persistence. We begin by using the innovations from Perron's crash and growth model. The results are presented in Table 5 and confirm the presence of a strong level of persistence in the United Kingdom, Italy and (although this is more tenuous) Norway. The null hypothesis of equal persistence could not be rejected in comparing the level of persistence between Norway and the United Kingdom for a test of 5% significance and between Norway and Italy for a test of 10% significance.

**Table 5. Measuring persistence in Aggregate Private Consumption: nonparametric approach Perron's crash and growth model**

Countries	Overall Sample			1 <sup>st</sup> Sub-Period		2 <sup>nd</sup> Sub-Period	
	$T_B$	$\gamma$	$se_\gamma$	$\gamma_1 = 1 - \alpha_1$	$se_{\alpha_1}$	$\alpha_2$	$se_{\alpha_2}$
Italy	1992	0,763 *	0,069	0,739 *	0,091	-0,061	0,145
The United Kingdom	1992	0,870 *	0,050	0,900 *	0,062	0,088	0,106
Norway	1994	0,667 *	0,091	0,800 *	0,120	0,300	0,180 +

Note: \* Denotes the rejection of the null of  $\gamma = 0,5$  (absence of persistence) while + denotes the rejection of the null of equal persistence between the two sub-periods for a test of 5% significance level in both cases.

This means that a policy innovation or a random shock that affects household expenditures will tend to have more permanent effects on United Kingdom and Italy than on Norway. Moreover, these shocks will tend to influence private consumption in Norway to deviate more quickly from its trend than will occur in the other countries. In the context of the current fiscal programs that are being implemented to tackle the economic crisis, our results suggest that Norwegian private consumption will more quickly reverse its long-run trend than one would expect for the United Kingdom and Italian private consumption. To put it in another way, the same fiscal stimulus would be more effective in Norway than in the other two countries.

In addition, we also tested the null hypothesis of a change in persistence between the sub-periods using the strategy proposed by Dias and Marques (2010). We estimated the following model:

$$x_t = \alpha_1 + \alpha_2 d_t + u_t \quad (14)$$

where  $x_t$  equals 1 if the time series crosses its mean and zero otherwise and  $d_t$  is a dummy variable that is 0 for  $t \leq T_B$  and 1 otherwise. From (14), we can see that  $\alpha_1 = 1 - \gamma_1$  and  $\alpha_2 = \gamma_1 + \gamma_2$  are the measures for the first and second sub-periods, respectively. Therefore, testing the change of persistence amounts to testing if  $\alpha_2$  is significantly different from zero.

Our results do not suggest that aggregate consumption has recently changed its level of persistence in Italy and the United Kingdom. However, for Norway, one can reject the null hypothesis of equal persistence between the two sub-

periods. Clearly, Norwegian aggregate private consumption became less persistent after 1994.

This change in the inertial behavior of aggregate consumption might be due to a change in preferences resulting in the strengthening of consumer habits. Consumers with stronger habits tend to respond more slowly to a stimulus and thus are more reluctant to change their consumption pattern to include a greater amount of green economic behavior, for example. Moreover, as the model in Section 2 shows, changes in household discount factors and interest rates may also explain changes in consumption persistence. The intensity of the current financial and economic crises may be a reason why households are more reluctant to anticipate their consumption, which is particularly relevant for durables.

The literature also points out that different combinations of habits (harmful/beneficial, addition/not-addiction and addictive/multiplicative) and risk aversion (strong/weak) conditions (Wendner 2003) may change consumer willingness to substitute

present for future consumption and may thus effect steady-state capital intensity, the savings rate and the economic growth rate. In particular, under certain circumstances (Belbute and Brito, 2008), stronger habits create fewer consumers' willing to postpone their consumption and create a greater impact of inertia on steady-state capital intensity. Furthermore, given the links among habits, persistence, patterns of saving and economic growth (Shieh et al. 2000; Carrol et al. 1997,2000; Lahiri and Puhakka 1998; Wendner, 2002), the presence of persistence in private consumption not only affects savings and growth rates but also might help to explain the strong evidence that economic growth significantly precedes an increase in the occurrence of saving.

Let us now turn to the case in which we measure persistence based on the cyclical component extracted from the time series with the HP Filter. We will first consider aggregate private consumption for the three countries as presented in Table 5.

**Table 6. Persistence in Aggregate Private Consumption: the HP- filter case**

Countries	Overall Sample			1 <sup>st</sup> Sub-Period		2 <sup>nd</sup> Sub-Period	
	T <sub>B</sub>	$\gamma$	se <sub><math>\gamma</math></sub>	$\gamma_1 = 1 - \alpha_1$	se <sub><math>\alpha_1</math></sub>	$\alpha_2$	se <sub><math>\alpha_2</math></sub>
Italy	1992	0,763 *	0,069	0,739 *	0,091	-0,061	0,145
The United Kingdom	1992	0,783 *	0,063	0,733 *	0,076	-0,142 +	0,129
Norway	1994	0,778 *	0,080	0,800 *	0,111	0,050	0,167

Note: \* Denotes the rejection of the null of  $\gamma = 0,5$  (absence of persistence) whereas + denotes the rejection of the null of equal persistence between the two sub-periods for a test of 5% significance level in both cases.

The use of the HP filter confirms the presence of a significantly high degree of persistence of aggregate consumption for each country, but unlike in the previous case, there are no statistically significant differences among the countries. Moreover, the results also suggest that British consumers became more reluctant to change their consumer patterns after the turning point (persistence increased after 1992). Recall that during the process of ratification of the Maastricht Treaty (formally the Treaty on the European Union), the speculation caused by the negative results of the first Danish referendum (June 1992) and the uncertainty surrounding the French referendum (September 1992) gave rise to speculative turbulence in currency markets, forcing Italian and British authorities to withdraw their currencies from the European Exchange Rate Mechanism on September 16, 1992. The “black Wednesday” and the speculative

attacks that followed until the middle of 1993 were only the result of a series of events catalyzed by the reunification of Germany in 1990. This event was unprecedented in history in merging a large and rich economy with a smaller economy with a much lower standard of living. For Norway, the change in the degree of inertia between the sub-periods is neither clear nor statistically significant.

### 5.3 Persistence of disaggregate private consumption: the HP filter case

Having established that aggregate private consumption involves a significant degree of inertia for the three countries, to assess the potential design of optimal public policies, it is important to measure persistence within the various categories of household expenses. In fact, the aggregate measures of

persistence occlude the variability in the amount of inertia for the different categories of consumers' spending. This is a predictable result given that the discount factor (i.e., concern about the future) was shown to be relevant to achieving the optimal degree of consumption persistence. It is obvious that different types of consumption goods have different levels of durability.

The first general conclusion is that one cannot reject the null hypothesis of presence of a statistically significant process of persistence in any of the nine categories of consumer expenses. Moreover, the null hypothesis of the tests of the change in persistence between the two sub-periods could not be rejected for the three countries and all items at a 5% of significance level.

**Table 7. Persistence of Disaggregate Private Consumption for Italy: the HP-Filter**

Variables	$T_B$	Overall Sample		1 <sup>st</sup> Sub-Period		2 <sup>nd</sup> Sub-Period	
		$\gamma$	$se_{\gamma_1}$	$\gamma = 1 - \alpha_1$	$se_{\alpha_1}$	$\alpha_2$	$se_{\alpha_2}$
Food	1992	0,711 *	0,073	0,696 *	0,097	-0,038	0,155
Clothing & Shoes	1992	0,763 *	0,069	0,783 *	0,091	0,049	0,145
Housing & Utilities	1992	0,605 *	0,079	0,652 *	0,104	0,119	0,165
Furnishing	1992	0,684 *	0,075	0,652 *	0,099	-0,081	0,158
Health	1992	0,684 *	0,075	0,609	0,098	-0,191	0,155
Transport	1992	0,816 *	0,063	0,826 *	0,083	0,026	0,132
Communications	1992	0,658 *	0,077	0,696 *	0,101	0,096	0,161
Education	1992	0,763 *	0,069	0,783 *	0,091	0,049	0,145
Alcohol and Narcotics	1992	0,789 *	0,066	0,739 *	0,086	-0,128	0,137

Note: \* Denotes the rejection of the null of  $\gamma = 0,5$  (absence of persistence) while + denotes the rejection of the null of equal persistence between the two sub-periods for a test of 5% significance level in both cases.

Consider first the case of Italy (Table 7) and note that transportation expenses are the most persistent (0.816), whereas housing expenses exhibit a lower degree of inertia (0.605). However, for the overall period, the null hypothesis of equal persistence could only be rejected for a test of 5% significance when we compared housing with transportation and with alcohol and drugs. This result is surprising because housing mainly includes services, non-durables and semi-durable items, while transport is primarily composed of durables goods. Moreover, there is no statistically significant evidence of a change in persistence between before and after the break for any of the nine items for private consumption.

In the United Kingdom, although the results show a wide range of degrees of inertia across the nine categories, the null hypothesis of equal persistence

could only be rejected for a test of 5% significance for furnishings (0.652) and clothing and shoes (0.804).

When the results for the sub-periods examined here are considered, we find that it is impossible to reject the null hypothesis of absence of persistence for furnishings. Before the break, education is the item with the highest level of persistence, but the figures are only statistically different from those for furnishings and of communication. Moreover, the pattern of persistence between the sub-periods suggests that for two categories of household expenses (education and communication), there was a clear change in the degree of persistence. In particular, education expenses became less persistent, whereas communications expenses turned out to be more persistent.

**Table 8. Persistence of Disaggregate Private Consumption for the United Kingdom: the H-P filter**

VARIABLES	T <sub>B</sub>	Overall Sample		1 <sup>st</sup> Sub-Period		2 <sup>nd</sup> Sub-Period	
		$\gamma$	se <sub><math>\gamma_1</math></sub>	$\gamma_1 = 1 - \alpha_1$	se <sub><math>\alpha_1</math></sub>	$\alpha_2$	se <sub><math>\alpha_2</math></sub>
Food	1992	0,739 *	0,063	0,733 *	0,082	-0,017	0,139
Clothing & Shoes	1992	0,804 *	0,057	0,767 *	0,073	-0,108	0,125
Housing & Utilities	1992	0,696 *	0,065	0,733 *	0,085	0,108	0,145
Furnishing	1992	0,652 *	0,072	0,600	0,088	-0,150	0,149
Health	1992	0,696 *	0,068	0,700 *	0,086	0,013	0,146
Transport	1992	0,696 *	0,063	0,733 *	0,085	0,108	0,145
Communications	1992	0,717 *	0,069	0,633 *	0,081	-0,242 +	0,138
Education	1992	0,739 *	0,063	0,833 *	0,078	0,271 +	0,133
Alcohol and Narcotics	1992	0,739 *	0,065	0,733 *	0,082	-0,017	0,139

Note: \* Denotes the rejection of the null of  $\gamma = 0,5$  (absence of persistence) whereas + denotes the rejection of the null of equal persistence between the two sub-periods for a test of 5% significance level in both cases.

Finally, the case of Norway confirms the presence of a high degree of persistence in seven of the nine categories of household expenses and no statistical evidence of differences among them. The null hypothesis of the absence of a significant degree of persistence could not be rejected for education or alcohol and drugs at a 5% significance level. Moreover, the results also suggest that it was impossible to reject the null hypothesis of equal persistence before and after the break for three items:

clothing, education and alcohol and drugs. In particular, clothing has become more inertial since 1994. Conversely, education and alcohol and drugs reduced their degree of persistence, which means that the effects of random shocks affecting these items became more temporary after the break than they were before.

**Table 9. Persistence of Disaggregate Private Consumption for Norway: the H-P filter**

Variables	T <sub>B</sub>	Overall Sample		1 <sup>st</sup> Sub-Period		2 <sup>nd</sup> Sub-Period	
		$\gamma$	se <sub><math>\gamma_1</math></sub>	$\gamma_1 = 1 - \alpha_1$	se <sub><math>\alpha_1</math></sub>	$\alpha_2$	se <sub><math>\alpha_2</math></sub>
Food	1994	0,704 *	0,087	0,733 *	0,122	0,067	0,183
Clothing & Shoes	1994	0,778 *	0,080	0,667 *	0,106	-0,250 +	0,160
Housing & Utilities	1994	0,778 *	0,080	0,800 *	0,111	0,050	0,167
Furnishing	1994	0,704 *	0,088	0,800 *	0,119	0,217	0,179
Health	1994	0,741 *	0,084	0,800 *	0,116	0,133	0,174
Transport	1994	0,815 *	0,075	0,867 *	0,103	0,117	0,155
Communications	1994	0,778 *	0,080	0,800 *	0,111	0,050	0,167
Education	1994	0,630	0,093	0,867 *	0,108	0,533 +	0,162
Alcohol and Narcotics	1994	0,630	0,093	0,800 *	0,119	0,383 +	0,179

Note: \* Denotes the rejection of the null of  $\gamma = 0,5$  (absence of persistence) whereas + denotes the rejection of the null of equal persistence between the two sub-periods for a test of 5% significance level in both cases.

Finally, the level of persistence of each item across the three countries are compared, we find that housing is more persistent in Norway (0.778) than in Italy (0.605) at a 5% significance level. This means that, all else being equal, the same policy shock will have more long-lasting effects on Norwegian housing

expenses than they will in Italy. Conversely, Norwegian private expenses on alcohol and drugs (0.630) are statistically less inertial than their Italian equivalent (0.789) using the same 5% test. Therefore, all else being equal, the same policy will have more



temporary effects on private expenses on alcohol and drugs in Norway than in Italy.

The null hypothesis of equal persistence was also rejected for a test of 10% when comparing transportation in the United Kingdom (0.696), Italy (0.816) and Norway (0.815). Moreover, Italian private expenses on education were found to be more persistent than the corresponding Norwegian expenses at a 10% significance level.

## 6 Conclusion

The goal of this article is to analyze the degree of persistence of aggregate and disaggregate private consumption for Italy, Norway and the United Kingdom, and thereby contribute to the design of public countercyclical policies that act through private aggregate and disaggregate consumption. We use a non-parametric methodology proposed by Marques (2004) and Dias and Marques (2010) to measure persistence that is more flexible and broader in scope than other measures used in the literature, particularly estimations of the sum of the autoregressive coefficients.

Our results show that the presence of significant degree of persistence in aggregate consumption in the three countries cannot be refuted. The null hypothesis of an equal level of persistence could only be rejected, at a 5% significance level, when the United Kingdom and Norway were compared. The fact that this result has only been confirmed using one of the three models described in this article is most likely due to the use of different methods to extract the long-term mean. In addition, we only found statistically significant evidence of changes in persistence before and after the known structural break for Norwegian aggregate private consumption.

Clearly, these results are consistent with the theoretically expected results (such as those presented in the model of optimal consumption in section 2). Because negligible differences in the interest rates for the three countries exist, the results accord with different cultural considerations such as the time horizon of consumers.

With few exceptions, the presence of a statistically significant level of persistence in disaggregate private consumption across the three countries also could not be rejected. Furthermore, the hypothesis of equal persistence between items within

and across countries could only be rejected in few cases.

Clearly, these results are significant from a policy perspective. As a matter of fact, persistence in consumption does exist and cannot be ignored, whether the goal is to stabilize the level of output via consumption or to boost output via long-lasting increases in consumption.

The evidence for high persistence in aggregate consumption in the three countries reflects strong habit formation mechanisms. Therefore private aggregate consumption will react slowly. However, given the high degree of persistence of aggregate private consumption, the good news is that policies that act through consumption will tend to have long lasting and larger effects.

Furthermore, the implications can also be considered from a relative perspective. The differences in the degree of persistence across different types of private consumption categories suggest that public policies can be implemented in a favorable setting in which their effects will tend to reinforce themselves, be long lasting and larger. In particular, policies may be selective and focused on those categories of consumption that are more persistent.

Because cultural differences are not easily changed, one possible instrument is interest rates. Our results do show that a decrease in interest rates intended to boost investment may also lead to undesirable results from the viewpoint of consumption, particularly for durables.

In future work, it is our intention to consider other countries, allowing for other characteristics that make them different. Because it is obviously difficult to measure the discount factor, one promising avenue seems to be that of considering the interest rate and the degree of aversion to risk. Moreover, our results do not show statistically significant evidence of differences in persistence levels of aggregate and disaggregate private consumption within and among the three countries, except for a few cases. This may be due to the use of annual data, which only allow us to capture long-term effects, whereas households might react differently in the short term to changes in policy or to exogenous and random shocks. For that reason, to evaluate the persistence of aggregate and disaggregate private consumption using quarterly or monthly data would be a natural extension of our work.

## Appendix – Unit Roots tests

Table 1A – DF-GLS Unit root tests – Italy

VARIABLE	DET	Lags	$t_c$	$t_\tau$	BIC
Aggregate Consumption	Constant and Trend	1	-2,150	-3,283	18,241
Food	Constant and Trend	1	-1,410	-3,283	14,244
Clothing	Constant	1	0,613	-2,417	14,818
Housing	Constant and Trend	1	-0,305	-3,348	14,917
Furnishing	Constant and Trend	4	-0,765	-3,081	14,485
Health	Constant and Trend	1	-1,481	-3,348	12,834
Transport	Constant	1	0,987	-2,417	15,954
Communications	Constant	3	0,019	-2,325	12,776
Education	Constant	1	-0,268	-2,417	10,4336
Alcohol and Narcotics	Constant	1	-1,679	-2,417	12,012

Table 2A – DF-GLS Unit root tests – United Kingdom

VARIABLES	DET	Lags	$t_c$	$t_\tau$	BIC
Aggregate Consumption	Constant and Trend	1	-1,775	-3,50	20,896
Food	Constant	0	0,175	-2,93	16,478
Clothing	Constant	1	2,431	-2,93	15,778
Housing	Constant and Trend	0	-11,498	-3,50	17,383
Furnishing	Constant and Trend	1	-2,190	-3,50	16,505
Health	Constant and Trend	1	-2,757	-3,50	13,857
Transport	Constant and Trend	1	-2,430	-3,50	18,480
Communications	Constant	1	2,268	-2,93	14,519
Education	Constant and Trend	1	-1,990	-3,50	14,683
Alcohol and Narcotics	Constant and Trend	0	-6,119	-3,50	16,766

Table 3A – DF-GLS Unit root tests – Norway

VARIABLE	DET	Lags	$t_c$	$t_t$	BIC
Aggregate Consumption	Constant and Trend	1	-0,560	-3,485	18,056
Food	Constant and Trend	1	-1,527	-3,485	13,889
Clothing	Constant	1	-0,126	-2,485	14,060
Housing	Constant and Trend	2	-1,166	-3,485	14,255
Furnishing	Constant and Trend	1	-0,248	-3,485	13,937
Health	Constant	1	0,427	-2,485	12,529
Transport	Constant and Trend	1	-1,112	-3,485	16,714
Communications	Constant and Trend	1	-0,484	-3,485	14,381
Education	Constant	1	-0,445	-2,485	10,997
Alcohol and Narcotics	Constant	7	-0,271	-2,485	13,771

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# Corporate Social Responsibility in Greece: The COCO-MAT SA Case Study

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**Abstract** – In recent years, companies have increased the role of Corporate Social Responsibility in their activities. Progressively an increasing number of companies show to be concerned about their performance on this subject and about reaching their objectives involving CSR. The effectiveness of investment ventures does not contradict social welfare and inclusively enlarges the importance of the concept of collective profit. In this way, CSR has also become part of the same strategic business planning. Companies shall have self-regulating mechanisms to monitor responsibilities and to guarantee that ethical standards and international norms are assured. In this paper the case of COCO-MAT, SA (Greece) is studied, working on the concept of CSR and dealing with the purpose of getting a positive impact on areas such as environment, consumers, employees or communities.

**Keywords** – *Corporate Social Responsibility, Sustainable Development, Environment, Communities, COCO-MAT SA.*

## 1. Introduction

According to a basic principle of modern programmatic strategic planning, we should not ignore that every business, as productive-economic entity, along with the profit, seeks to attain, to involve and to retain all these components that determine any other form of social organization. In this sense, the efficiency of entrepreneurship in a given organizational environment serves apart from efficiency and sustainability, basic social needs and aspirations, so that firms become organizations of individuals interacting and constitute the most numerous groups on a social level corresponding to systems of coordinated and organized action.

High level of specialization - which characterizes the structure and coordination of

organizations – as opposed to diffused and volatile relations among unorganized individuals, makes each organization a sociological unit of significance comparable to a biological organism (J. March & H. Simon: 1993, pp. 79-106). The simplistic and reductive practice of these entrepreneurship forms that ignore the complex issues of best management practices and satisfaction of the workforce has equated objectives with short-term profitability and simply tried to impose the adaptation of the human factor on the imperatives of technological rationality.

Initially, radical changes in the process of mass production aiming at maximizing profit did not only remained indifferent in new forms of human misery, due to the acceleration of production factors, but also unprepared to follow new developments in the field of technology, information and their impact on society, labor relations and the environment, which demand a reconfiguration of relations within organizational business structures. In this way, the openness of enterprises was in the service of an economic theory which placed emphasis on increasing business efficiency through a uniquely maximizing entrepreneurial process, without giving particular importance to the fact that decision-making process as a collective activity serves as a balancing mechanism for both participants in organizational structures and the broader social and environmental conditions. For example, issues related to workplace discrimination and the quality of working life, as well as abusive practices of many enterprises, contributed to a growing exacerbation of problems.

Furthermore, prolonged exploitation of natural resources, incalculable environmental consequences, as well as enormous social and regional disparities

increased skepticism on the unimpeded growth and the unregulated sector of entrepreneurial activity. In view of all these dangers, there has been a need to redefine the concept of business profit so to minimize any negative consequences on social cohesion and the preservation of ecological balance.

Considering this, Corporate Social Responsibility (CSR) got a very relevant role in the organizations and nowadays is important enough to make that organizations put very challenging objectives in this area. Many companies feel, in fact, a strong need of commitment with society and environmental concerns. This concern is discussed in this paper about a Greek company and some interesting ideas result from the analysis.

## **2. Social responsibility and Partnership**

In the process, business issues as organizations have begun to be viewed through the changes imposed by the introduction of the scientific strategic planning to manufacturing and labor relations. In this way, a different meaning has been given to the demand of performance (products, services), efficiency and organizational behavior, while an effort has been made to limit the negative impact on both the internal (labor relations) and external business environment (social and environmental conditions, institutional status). (D. Bourandas, 2002).

The attempted change in the entrepreneurial goals of Corporate Social Responsibility is associated to the finding that the effectiveness of investment ventures does not contradict social welfare; on the contrary, it contributes to the concept of collective profit in it. In this way, CSR has also become part of the same strategic business planning.

Over the time it has become conspicuous that socially responsible activity is limited neither to philanthropic activities nor the acceptance of legal obligations within the context of entrepreneurial business correctness; it is to satisfy all critical factors inside, such as human resources, labor relations and a range of factors related to consumers of products and services, suppliers, shareholders and the local community itself as a whole.

In Europe, for example, the 2001 European Commission Green Paper presents the conceptualization associated with the idea of social responsibility that concerns the situation according to

which companies decide on a voluntary basis, to contribute to a fairer society and a cleaner environment. In fact, based on this assumption, the company management cannot/ should not be guided towards the only fulfilment of interests of the owners of the company, but also of other stakeholders' interests (employees, local communities, customers, suppliers, public authorities, competitors and society as a whole).

Within this context and with a view to redefining key priorities, there has been a need to move towards an extended nature of the business beyond the idea of a purely economic entity and gradually incorporating an array of responsibilities towards society, confirming its socially responsible role and the fact that is constitutes an integral part of the society in which it operates. From a historical point of view, this is clear in periods of intense economic crisis, when large entrepreneurial units attempt – within the general unfavorable climate crisis – to violate the rules of fair competition and implement antisocial practices.

In an effort to protect the citizen and the consumer from unrestricted, unrestrained profitability of large enterprises that often circumvent social rights and authorities, pressure was exerted so that protective rules and regulations would be adopted. This pressure was accompanied by the argument that a company could not be assessed only by the quality and cost of products and services it offers but also by the way it manages issues of social and environmental nature. Both reactions against the unrestricted, unrestrained profitability of large enterprises and the pressure exerted have resulted in restricting very powerful enterprises through antitrust laws, banking regulations and protective legislation for consumers. Furthermore, it has led to a growing awareness of social responsibility governing the entrepreneurial environment and utilizing the power of enterprises for social and voluntary purposes beyond making profit.

Over the years, the concept of Corporate Social Responsibility has gained great importance, and its integration in the entrepreneurial policy is getting more and more necessary. Businesses have gradually realized that their increased productivity is connected with social responsibility shown by contributing to local, social and economic development and quality of life.

Focusing on changes related to the infrastructure of enterprises concerns activities that take place within the company and contribute to proper management and human resource development, satisfaction on the part of management and employees with increased rights of participation, information and negotiation. Another important factor is the provision of a healthy and safe working environment that ensures the prevention of occupational accidents, equal opportunities and the harmonization of work and family life. At the same time, fair recruitment procedures are ensured, as well as reward systems are developed that provide facilities for staff and their families, along with those required by law. Moreover, company training and professional development of staff is a major concern of a socially responsible company, so that employees maintain or improve the level of their skills whose immediate effect is a better performance.

Moreover, as far as the impact on external environment is concerned, actions have been developed that go over beyond the boundaries of the enterprise, such as local communities, suppliers, customers, NGOs and the environment (O. Kyriakopoulos, 2004: 73). The implementation of quality systems in the production process, credibility towards consumers in connection with investment in research and social development creates stability and trust relations, as most products are now adapted to some identified social needs. Moreover, the company can develop synergies with local communities and actively participate in designing development prospects relevant to business (chambers, associations), social (civil society) and natural environment (environmental associations). Participation in all of these sectors highlights the social profile of the company, its reputation and ultimately offers multiple benefits both for it and society in general.

### **3. From corporate philanthropy to sustainable development: Codes of business ethics**

Over the last twenty years, CSR has been studied as an administrative process and has begun to establish itself as a political culture being widespread in the business world. Some companies have had the opportunity to enhance their social profiles and to connect their business activity with a new kind of strategy of linking business objectives with ever increasing and changing social expectations. As these commitments and obligations serve social needs and

employment demands and meet established social values without violating them, they can reasonably aim at long-term financial investment and profit performance on the part of the businesses (H. R. Bowen, 1953, p.6, K. Davis, 1960, p.70). In fact, social and environmental concerns become measures and policies from one company on a voluntary basis, in cooperation with other stakeholders.

Of course, these shifts are made according to a specific perspective, a modern advertising strategy, that aims at creating a new identity that will be more attractive and acceptable from society, since by evaluating the product the consumer also evaluates the business itself, mainly in terms of its social profile, i.e. its total contribution to ensure balanced social and environmental conditions. This reality is of paramount significance in strategic business planning, because it great results by increasing the number of customers and profitability. This can be identified as a social dialogue platform that is closely connected with a balanced approach to the concept of sustainable development, according to which a company is viable and competitive in long run if it is cost-effective and efficient, minimizes negative environmental effects and acts taking into account both the society – where the business is located - and its expectations for the future.

The company is thus becoming a key instrument of social progress, technological development, as well as education and change, which must follow socially acceptable procedures or “business ethics” worded with consistency and social compatibility. This means that owners, employees, customers and generally everyone associated with the business must accept specific business ethics codes that will describe any operational activity and behavior and change according to the occurring demands or the place where the company operates. Changes in a new environment of social adaptations may be the result of mild regulations on new business demands or wider balances in entrepreneurship (K. Sahlin - Andersson 2006 (balancing act), (P.G. Lantos 2001).

The “business ethics codes” are perceived and implemented in different ways depending on the type property of each company (private - public) and its legal form (sole proprietors or companies). Based on this rational, the notion of “Corporate Social Responsibility” (CSR) emerged, which is not limited to statutory rules of law, but extends to the need of developing a “Business Ethics Code”.

“Responsibility” refers to the obligation of companies to pursue policies, make decisions and develop activities that are consistent with the goals and values of the society (H. R Bowen H. 1953).

Among other things, the company has an obligation to respond consistently to its statutory obligations and to contribute to the corruption combating, corruption that leads to market distortions and that harms the community. At the same time, it retains the right to pursue transparency, trustworthiness and reciprocity in state relations with citizens and other businesses as well as the effective protection of justice.

Furthermore, it encourages the growth of employment, since it claims from the state an effective social protection network that aims at short reintegration of the unemployed in the market itself, contributing to job creation through implementation of a merit-based performance, promotions and payments system, by ensuring good and safe working conditions with equal rights and opportunities. Moreover, the company has the right to claim from the state to protect its reputation and receive objective treatment on the basis of real and confirmed facts. On its part, the company provides honest information and advice to those who deal with it, respecting consumer rights by providing safe and quality products and services at competitive prices.

#### **4. The European Policy on CSR. The Greek Case**

At an European Union (EU) level and as an attempt to include the definitions offered for Corporate Social Responsibility (CSR), the EU incorporates social and environmental concerns in organizations’ business activities on a voluntary basis and in their interaction with their stakeholders, as they realize that responsible behavior leads to sustainable business success. Furthermore, Corporate Social Responsibility relates to the change of company attitude towards a socially responsible manner and a lasting contribution to society and with a steady impact on society. This can happen when a company seeks to reconcile various stakeholders’ demands and needs, while achieving a balance acceptable by all sides (COM (2001) 366), (2002) 347). COM (2011) 681.

Within the European context, the company is entitled to an individual national and European policy that effectively protects intellectual property,

supports research and development and encourages innovation. The company also has the responsibility to monitor technological advances, to improve its competitiveness, to modernize its production processes and to innovate its products or services.

Compared with other European and international standards, CSR has not been developed extensively in Greece. There are several companies in Greece that implement special CSR programmes. However, it is estimated that only 10% of Greek companies have a comprehensive strategy for CSR, while in Europe the same figures are at much higher levels. It could be said that social responsibility policies are mainly drawn upon high-turnover companies and multinational companies.

There is a special department in these enterprises which is in charge and manages CSR issues. On the contrary, the integration of CSR principles in SMEs remains particularly restricted, as in these companies competitiveness is low, while basic priority is sustainability and short-term profit (M.K Tzivara, 2007). In fact, as far as in what Greece is concerned, the limited implementation of CSR principles can be understood by the fact that fewer than 10% of companies operating in the Greek market are big enterprises, run by professional managers, prepare social accounts and have the ability to synchronize and adapt to changing conditions, thus resulting in a globalized economy environment.

In Greece, a Network for Corporate Social Responsibility has been developed, which identifies CSR1 as “a voluntary commitment on the part of the companies to include in their business practices social and environmental activities that are beyond those imposed by law and related to all those directly or indirectly affected from their activities”. Until now, the Greek Network consists of 135 member companies and 8 operators with major activities related to networking with relevant international bodies, developing campaigns to promote corporate social responsibility, conducting surveys and creating information materials, organizing workshops, participating in European programmes and cooperating with public bodies.

It should be noted that only a few number of companies can be discerned with a high level of

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<sup>1</sup>[http://www.csrhellas.org/portal/index.php?option=ozo\\_content&perform=view&id=183&Itemid=136&lang=](http://www.csrhellas.org/portal/index.php?option=ozo_content&perform=view&id=183&Itemid=136&lang=)



maturity in integrating CSR principles and codes (notably in the financial sector, in telecommunications, media and groups in certain industries), while most companies mainly support charitable activities, cultural events and sponsorships mainly involved in public relations' strategies and less in corporate responsibility. To all these difficulties of CSR implementation and spreading, bureaucratic crunches and weaknesses in creating organized structures of social and political debate should be added, factors that rather discourage the implementation and strengthening of CSR principles in Greece.

The lack of maturity level of CSR in most Greek companies, which practically means not incorporating CSR activities in the applied strategy and corporate culture is often due to ignorance and lack of knowledge of both its existence and medium-long-term positive effects brought about by its implementation.

## 5. A Case study: COCO-MAT S.A.

COCO-MAT S.A. is a Greek-Dutch company with franchise stores all around the world. The Athens branch was founded in 1989 and initially operated in the production of mattresses made of natural materials. Its brand name cognates from the word COCO, namely the coconut used in the production of mattresses in Greece for the first time, and from the word MAT, namely mattress. In 1992 the company headquarters moved to the Industrial Area of Xanthi (Northern Greece), which factory premises currently produce a wider range of products, such as mattresses, pillows, furniture and linens. The company employs approximately 220 people.

From the very beginning, the company developed a quality policy and has been participating in the EFQM Business Excellence Model since 1997. The policy of COCO-MAT SA is based on sustainable development and focuses on four main areas:

- the ecological quality products,
- customer satisfaction,
- employee satisfaction and
- social contribution (COCO-MAT, 2009).

From very early, the company oriented itself towards social service in the 1990s, when the concept of Corporate Social Responsibility was still at a very early dissemination stage in Greece. From the very beginning, the social work practice included some

social responsibility, aiming at focusing more on environmental protection, the promotion of equality, all at work and social care (C. Pantazidou, 2009).

There is a separate sector of Corporate Social Responsibility (CSR) in the company, but the person responsible for the systematic practice of CorCSR since 2001 is also Head of Totally Quality Management (TQM). The company has clearly specified to its employees and customers the values and rules of conduct related to Corporate Social Responsibility through presentations in order to develop a common vision. Its participation in conferences or other collective initiatives (local, national, sectoral, etc.) relevant to the promotion of Corporate Social Responsibility is continuous, since it tries to remain informed and active in CSR practices. A very important element showing the company's awareness of social and environmental issues is that the COCO-MAT SA is an active member of the Greek Network for Corporate Social Responsibility (CSR) and its activities are referred to the 'List of Best Practices for SMEs' Network for CSR.

As discussed above, the company has encountered no obstacles in the implementation of corporate social responsibility (CSR). Instead, the benefits received and collected by COCO-MAT, while implementing such practices, have been clear from the outset: "The Company has served as an example for all companies and established close ties with its customers, after having satisfied their needs and demonstrated its respect for the environment and the values it stands for". Additional benefits are the satisfaction of the society, the recognition of the company as a model of social contribution, the increase of productivity, the reduction of costs and the confidence of its employees in it.

Thus, there is a continuous effort on the part of Administration to provide growth prospects, ideal working conditions and shorter working hours. Additionally, employees receive a large number of privileges, such as continuing education, ability of staff to take an interest-free loan from the company of around 3,000 euro, encouragement to use the company's products that they themselves produce, buying them at special prices or with non-interest payments. Furthermore, it is important to recognize and reward personal achievements of staff in the form of salary bonuses, promotions and gifts, as well as by organizing events with a special award to employees with outstanding offer to the company.

What is important is the fact that employees in the company can express their views on labor issues affecting them through relevant forms, so that their views are taken into account in the formulation of the strategy and design of COCO-MAT SA. For people with “special needs” who are employed in the company, special facilities, such as a specific number of hours or days of work per week, are provided, depending on their needs and abilities. Additionally, this group of employees is encouraged to participate actively in the process of customer service.

As far as education and training opportunities for workers of COCO-MAT SA are concerned, these are provided on an ongoing basis through organization of training seminars and encouragement for further academic education. Moreover, the company organizes special training courses which are monitored by the heads of departments, the managers of stores and all employees. Furthermore, the head of each department organizes hourly lessons once a month, so that employees are aware of the arising challenges and needs. Certification of improvements is controlled through the electronic database of the company.

Among the immediate priorities of the company COCO-MAT SA are the implementation of policies for the protection of human rights and their opposition to any form of discrimination in the workplace. The company management recognizes the diversity of people, so it does not use tight criteria in hiring new employees. “What is mainly examined are morals, personality, energy, environmental awareness and consistency of prospective employees, of course, without ignoring the qualifications of each candidate, such as education, knowledge, professional development and experience”.

Therefore, the main company policy is to provide equal opportunities for all employees. It should be noted that COCO-MAT SA has accomplished a great and commendable first position: more than 40% of all employees are refugees from the former Soviet Union and Turkey, which proves the company’s interest in vulnerable groups of foreigners in our country, helping to address racial, religious and ethnic discrimination. Concern for equal treatment of all citizens is also expressed by hiring people with “special abilities” and people from large families. It is characteristic that almost 10% of COCO-MAT SA employees are disabled. The management of the company has shown right from the beginning confidence in these individuals and has

assigned them important responsibilities, so that a large proportion of these people have managed to reach high hierarchical positions.

Moreover, since its first steps the company COCO-MAT SA has developed a policy with a focus on quality and participates in the EFQM Business Excellence Model since 1997. In addition, the company implements a Quality Management System and an Environmental Management System, which were designed and operated based on ISO 9001:2000 and ISO 14001 standards respectively. Within this context, the company is environment aware, so it implements various policies to reduce environmental effects. The common practice is not to use chemicals throughout the production process. The raw materials used in the products of COCO-MAT SA are natural ones, and their use for the production of environment - and human-friendly products is a matter of principle. For example, some raw materials that are the basis for its products are:

- coconut (fibers that surround the coconut after suitable treatment are combined with natural rubber to create a resilient coconut),
- natural rubber (the sap of the tree, called HEVEA, after processing into a foamy layer of natural rubber),
- wool and cotton (coming from Thrace (Greece) and considered to be the best in terms of quality due to the unique climatic conditions and the composition of the subsoil),
- seaweed (used in order to offer additional iodine to people with asthma and respiratory problems),
- horsehair,
- linen,
- feather, and lately
- activated carbon.

Dedication to maintaining ecological balance is also evident by the fact that the purity percentage of the natural rubber produced in the company comes up to 96%, something which COCO-MAT SA boasts of as an exclusive feature. Furthermore, concern is expressed for the health of people by producing environment - and people-friendly products, including packaging. Even packaging materials used for the company’s products are recyclable (transport of mattresses in cotton pouches) and are collected by the company upon delivery of products to the customer in order to recycle them. It should also be mentioned that the prospectus of the company “Delta”

is now diffused 100% online, so that there is minimal environmental damage caused by printing brochures.

In 1998, COCO-MAT SA designed and implemented a programme aimed at using less plastic. Furthermore, the plastic that has already been used in the production process of the company is collected after its use and sent for recycling. The same happens with the paper used for the needs of production and administrative needs of the company. In addition, the company continued its campaign in order to ban the use of plastic by running a programme which title was "2004 without plastic." For this purpose, it proceeded to the replacement of plastic mattress case with fabric and to the transportation of furniture in wooden boxes. In addition, 100% cotton bags are now manufactured, which are distributed for free along with the list of COCO-MAT, and since 1998 until now almost 650,000 bags have been distributed.

The environmental impact of the operation of the central factory of COCO-MAT SA is continuously reduced to a minimum. For example, the wastewater of the factory is only those of the staff and the usual cleaning. In addition, the company operates the factory in the industrial area of Xanthi, in the industrial park E.T.V.A (Greek Bank of Industrial Development), where the infrastructure is such that it allows the company to produce without burdening the environment with industrial noise. Machinery company is certified with the CE mark and a special low-noise in operation by the level of noise allowed by existing laws. Moreover, the plant of the company has no chimneys to avoid polluting the environment. Finally, it is important to refer that COCO-MAT SA uses gas for its cars and factories.

Finally, of particular importance is the environmental awareness that COCO-MAT SA demonstrates, which is also reflected by its participation in relevant conferences and events, by its sponsorships to environmental organizations, etc. Typical examples of activities are tree planting activities organized from time to time and cleaning rivers and beaches. During the 20 years of its operation, the company has won major awards for its environmental awareness. In addition, the company ensures that the activities undertaken reflect social needs and expectations. Thus, it provides financial support for activities and programmes of the local community, by sponsoring sports' clubs, clubs in general and cultural events. Furthermore, it finances ecological activities, campaigns and people with special social needs, such as flood and fire victims,

the elderly and refugees. In this project, the company collaborates with many local organizations, non-governmental and other organizations.

## 6. Concluding Remarks

This paper studies CSR and its importance in the new general context of companies, as well as a specific case in Greece dealing with the concerns of this company on this subject. Responsible corporate governance combined with sustainable development, is a modern and socially acceptable expression of a new organizational culture of enterprises. In this framework responsible corporate governance is at the heart of a company's strategic planning and contributes to the fulfilment of broader needs arising through the demands and the needs expressed by civil society. At the same time, the concept of financial and business benefits is re-identifies and the long-term profitability of the enterprises is ensured.

In this way, the adoption of these principles refers to a variety of stakeholders who affect or create a new development model in accordance with the public interest (public bodies or bodies of local self-government). On the other hand, both employee and citizen groups are affected by this type of business activity that enhances the quality of life of local societies.

The case study we are considering in this paper demonstrates that the pursuit of profit can and must be compatible with the adoption of principles of entrepreneurship that ensure the quality of products, the position of workers in the productive process and the wider social and environmental objectives

This company, COCO-MAT SA, integrates a CRS perspective in its business core as a strategy for creating an image and promoting the company in the communities and society as a whole, considering sustainable practices but also seeing this way as an approach to keep it ahead in the long term. COCO-MAT SA is concerned with a set of ways of contributing to the collective welfare on the society, to the interests of the communities and to the environment.

Finally, the study shows the importance of business ethics and the respective impact on organizational structure in companies as well as the importance of a set of items in the relationship with stakeholders, both internal and external, to the companies.

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# Modelling Enforcement and Compliance in Fisheries: A Survey

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**Abstract - Monitoring and enforcement considerations have been largely ignored in the study of fishery management. This paper discusses this issue with a formal model to show the impacts of costly, imperfect enforcement of law on the behaviour of fishing firms and fisheries management. Theoretical analysis combines a standard bio-economic model of fisheries (Gordon/Schaefer) with Becker's theory of Crime and Punishment.**

**Keywords - Fisheries, Crime, Punishment, Enforcement, Becker's Theory.**

## 1. Introduction.

By definition, anything that is an infringement of the law is illegal. Illegal fishing therefore covers a wide range of behaviour, which can take place at different levels: local, national, and international. Illegal fishing has always existed, but, in recent decades, there has been a sharp rise in violating activities, due to several factors. Technical progress in motorization, freezing techniques, improved gear, new forms of stocks detection and information made it easier. But also, the new Law of the Sea (1982), generating a “creeping jurisdiction” process that seems to give an end to the principle of open access, is in the roots of this phenomenon.

Obviously, it's impossible to quantify or qualify infringements. They are known to take place at all levels and take different forms at different times; some violations are detected but many remain unnoticed. Infringements take the traditional forms of fishing over the quota or using non-permitted mesh-size, but are also in situations of non-permitted by-catches or transshipment, even in the fake world of convenience flags. The possibilities of fraud after landing are enormous.

Illegal fishing is a problem because it undermines efforts to conserve and manage fish

stocks. Destruction of fishing-grounds seriously harms efforts to replenish stocks and diminishes social perspectives about economic returns, in both the short and long term.

The enforcement of Law is the other side of the mirror. The objective of monitoring and surveillance is to deter/detect infringements and to encourage compliance with the rules. The monitoring of fishing activities combines prevention, penalties and the development of a sense of responsibility. Fisheries control regimes aim to contribute to resource management as a complement of other tools of the conservation policy, to discourage the inclination to infringe regulation, guaranteeing fair and transparent enforcement, to impose penalties on wrongdoers and, incidentally, also helps improve scientific knowledge.

In the context of Fisheries Economics, the monitoring problem can be seen as an externality arising when exclusive property rights are absent (Cheung, 1970). And that absence depends on, among other things, the costs of defining and enforcing exclusivity. Most of the literature on fisheries management and regulation implicitly assumes law can be perfectly and cost-less enforced. Even if such costs and imperfections are recognised they are not usually incorporated in the analysis to show how agents' behaviour and management policies are affected by their presence. Despite the astute observations in the traditional literature (Scott, 1979), enforcement considerations have been largely ignored in Fisheries Economics.

This paper reviews the relevant literature and explores this issue with a formal model of fisheries law enforcement. Based on the mid-eighties analysis of Sutinen and Andersen, it combines the standard Gordon/Schaefer fisheries model with the insights of the so-called “Theory of Crime and Punishment” of Becker.

The paper has the following structure:

In the first point the model is introduced. The agent behaviour in a situation of crime is discussed and a formulation of fisheries enforcement cost function is derived. The second point describes the optimal management policy when the enforcement costs are considered. Optimal control theory is introduced to solve the model and the results are discussed. In the third, the paper analyses the methods to improve compliance with fisheries regulation. Several policy prescriptions are made.

## 2. The Model: Illegal Behaviour and Enforcement Costs

Despite the enormous volume of literature on Fisheries Economics, only a few number of papers are devoted to the issue of enforcement. According to Sutinen and Hennessey (1986), it has always been "the neglected element in fishery management".

The fundamental problem in fisheries management is to obviate the tendency towards overexploitation of the resources under open access. Starting at any initial stock size, a means must be found to reduce catch rates. Regulation methods used to curb this tendency of overfishing and overcapacity includes gear restrictions, area and seasonal closures, TACs, ITQs, limiting entry and other forms of reducing fishing effort.

Assume that, whatever means are applied to reduce catch rates, any catch level above the level of the permitted quota for a certain fishing,  $q_i^*$ , is illegal. If we suppose a system of individual non-transferable quotas, the amount of the individual firm catch above its quota ( $q_i - q_i^*$ ) is illegal.

If detected and convicted, a penalty fee is imposed on the firm in an amount given by  $f$ ,

$$f = f(q_i - q_i^*)$$

where  $f > 0$ , if  $q_i > q_i^*$  and  $f = 0$ , otherwise;

and  $\partial f / \partial q \geq 0$ ;  $\partial^2 f / \partial q^2 \geq 0$ ;  $\forall q_i > q_i^*$ .

We assume that the function  $f(\cdot)$  is continuous and differentiable for all  $q_i^* > q_i$ .

This penalty fee has a finite upper bound and each firm is assumed to face the same penalty fee schedule.

An individual firm's profit before penalty is given by

$$\Pi^i(q_i, x) = p q_i - c^i(q_i, x),$$

where  $p$  denotes the price of fish,  $x$  is the size of fish stock and  $c(\cdot)$  is the cost function. We assume that firms are price takers.

In an imperfect law enforcement regime not every violator is detected and convicted.

Let the probability of detection and conviction be given by  $\theta$ , and, to simplify, let us assume that all firms face the same probability.

If detected and convicted of a violation, a firm's profit will be  $\Pi^i(q_i, x) - f(q_i - q_i^*)$ ;

if not,  $\Pi^i(q_i, x)$ .

So, expected profits are

$$1. \quad \theta [\Pi^i(q_i, x) - f(q_i - q_i^*)] + (1 - \theta) \Pi^i(q_i, x)$$

Assuming firms are risk neutral and maximising expected profits, each  $q_i$  is determined by the first order condition (subscripts other than  $i$  denote partial derivatives)

$$2. \quad \Pi_{q_i}^i(q_i, x) \geq \theta f_{q_i}(q_i - q_i^*)$$

The solution to 2. for one form of the marginal penalty schedule,  $f_{q_i}$ , lead to the following result:

If there were no penalty for fishing beyond legal quota, or if there were no probability of being detected and convicted ( $f = 0$  or  $\theta = 0$ ) the firm would set its catch at the open access catch rate,  $q_i^0$ . For a given stock size ( $x$ ), the firm sets its catch rate at a level in excess of its quota, where marginal profits equal the expected marginal penalty.

The first order condition 2. can be solved for a firm catch rate, as  $q_i = q_i(\theta, x, q_i^*)$ .

The catch rate also depends on price, production cost parameters and parameters of the penalty fee schedule, but these are suppressed for notational simplicity.

Note the following properties, important for the discussion<sup>1</sup>:

- An increase in the probability of detection and conviction decreases, or leaves unchanged, a firm catch rate, as the expected marginal penalty schedule becomes steeper.
- An increase in the stock size shifts up the marginal profit schedule and increases, or leaves unchanged, a firm's catch rate.
- An increase in the quota shifts the expected marginal penalty to the right and increases a firm's catch, so long as the initial catch rate is inferior to the bionomic equilibrium (open access situation).

Aggregating the catches for all firms in the fishery yields the aggregate catch function

$$q = q(\theta, x, q^*),$$

where  $q^* = \sum q_i^*$ , for the  $N$  firms operating in the fishing ground.

Assuming there is a sufficient heterogeneity across firms to allow this equation to be continuous, therefore inverse forms exist and  $\partial q/\partial \theta < 0$ ,  $\partial q/\partial x > 0$ ,  $\partial q/\partial q^* > 0$ .

To detect and convict violators require inputs (aircraft, patrol vessels, police, and judicial personnel). Let the quantities of such inputs be represented by a vector  $k$ , which has an associated vector of unit prices  $w$ .

The probability of detecting and convicting fraud is assumed to depend positively on the inputs. Assuming the least cost combination of  $k$  is chosen for each level of  $\theta$ , there is an enforcement cost function  $e(\theta)$ , where  $\partial e/\partial \theta > 0$ ,  $\partial^2 e/\partial \theta^2 \geq 0$ , and, using the inverse, enforcement costs can be represented by  $E(q, x, q^*)$ .

The following properties hold:

A reduction in the catch level (below the open access level for a given size and quota) requires an increase in enforcement costs.

Increase in the fish stock or quota requires greater enforcement costs to achieve a given catch level (note that this ignores some economies of scale in enforcement).

The size of the quota also affects enforcement.

### 3. Optimal Policy

Now, we must investigate how optimal management policies are affected by costly, imperfect enforcement.

Optimal policies are based on the usual criterion of maximising the discounted sum of net social benefits. In each period these net benefits are given by

$$3. \int_0^q p(q) dq - c(q, x) - E(q, x)$$

$p(q)$  is the inverse demand function,  $c(q, x)$  is the aggregate cost catch function and  $e(q, x)$  is the enforcement cost function.

The aggregate cost function depends on the fixed set of quotas and doesn't include penalty fees. these are excluded since they are transfers from fishing firms to general treasury.

Since quota allocation is assumed exogenously determined,  $q^*$  is suppressed as argument in the enforcement cost function.

We introduce now the usual stock dynamics standard differential equation, where  $F(x)$  is the natural growth rate.

$$4. \dot{x} = F(x) - q$$

Optimal policies are found by maximising

$$5. \int_0^\infty [\int_0^q p(q) dq - c(q, x) - E(q, x)] e^{-\delta t} dt$$

subject to 4.

First order conditions are

$$p - c_q - E_q - \lambda = 0$$

$$\lambda = c_x + E_x + \lambda(\delta - F_x)$$

$\lambda$  is the dynamic multiplier.

Solving the problem, we are conducted to a transformed golden rule

$$6. \delta - F_{x^{**}} = -(c_{x^{**}} + E_{x^{**}}) / [p^{**} - (c_{q^{**}} + E_{q^{**}})]$$

This determines the steady state optimal size stock,  $x^{**}$ , the optimal catch rate,  $q^{**}$ , and resulting price,  $p^{**}$ .

<sup>1</sup> See Sutinen and Andersen (1985).

We can derive interesting conclusions if we compare this, with the situation where we assume costless and perfect enforcement, that is, when catch rates are perfectly controlled at zero cost. In this case the condition for optimality is the usual modified golden rule<sup>2</sup>:

$\delta - F_{x^{***}} = -c_{x^{***}} / (p^{***} - c_{q^{***}})$ , where  $x^{***}$  is the optimal stock size,  $q^{***}$  the optimal catch rate and  $p^{***}$  the resulting price.

By comparing the two golden rules it can be concluded that:

- the presence of costly, imperfect enforcement results in a smaller optimal stock size than otherwise:  $x^{**} < x^{***}$
- similarly, higher enforcement costs result in a lower optimal stock.

The rationale is not difficult to follow. Assuming that some kind of quota system is in effect to ration access, enforcement activity would involve monitoring compliance with these quotas and assigning penalties on those found in violation. If quotas were so large as being consistent with free access equilibrium, enforcement costs would be zero because no enforcement would be necessary to ensure compliance. But, moving away from free access equilibrium increases both net benefits and enforcement costs. For this model, as the steady-state population size is increased, marginal enforcement costs increase and marginal net benefits decrease. At the efficient population size, with enforcement costs, the net marginal benefit equals the marginal enforcement costs. This necessarily involves a smaller population size than the efficient population size ignoring enforcement costs, because the latter occurs when the marginal net benefit is zero (Tietenberg, 2003).

Sutinen and Andersen (1985) also compare the catch rates for costless, perfect enforcement with costly, imperfect enforcement. They conclude that depends on whether the stock sizes are above or below the so-called MSY (Maximum Sustainable Level). For the most usual case, that is,  $x^{**} < x^{***} < x_{MSY}$ , the catch rate in the situation of costly enforcement costs is lower than the case without consideration of enforcement costs.

#### 4. Enforcement and Compliance

Besides the intrinsic value of the model important research questions are suggested.

The enforcement issue points out another advantage of private property rights based management: they are self-enforcing. This may represent an important step to proceed in the discussion of regulatory instruments. First, if enforcement costs are significant, the more common forms of regulation (command and control tools as TACs, mesh size or areas/seasons closures, for example) should require further re-evaluation. Usually they are detracted because they are not economically efficient. But is also commonly recognised that costs of enforcement are weaker in these cases.

Second, the analysis of Individual Transferable Quotas reveals the equivalence between ITQs and taxes. But, with the consideration of enforcement costs, this may not hold. The analysis of Sutinen and Andersen, with non-transferable quotas, appears to more closely parallel the case of taxes. Investigation on the ITQs case is still a work in progress. In any case, the reduced costs of enforcement favoured this tool. As the fishermen are given almost private property rights of resource use, this means that some kind of auto-regulation is guaranteed. In theory, this engages fishermen in compliance with the regulation and diminishes enforcement costs. In practice, the implementation of ITQs systems is confronted with a lot of problems including illegal behaviour (Copes, 1986).

In another dimension, this approach also reveals the importance of empirical studies trying to estimate the factors that ensure compliance with the regulation. These studies give important basis for public authorities decision about the actions to be implemented.

Stigler (1970) argues that public authorities have four basic means to improve compliance:

- minimize the chances that violations will go undetected,
- maximize the probability that sanctions will follow the detection of violations,
- speed up the process from time to detection to assignment of sanction,
- make the sanctions large.

There is dispute among experts about the best alternatives. Some scholars have argued that the

<sup>2</sup> See Clark and Munro (1975)



probability of being detected is more important than the size or magnitude of the sanction, while others argue that making the charging time follow as closely as possible to the detection of illegal behaviour is the most important factor in enhancing compliance. Others, also, put in evidence the level of expenditure oriented to monitoring activities.

Empirical evidence? The difficulties in getting data to this kind of research are very problematic. But we stress the necessity of more studies<sup>3</sup>.

Econometric studies have demonstrated that all factors are significant. Especially the one that states fishermen perceived probability of detection and conviction affects their violation rate as predicted by the theory. The higher the probability, the lower the rate of violation. So, enforcement and others measures of control to increase perceived probabilities, enhance compliance.

Personal characteristics of fishermen also are expected to influence compliance behaviour. In the study of Sutinen and Gauvin (about lobstermen in Massachusetts) the pattern is that fishermen who have more illegal landings are thought to be older and to fish fewer days. At the same time they are thought to be in the fishery for the short term. This could be a portrait of a serious group of violators who are about to retire and are grasping at short-time gains because they do not feel they will be around to reap the long-term benefits of conservation. But we can also expect that fishermen with more years in the fishery and more income dependent on a certain fishery have stronger conservation motives. So, studies must investigate these issues.

## 5. Final Remark

In the Portuguese case, after a significant process of modernization of the surveillance structures, several problems still persist. The European Commission gave the financial support to guarantee the indispensable means of surveillance and control and increased the deterrence capacity of control in member states (in a uniform way, which is important) and the transparency and trust between partners. That lead to the increase of the probability of detection as a means to deter criminal behaviour and increased compliance with regulation. But the differences in the judicial administration maintains. In the Portuguese case, the dispersion of surveillance and control activities between several agencies

(Maritime Authority, Ports Administration, different Policies' corps) is, always, referred as a fundamental root of inefficiency. The stakeholders put, also, in evidence, the delayed application of regulation by the tribunals.

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<sup>3</sup> See, for example, Sutinen and Hennessey (1986) or Sutinen and Gauvin (1989).

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# Outward U.S. Foreign Direct Investment Performance during Recent Financial Crises

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**Abstract - Foreign direct investment (FDI) plays an extraordinary and growing role in the global markets and represents an integral part of the U.S. economy. This research has descriptive character and focuses on the latest trends in outward United States foreign direct investment (US FDI) illustrating the impact of the recent financial crises on FDI performance.**

**The study analyzes the outward US FDI stock contribution to the global FDI stock and its performance during the last decade including geographical and sectorial distribution. The next paragraph focuses on outward US FDI corporate players ranking MNC's by revenue and foreign assets. The essential part of this research relates to outward US FDI employment and financial performance, which includes: equity, reinvested earnings and intercompany debt.**

**This study constitutes a base for the further exploration of the importance of outward US FDI in the global markets and in the U.S. economy. The goal of this research is to illustrate the impact of current financial crises on outward US FDI performance. The basic statistics related to outward US FDI flow and stock come from the UNCTAD's FDI/TNC and from the Bureau of Economic Analysis (BEA), a section of the U.S. Department of Commerce.**

## 1. Introduction

The International Monetary Fund defines foreign direct investment (FDI) as an investment that allows an investor to have a significant voice in the management of an enterprise operating outside the investor's own country. The phrase "significant voice" usually means ownership of 10 per cent or more of the ordinary shares or voting power (for an incorporated enterprise) or the equivalent (for an unincorporated enterprise). This may involve either creating an entirely new enterprise—a so-called Greenfield investment—or, more typically, changing the ownership of existing enterprises, via mergers and acquisitions. Other types of financial transactions between related enterprises, such as reinvesting the earnings of the FDI enterprise, are also defined as FDI (<http://www.conferenceboard.ca/hcp/details/economy/outward-fdi-performance.aspx>).

The United States continues to be the leading destination for foreign direct investment (FDI) and the leading investor in other economies. A.T. Kearney's FDI Confidence Index measures investor sentiment on the basis of a survey of senior executives in the world's largest enterprises, and ranks present and future prospects for FDI flows to different economies with respect to the factors that drive corporate decisions to invest abroad. The FDI Confidence Index Report of 2010 ranked China and the United States as the most attractive FDI locations in the world, recording unprecedented levels of investor confidence. According to the ranking for 2011, however, although the United States remained a strong magnet for FDI in the world economy, China, India and Brazil occupied the top spots in terms of the Confidence Index (<http://www.atkearney.com/gbpc/foreign-direct-investment-confidence-index>).

The financial crisis, which began in summer 2007, has led to a progressive deterioration of the investment situation in the world economies. Various indicators during the first half of 2008 already suggested a decline in world growth prospects as well as in investors' confidence. This deteriorating climate began to leave its first negative marks in investment programs, including FDI, in early 2008. According to UNCTAD's 2008-2010 *World Investment Prospects Survey*, conducted April-June 2008, 40% of the respondent companies already mentioned at that time that the financial instability had a "negative" or "very negative" impact on their investment ([unctad.org/en/docs/wips2008\\_en.pdf](http://unctad.org/en/docs/wips2008_en.pdf)).

## 2. Recent Financial Crises and US FDI

The current recession, which began in December 2007, could rank as the longest U.S. economic downturn since the Great Depression. In addition to the severe economic downturn of the U.S. economy, global economic indicators have registered sharper declines than in the previous two global recessions of 1981 and 1990. The current global recession corresponded with reduction in global and U.S. foreign direct investment stock (Ibarra-Caton and Mataloni, 2010).

The contribution of the United States to the world outward FDI stock is tremendous. In the last decade, on average between 2000 and 2011, US FDI stock represented 25% of the total world stock, while the all European Union countries accounted for 51% of the world FDI stock ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

The United States is the largest recipient of direct investment in the world and the largest investor abroad. American direct investment abroad has grown sharply since the mid-1990s, raising questions about the effects of such investment on the U.S. economy. These questions seem pertinent since American multinational corporations lost shares of U.S. GDP over the last decade and their domestic employment had declined until the mid-1990s. Increased economic activity abroad relative to that in the United States increased overseas affiliate employment in some industries, including manufacturing

(<http://www.fas.org/sgp/crs/misc/RS21118.pdf>).

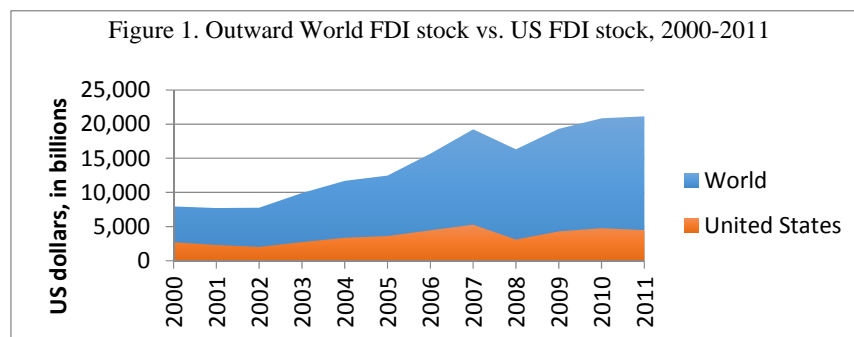
Critics claim that these companies have abandoned the United States, that they succeed only by exporting jobs, and that their domestic and international operations need to be rebalanced through changes in U.S. tax, trade and investment policy. However, strong U.S. multinational companies that are able to compete effectively in foreign markets will be positioned to help restore American economic growth. The ability of U.S. multinationals to stem domestic job losses and return to hiring more American workers depends on the health, vitality and competitiveness of their worldwide operations ([businessroundtable.org/studies-and-reports/how-u.s.-multinational...](http://businessroundtable.org/studies-and-reports/how-u.s.-multinational...)).

There are empirical studies done on outward US FDI determinants. Dunning's (1988) identified an array of location factors that improve a country's attractiveness to foreign investors. Location advantages range from the availability of cheap labor, natural resources, skilled labor, and large and rapidly expanding local market, to the existence of stable economic and political systems. The presence of location advantages is a necessary condition for

successful and profitable operation. Some studies emphasize the importance of economic factors such as market size, market growth, inflation rates, and income levels (Root and Ahmed 1979; Grubert and Mutti, 1991; Woodward and Rolfe, 1993). These studies suggest that FDI tends to be attracted mostly to countries with large and expanding domestic markets. Other studies place emphasis on political risk (Nigh, 1985; Fatehi-Sedeh and Safizade, 1988; Oseghale, 1993). While Cheng and Kwan (1999) suggest the primacy of the level of development of host country's infrastructure, Guisinger et al. (1992), Rolfe and White (1992), and Brewer (1993) emphasize the role of government policy in the process. Interestingly, these studies gave little or no considerations to the importance of a host country's institutional framework (Oseghale and Nwachukwu, 2010). Wheeler and Mody (1992) were among the first researchers to explore, empirically, the linkage between institutional framework (bureaucratic red tape, political instability, corruption, quality of the legal system and so on) and the location of US foreign affiliates.

### 3. Outward US FDI Stock Performance

As the world's largest economy, the United States is well positioned to participate in the increasingly competitive international environment for FDI that has emerged as both advanced and developing economies have recognized the value of such investment. In 2008 amid a sharpening financial and economic crisis, global and US FDI stock declined substantially. Figure 1, illustrates the US FDI stock compared to the global outward FDI stock. The outward global stock decreased between 2007 and 2008 by 15% from US\$ 19,273 billion to US\$ 16,343 billion increasing in 2009 and 2010 reaching US\$ 21,169 billion in 2011. The outward global stock trend reflects the outward US FDI stock trend.



Source: UNCTAD's FDI/TNC database, available at: [www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)

The *outward US FDI stock decreased by 41%*, from US \$ 5,275 billion to US\$ 3,102 billion between 2007 and 2008 increasing in 2011 to UD\$ 4,500billion. The outward US FDI stock as a percentage of GNP declined between 2007 and 2008 from 37% to 21% to increase to 29% in 2011 (Table 1). In 2011, outward US FDI stock (US\$ 4,500 billion) exceeded by far the outward FDI stock of other large developed economies within the European Union, such as the United Kingdom (US\$ 1,731 billion), Germany (US\$ 1,442 billion), France (US\$ 1,373 billion) and individuals contributors, such as: Hong Kong (US\$ 1,046 billion), Japan (US\$962 billion) and Canada (US\$670 billion).

by **22%**, from US\$ 394 in 2007 to US\$ 308 billion in 2008, decreasing farther to UD\$ 267 billion in 2009, to increase again in 2010 to US\$ 304 billion and to UD\$ 397 billion in 2011 exceeding the pre-crisis level (table 2).

While the outward US FDI flows increased dynamically in 2011, the European Union countries outward FDI did not return to their pre-crisis level while Japan and Hong Kong increased outward FDI significantly in comparison with the pre-crisis level. The United States continues to be the leading outward FDI investor in the world, with outflows at US\$397 billion in 2011, with total outward FDI flows from developing economies (US\$384 billion)

**Table 1. Outward U.S. and Global FDI Stock, 2000-2011 (US\$ billions)**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
World	7,953	7,719	7,786	9,917	11,695	12,465	15,697	19,273	16,343	19,326	20,865	21,169
<b>United States</b>	<b>2,694</b>	<b>2,315</b>	<b>2,023</b>	<b>2,729</b>	<b>3,363</b>	<b>3,638</b>	<b>4,470</b>	<b>5,275</b>	<b>3,102</b>	<b>4,287</b>	<b>4,767</b>	<b>4,500</b>
Comparator economies												
Canada	238	251	276	319	373	388	445	522	524	602	639	670
Hong Kong	388	352	310	340	403	472	677	1,011	762	832	936	1,046
Germany	542	618	696	831	925	928	1,081	1,332	1,327	1,412	1,437	1,442
France	926	798	639	947	1,154	1,232	1,610	1,795	1,268	1,583	1,580	1,373
Japan	278	300	304	336	371	387	450	543	680	741	831	962
United Kingdom	898	870	994	1,187	1,247	1,199	1,455	1,836	1,531	1,674	1,627	1,731

Source: UNCTAD's FDI/TNC database, available at: [www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)

**Table 2. Outward U.S. and Global FDI flows, 2000-2011 (U.S.\$ billions)**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
World	1,227	748	529	571	926	889	1,415	2,198	1,969	1,175	1,451	1,694
<b>United States</b>	<b>143</b>	<b>125</b>	<b>135</b>	<b>129</b>	<b>295</b>	<b>15</b>	<b>224</b>	<b>394</b>	<b>308</b>	<b>267</b>	<b>304</b>	<b>397</b>
Comparator economies												
United Kingdom	233	59	50	62	91	81	86	272	161	44	40	107
France	178	87	50	53	57	115	111	164	155	107	77	90
Hong Kong	59	11	18	5	46	27	45	62	51	64	95	82
Germany	57	40	19	6	21	76	119	171	73	75	109	54
Canada	45	36	27	23	43	28	46	58	80	42	39	50
Japan	32	38	32	29	31	46	50	74	128	75	56	114

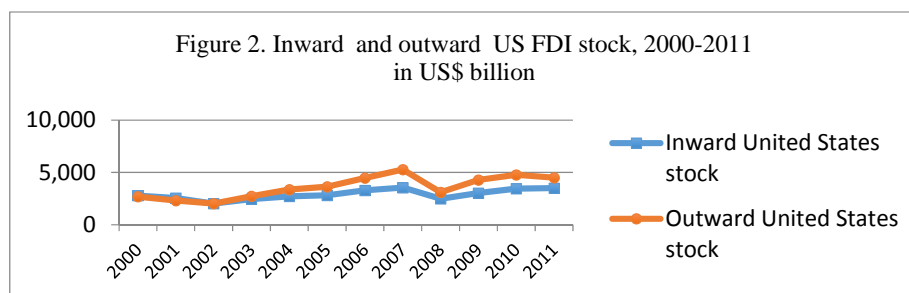
Source: UNCTAD's FDI/TNC database, available at: [www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics) (Annex table 1)

During last financial crisis, the global FDI flow fell by **10.4%** from US\$ 2,198 in 2007 to US\$ 1,969 billion in 2008 picking up in 2009 to reach US\$ 1,694 billion in 2010 and surpassing the pre-crisis level in 2011. The U.S. outward FDI flow decreased

and with the total flows from developed economies (US\$1.24 trillion), in particular, the European Union countries (US\$ 651) and individual contributors such as: Japan (US\$114 billion) and Hong Kong (US\$ 82 Billion).

The outward US FDI stock outperformed inward US FDI stock during analyzed period of time (except 2000 and 2001), which indicates that American stock abroad exceeds inward U.S. foreign

billion in 2000 to US\$ 311 billion in 2011. Among services, holding companies represent the largest recipient category in most years during 2000-2011. In recent years, financial services attracted

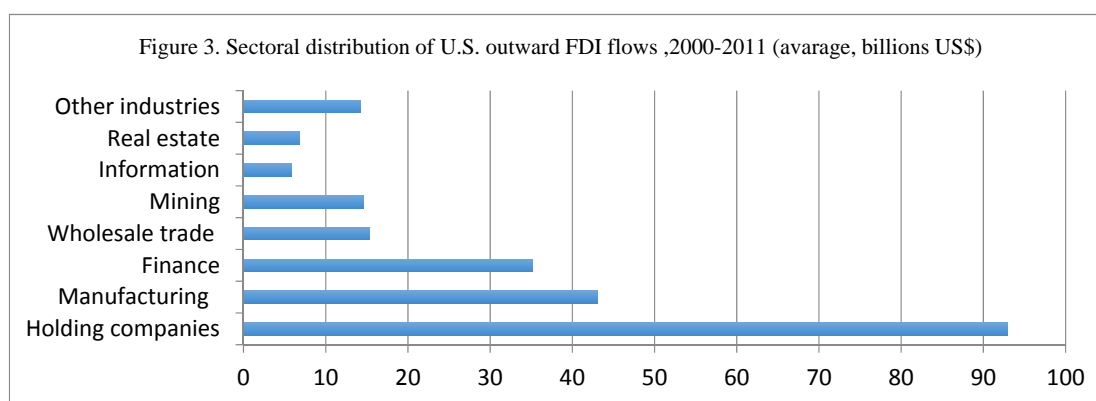


Source: UNCTAD's FDI/TNC database, available at: [www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)

Table 3. Inward and outward US FDI flow and stock, 2000-2011, US \$billions

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Inward US FDI flow	314	159	75	53	136	105	237	216	306	153	198	227
Inward US FDI stock	2,783	2,560	2,022	2,455	2,717	2,818	3,293	3,551	2,486	3,027	3,451	3,509
Outward US FDI flow	143	125	135	129	295	15	224	394	308	267	304	397
Outward US FDI stock	2,694	2,315	2,023	2,729	3,363	3,638	4,470	5,275	3,102	4,287	4,767	4,500

Source: UNCTAD's FDI/TNC database, available at: [www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)



Source: United States Department of Commerce, Bureau of Economic Analysis, available at: [www.bea.gov/international](http://www.bea.gov/international)

stock. Since 2007 outward US FDI flow outperformed inward US FDI flow (Table 3 and Figure 2).

#### 4. Sectorial Distribution of Outward US FDI Flow

Within the outward US FDI flows, the services sector is the largest recipient, growing from US\$ 91

considerable foreign direct investment. Between 2010 and 2011 financial services increased US\$ 25 billion to US\$ 37 billion. In the same period of time, the wholesale trade investment doubled from US\$ 12 billion to US\$ 24 billion. Within outward US FDI flows, manufacturing sector grew from US\$ 43 billion in 2000 reaching the pick of US\$ 72 billion in 2007 to decline during recession in 2008 to US\$

36 billion and increase again in 2011 to US\$ 59 billion (Table 4).

The most of outward US FDI flows went to service industry. This industry accounted, between 2000 and 2011 on average for 76% of the total FDI flows, followed by the manufacturing industry (19%) and other industries (5%).

equipment, petroleum products and pharmaceuticals. The top four leading TNCs include: General Electric (electrical and electronic equipment), Exxon Mobil and Chevron (petroleum products) and Pfizer Inc (pharmaceuticals) (Annex Table 6).

**Table 4. Sectorial distribution of outward US FDI flow, 2000 – 2011 (US\$ billion)**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
<b>All sectors</b>	<b>143</b>	<b>125</b>	<b>135</b>	<b>129</b>	<b>295</b>	<b>15</b>	<b>224</b>	<b>394</b>	<b>308</b>	<b>267</b>	<b>304</b>	<b>397</b>
<b>Services</b>												
Holding companies	30.1	45.2	45.9	50.3	117.2	-66.4	97.5	153.6	118.6	140.3	175.7	207.6
Other then holding	60.4	36.7	43.9	44.2	106.4	28.9	68.4	164.1	131.4	69.7	70.6	99.1
Finance	22	3	38	20	51	13	26	82	58	47	25	37
Wholesale trade	12	16	3	12	19	13	15	13	32	13	12	24
Information	17	-3	-1	4	-0.36	3	4	9	8	9	8	12
Real estate	-1	0.88	7	-3	9	9	11	18	4	6	9	12
<b>Manufacturing</b>	<b>43</b>	<b>26</b>	<b>32</b>	<b>31</b>	<b>63</b>	<b>28</b>	<b>42</b>	<b>72</b>	<b>36</b>	<b>39</b>	<b>46</b>	<b>59</b>
Mining	2.2	15.6	6.7	3.8	18.2	12	21.8	19.9	25.6	12.1	13	24.8
<b>Other industries</b>	<b>17.7</b>	<b>21.32</b>	<b>3.4</b>	<b>10.9</b>	<b>17.96</b>	<b>3.4</b>	<b>6.7</b>	<b>26.5</b>	<b>25.8</b>	<b>0.6</b>	<b>15.3</b>	<b>20.6</b>

Source: United States Department of Commerce, Bureau of Economic Analysis, FDI database, available at [www.bea.gov/international](http://www.bea.gov/international) (Annex table 2)

## 5. Outward US FDI Corporate Players by Revenue and Foreign Assets

The multinational companies headquartered in the United States, ranked by revenue for 2011, are dominated by Petroleum Refining industry with Exxon Mobil on the top of the list followed by Chevron, ConocoPhillips and Valero Energy. Among the multinational corporations operating abroad, general merchandize industry with Wal-Mart Stores Inc. is ranked number two in 2011. United States parent companies in manufacturing prominently on the list are: General Motors (ranked 5) and Ford Motor (ranked 8). Included in the list of the top twenty-five foreign affiliates by revenue are the affiliates of four commercial banks: Bank of America Corp.,(ranked 12) J.P. Morgan Chase & Co., (ranked 15) , Citigroup (ranked 18) and Wells Fargo (ranked 22). US MNEs in electronic manufacturing, with established names like Hewlett-Packard and Apple are also among the top twenty-five, ranking 9 and 16 respectively (Annex Table 5).

Based on the foreign assets ranking, the leading U.S. trans-national companies (TNCs) are the companies manufacturing electrical and electronic

## 6. Outward US FDI Employment by Corporate Players

Foreign companies and their U.S. subsidiaries generate enormous economic benefits for the American economy and bring billions of investment dollars into the United States, create thousands of in-sourced American jobs, and highlight the importance of the U.S. market for foreign companies. Based on the Table 4 outward US FDI employment outperformed inward US FDI employment in each year, between 2000 and 2011, which indicates that all foreign affiliates create more jobs abroad than U.S. affiliates in the country. The most of the jobs created abroad by our foreign affiliates are in manufacturing industry, retail trade, wholesale trade, food services and management industries (Figure 4).

Americans believe that outward U.S. direct investment abroad, directly or indirectly, shifts some jobs to low wage countries. They argue that such shifts reduce employment in the United States and increase imports, thereby affecting negatively both U.S. employment and economic growth. Economists generally believe that firms invest abroad because those firms possess some special process or product knowledge or because they

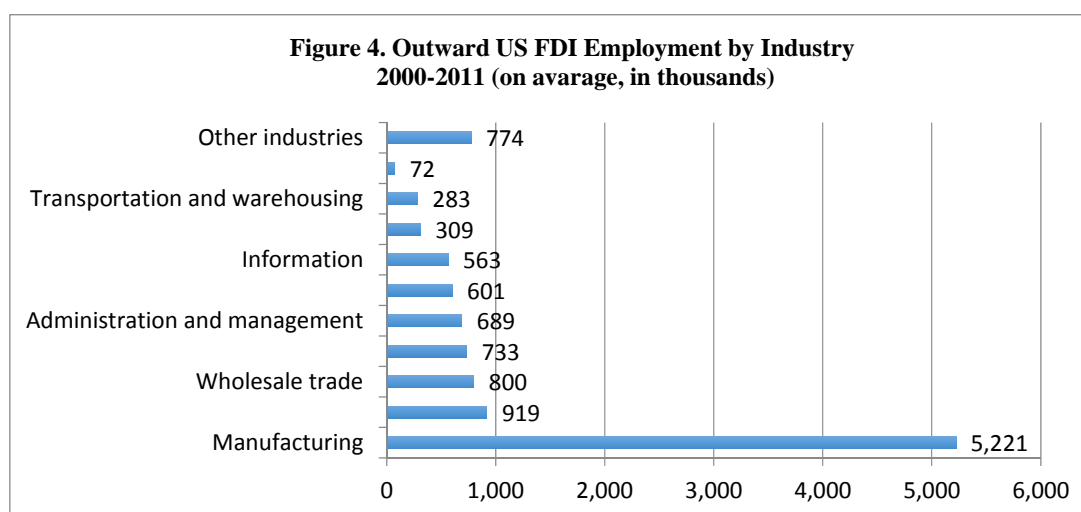
possess special managerial abilities which give them an advantage over other firms.

to raw materials, cheap labour, or other markets (<http://www.fas.org/sgp/crs/misc/RS21118.pdf>).

**Table 5. Inward and outward US FDI employment, 2000-2010 (thousands of employees).**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total U.S. employment	165,37	165,510	165,063	166,019	169,026	172,551	176,124	179,899	179,644	174,226	173,627
Inward FDI all U.S. Affiliates	6,525	6,268	5,925	5,713	5,617	5,665	5,803	6,089	6,325	5,979	5,802
Outward FDI, all Foreign Affiliates	9,713	9,804	9,776	9,657	10,068	10,622	11,149.9	11,732	11,801	13,029	13,256

Source: United States Department of Commerce, Bureau of Economic Analysis, FDI database, available at: [www.bea.gov/international](http://www.bea.gov/international)



Source: United States Department of Commerce, Bureau of Economic Analysis, FDI database, available at [www.bea.gov/international](http://www.bea.gov/international)

There are instances when firms shift activities abroad to take advantage of lower labour costs. However, it is clear from the data that the majority of U.S. direct investment abroad is in developed countries where wages, markets, industries, and consumers' tastes are similar to those in the United States. U.S. direct investment in these developed countries is oriented toward serving the markets where the affiliates are located and they tend, in the aggregate, to boost exports from the United States. In addition, foreign firms have been pouring record amounts of money into the United States to acquire existing U.S. firms, to expand existing subsidiaries, or to establish Greenfield investments (<http://www.fas.org/sgp/crs/misc/RS21118.pdf>).

On the whole, U.S. firms invest abroad to serve the foreign local market, rather than to produce goods to export back to the United States, although some firms do establish overseas operations to replace U.S. exports or production, or to gain access

As far as the TNCs foreign employment, Wal-Mart's is the leading corporation with 800,000 foreign employees in retail and trade, followed by TNC's in electrical and electronic equipment industries, such as: International Business Machines Corporation (308,287), Hewlett-Packard (228,392) and General Electric Co (170,000). Motor vehicles industry represented by General Motors and Ford Motor employed respectively 106,000 and 85,000 employees. The next industries with quite high number of foreign employment are food, beverages and tobacco companies such as: Kraft Foods Inc. (90,000 employees) and The Coca-Cola Company (78,800 employees) and pharmaceutical companies such as: Johnson & Johnson (69,230 employees), Pfizer Inc. (64,420 employees), Merck & Co (52,900 employees) and Abbott Laboratories (51,450 employees). (Table 7).



## 7. Financial Structure Outward US FDI

Flows of FDI include capital provided either directly or through other related enterprises by a foreign direct investor to an enterprise. These flows have three components: equity capital, reinvested earnings and intra-company loans. The outward US FDI equity, during the recent financial crises started to decline from US\$ 201 billion in 2007 to US\$ 127 billion in 2008 and to US\$ 18 billion in 2009. Upward trend of equity capital started in 2010 with increased to US\$ 41 in 2010 and to US\$53 in 2011 (Table 8). Equity capital flows for new investments experienced a sharp decline during the current recession. The pronounced decline in equity capital flows for new investment coincided with a worldwide decline in global merger and acquisition activity. According to Thompson Reuters, global merger and acquisition activity fell by 40 percent.

Furthermore, an analysis of the correlation between individual components of FDI reveals the existence of very low inter-component correlation (ranging from -0.089 to 0.23). The weak correlation between the components suggests that they are independent of each other. This finding corroborates that of Salorio and Brewer (1998). The further study examined the effect of the quality of host country institutions on reinvestment decisions by United States multinationals.

Six indicators of quality of institutions were used as measures of the quality of host country institutions. The six indicators are Voice and Accountability, Political Stability and Lack of Violence, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. These indicators have been found, by Kaufmann (1999) to be most important in assessing the overall quality of a country's institutions. The statistical analysis reveals that the quality of host county

**Table 8. The structure of outward US FDI flow by financial components (2000 – 2010), US\$ billions**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Capital outflows	143	125	135	129	295	15	224	394	308	267	304	397
Equity	78	61	43	35	133	62	49	201	127	18	41	53
Intercompany debt	-12	12	26	-7	20	-15	-22	-17	-31	42	-29	18
Reinvested earnings	77	52	66	101	142	-32	197	210	212	207	292	326
Direct investment income	134	110	125	165	228	272	304	350	393	335	421	458

Source: United States Department of Commerce, Bureau of Economic Analysis, FDI database, available at [www.bea.gov/international](http://www.bea.gov/international)

The share of reinvested earnings trended upward through 2008, indicating that parent firms were still choosing to invest in their foreign affiliates rather than remit their earnings to the United States. Despite weak economic conditions, U.S. multinationals have continued to expand their investments in newly emerging markets at a more rapid rate than in advanced economies. The outward US FDI reinvested earnings declined between 2008 and 2009 from US\$ 212 billion to US\$ 207 billion and increased beyond the pre-crisis level of US\$292 billion in 2010 increasing farther to US\$326 billion in 2011. Reinvestment is not only different from new equity and inter-company debt flows in terms of its share of total US FDI, it is the only component which originates in the host country and thus, does not involve cross-border transfer of funds.

Intercompany debt flows— loans between parent firms and affiliates—constitute a very small component of outward US FDI and are extremely volatile; they change direction frequently because the loans, which are often for the purpose of providing short term financing for intra-firm trade, tend to be repaid soon after they are created (Ibarra-Caton and Mataloni, 2010).

institutions has a statistically significant effect on reinvestment decisions by US multinationals (Oseghale and Nwachukwu, 2010).

## 8. Conclusions

The recent economic crises negatively impacted world FDI flows in 2008 and 2009 and opened a period of major uncertainty. The effectiveness of government policy responses at both the national and international levels in addressing the financial crisis and its economic aftermath will play a crucial role for creating favorable conditions for a continued recovery of FDI inflows into the United States. Public policies will obviously play a major role in the implementation of favorable conditions for such a recovery. Structural reforms aimed at ensuring more stability in the world financial system, a renewed commitment to an open environment for FDI and the implementation of policies aimed at favoring investment and innovation are key issues in this respect (<https://wpqr1.adb.org/.../0918BE1C4C9148EC48257567000D8869/...>).

The United States is not only the largest recipient of direct investment but as well, the largest investor abroad in the world. The contribution of the United States to the world outward FDI stock is

tremendous. This research confirmed, that outward US FDI stock outperformed inward US FDI stock between 2002 and 2011, which indicates that American stock abroad exceeds foreign stock in the United States. In the last decade, on average between 2000 and 2011, US FDI stock represented 25% of the total world stock.

The outward US FDI stock decreased by 41%, from US \$ 5,275 billion to US\$ 3,102 billion between 2007 and 2008, while outward US FDI flows decreased by 32% from US\$ 394 billion to US\$ 308 billion. The most of outward US FDI flows reached service industry. This industry accounted, between 2000 and 2011 (on average ) about 76% of total FDI flows, followed by the manufacturing industry (19%) and remaining other industries (5%).

The multinational companies headquartered in the United States, ranked by revenue for 2011, are dominated by Petroleum Refining industry with Exxon Mobil on the top of the list followed by Chevron, ConocoPhillips and Valero Energy. Among the multinational corporations operating abroad, general merchandize industry with Wal-Mart Stores Inc. is ranked number two in 2011. United States parent companies in manufacturing prominently on the list are: General Motors (ranked 5) and Ford Motor (ranked 8).

Based on the foreign assets ranking, the leading U.S. trans-national companies (TNCs) are the companies manufacturing electrical and electronic equipment, petroleum products and pharmaceuticals. The top four leading TNCs include: General Electric (electrical and electronic equipment), Exxon Mobil and Chevron (petroleum products) and Pfizer Inc (pharmaceuticals)

The outward US FDI employment outperformed inward US FDI employment in each year, between 2000 and 2011, which indicates that our foreign affiliates create more jobs abroad than foreign companies operating in our country. The most jobs created abroad by our affiliates were in manufacturing industry, retail trade, wholesale trade, food services and management industries. Americans believe that outward U.S. direct investment abroad, directly or indirectly, shifts some jobs abroad, serve the foreign local market, rather than produce goods to export back to the United States. In contrary, some firms do establish overseas operations to replace U.S. exports or production, or to gain access to raw materials, cheap labour, or other markets, affecting negatively U.S. employment and economic growth.

As far as corporate employment, Wal-Mart's is the leading corporation with 800,000 foreign employees in retail and trade, followed by International Business Machines Corporation (308,287), Hewlett-Packard (228,392) and General Electric Co (170,000) in electrical and electronic

equipment industries. Motor vehicles industry represented by General Motors and Ford Motor employed respectively 106,000 and 85,000 employees. The next industries with quite high number of foreign employment are food, beverages and tobacco companies.

The outward US FDI equity capital for new investments experienced a sharp decline during the current recession. The pronounced decline in equity capital flows for new investment coincided with a worldwide decline in global merger and acquisition activity... The outward US FDI equity, during the recent financial crises started to decline from US\$ 201 billion in 2007 to US\$ 127 billion in 2008 and to US\$ 18 billion in 2009. Upward trend of equity capital started in 2010 with increased to US\$ 41 in 2010 and to US\$53 in 2011.

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As far as outward US FDI, based on the United States Council for International Business (USCIB) reports the U.S. multinationals are first and foremost American companies, and continue to enhance the nation's economy by their capital investment, research and development, and continued support of good-paying American jobs. The worldwide operations of U.S. multinationals are highly concentrated in America in their U.S. parents, not abroad in their foreign affiliates. The idea that U.S. multinationals have somehow "abandoned" the United States is not supported by the facts.

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**Annex table 1. United States: geographical distribution of outward FDI flows, 2000-2011**  
(US\$, in billions)

Economy	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
All Countries Total	143	125	135	129	295	15	224	394	308	267	304	397
North America	17	17	15	17	24	14	-2	22	12	10	28	40
Canada	17	17	15	17	24	14	-2	22	12	10	28	40
Europe	78	66	80	88	137	-29	148	240	178	159	187	224
Denmark	2	0.26	2	-2	0.84	0.73	-0.39	0.84	1	-0.23	0.68	7
Germany	4	12	2	4	9	8	3	10	0.78	7	5	8
Ireland	10	2	11	7	9	-15	20	16	32	23	28	31
Luxembourg	2	20	11	8	3	-9	17	25	27	23	49	50
Netherlands	0.96	12	15	16	31	-19	41	109	39	60	47	56
Switzerland	9	4	8	14	12	-9	11	7	25	16	-0.82	12
United Kingdom	28	8	15	27	42	6	31	22	30	28	47	37
Latin America	23	26	15	4	32	0.07	36	55	63	61	45	85
Argentina	0.68	-0.51	-1	-0.12	2	0.86	4	0.55	2	1	-2	3
Bermuda	9	7	4	-4	4	-1	20	15	8	30	16	26
Brazil	3	0.11	-0.27	-0.29	3	1	0.22	6	4	3	9	10
Chile	0.20	3	-2	0.20	0.91	-0.43	0.45	4	3	1	4	4
Mexico	4	14	8	4	8	10	9	10	5	8	0.41	8
Peru	-0.02	0.10	-0.44	0.30	0.48	0.90	0.23	0.68	-0.58	0.76	0.76	2
Venezuela	4	0.46	0.15	-0.46	-0.40	1	0.51	1	1	2	0.81	2
Africa	0.71	2	-0.58	3	2	3	5	5	4	9	9	5
Egypt	-0.09	0.58	0.13	0.47	0.45	1	0.05	0.99	2	2	2	2
South Africa	0.35	-0.09	0.12	0.23	0.48	0.08	0.16	1	0.31	0.41	0.78	0.72
Middle East	1	1	3	1	3	4	6	4	4	5	-0.28	0.85
Saudi Arabia	0.39	-0.32	2	-1	-1	-0.21	0.77	0.56	0.34	3	-0.16	0.79
United Arab Emirates	0.09	0.10	0.40	0.19	1	-0.06	1	0.26	0.29	1	0.28	1
Asia and Pacific	23	13	23	17	97	24	32	68	47	23	36	41
Australia	0.89	-0.75	8	8	n.a.	n.a.	2	10	10	3	18	14
Hong Kong	5	5	1	-0.69	n.a.	5	4	12	-0.33	8	-21	5
Japan	4	-5	9	0.87	13	6	3	16	-2	10	1	5
Korea	2	1	2	1	4	2	3	0.82	2	3	3	4
Singapore	4	6	0.53	5	n.a.	3	8	14	9	4	13	8

Source: United States Department of Commerce, Bureau of Economic Analysis, FDI database, available at: [www.bea.gov/international](http://www.bea.gov/international).

**Annex table 1a. United States: geographical distribution of outward FDI flows, 2000-2011 (% of total)**

<b>Economy</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
All Countries Total	100	100	100	100	100	100	100	100	100	100	100	100
North America	12	14	11	13	8	93	-1	6	4	4	9	10
Canada	12	14	11	13	8	93	-1	6	4	4	9	10
Europe	55	53	59	68	46	-193	66	61	58	60	62	56
Denmark	1	0.2	1	-2	0.3	5	-0.2	0.2	0.3	-0.1	0.2	2
Germany	3	10	1	3	3	53	1	3	0	3	2	2
Ireland	7	2	8	5	3	-100	9	4	10	9	9	8
Luxembourg	1	16	8	6	1	-60	8	6	9	9	16	13
Netherlands	1	10	11	12	11	-127	18	28	13	22	15	14
Switzerland	6	3	6	11	4	-60	5	2	8	6	-0.3	3
United Kingdom	20	6	15	27	42	6	31	22	30	28	47	37
Latin America	16	21	11	3	11	0	16	14	20	23	15	21
Argentina	0.5	-0.4	-0.7	-0.1	0.7	6	2	0.1	0.6	0.4	-0.7	0.8
Bermuda	6	6	3	-3	1	-7	9	4	3	11	5	7
Brazil	2	0.1	-0.2	-0.2	1	7	0.1	2	1	1	3	3
Chile	0.1	2	-1	0.2	0.3	-3	0.2	1	1	0.4	1	1
Mexico	3	11	6	3	3	67	4	3	2	3	0.1	2
Peru	-0.01	0.1	-0.3	0.2	0.2	6	0.1	0.2	-0.2	0.3	0.3	0.5
Venezuela	3	0.4	0.1	-0.4	-0.1	6.7	0.2	0.3	0.3	0.7	0.3	0.5
Africa	0.5	1.6	-0.4	2	0.7	20	2	1	1	3	3	1
Egypt	-0.1	0.5	0.1	0.4	0.2	6.7	0.02	0.3	0.6	0.7	0.7	0.5
South Africa	0.2	-0.1	0.1	0.2	0.2	0.5	0.1	0.3	0.1	0.2	0.3	0.2
Middle East	1	0.8	2	0.8	1	27	3	1	1	2	-0.1	0.2
Saudi Arabia	0.3	-0.3	1	-0.8	-0.3	-1.4	0.3	0.1	0.1	1	-0.1	0.2
United Arab Emirates	0.1	0.1	0.3	0.1	0.3	-0.4	0.4	0.1	0.1	0.4	0.1	0.3
Asia and Pacific	16	10	17	13	33	160	14	17	15	9	12	10
Australia	1	-0.6	6	6	n.a.	n.a.	0.9	3	3	1	6	4
Hong Kong	3	4	1	-1	n.a.	33	2	3	-0.1	3	-7	1
Japan	3	-4	7	1	4	40	1	4	-1	4	0.3	1
Korea, Republic of	1	0.8	1	0.8	1	13	1	0.2	0.6	1	1	1
Singapore	3	5	0.4	4	n.a.	20	4	4	3	1	4	2

Source: U.S. Department of Commerce, Bureau of Economic Analysis, FDI database, available at: [www.bea.gov/international](http://www.bea.gov/international).

**Annex table 2. United States: sectorial distribution of outward FDI flows, 2000 – 2011 (UD\$, billions)**

<b>All Countries Total</b>	143	125	135	129	295	15	224	394	308	267	304	397
<b>Services</b>	91	83	92	95	225	-35	167	323	254	215	249	311
Wholesale trade	12	16	3	12	19	13	15	13	32	13	12	24
Retail trade	2	3	3	3	4	-0.19	-0.16	6	5	3	5	4
Information	17	-3	-1	4	-0.36	3	4	9	8	9	8	12
Depository institutions	-1	10	-2	1	-2	-5	-6	11	4	-17	-4	-9
Finance	22	3	38	20	51	13	26	82	58	47	25	37
Real estate	-1	0.88	7	-3	9	9	11	18	4	6	9	12
Professional services	5.4	3.7	-1.1	3.2	12.4	-2.1	9.4	12.1	9.4	4.7	7.6	8.1
Transportation	0.45	1.2	2.3	0.7	1.5	3	1.1	5.3	4.1	4.6	2.5	4.6
Holding companies	30.1	45.2	45.9	50.3	117.2	-66.4	97.5	153.6	118.6	140.3	175.7	207.6
Other services	4	3	-3	4	13	-1.69	9	13	11	4	8	11
<b>Manufacturing</b>	43	26	32	31	63	28	42	72	36	39	46	59
Food	2	2	3	3	0.87	1	3	11	4	3	5	4
Beverages and tobacco	0.27	0.38	7	4	5	6	4	4	3	3	2	5
Textiles, apparel, & leather	0.39	0.27	-0.05	0.41	0.47	0.70	0.72	1	0.37	0.39	0.50	0.84
Wood products	-0.05	0.37	0.63	0.08	0.38	-0.32	-0.35	-0.42	-0.26	-0.31	-0.20	-0.04
Paper	1	2	0.75	-0.17	1	-0.04	0.49	1	0.29	0.20	0.18	0.24
Printing	0.11	-0.24	0.05	-0.03	4	0.99	-0.14	0.03	-0.20	0.03	1	0.001
Petroleum and coal	2	2	3	0.04	-0.3	3	2	2	0.87	7	-4	-3
Chemicals	4	10	8	7	13	4	6	11	16	14	15	16
Plastics and rubber	0.07	0.71	1	1	0.85	1	-0.04	2	2	0.58	1	0.89
Nonmetallic minerals	0.49	0.64	0.97	0.6	3	0.12	1	3	0.94	1	2	2
Primary & fabricated metals	1	0.31	1	-0.31	3	-0.70	3	3	3	0.89	1	3
Machinery	3	-0.81	0.29	3	4	2	4	6	7	4	5	7
Computers & electronics	17	4	-2	2	11	4	13	7	4	-2	9	8
Electrical equipment	2	1	2	0.31	0.66	2	3	4	3	-0.19	2	-0.01
Transportation equipment	8	2	5	3	2	-0.25	2	12	-12	3	-0.07	9
Furniture and related	n.a.	2	0.20	0.07	0.08	-0.10	0.01	-0.09	-0.03	-0.01	0.06	0.15
Other manufacturing	2	0.2	1	7	14	5	1	6	4	5	6.5	6
<b>Other industries</b>	9	16	11	3	7	22	15	-1	18	13	9	27
Mining	2.2	15.6	6.7	3.8	18.2	12	21.8	19.9	25.6	12.1	13	24.8
Utilities	2.6	2.9	-1.2	-0.4	-1.9	4.8	0.3	-4.2	0.3	0.6	1.5	5.8
Other	4.25	-2.6	5.4	-0.6	-9.4	4.7	-7.1	-16.7	-8	0.7	-5.3	-3.9

Source: United States Department of Commerce, Bureau of Economic Analysis, FDI database, available at [www.bea.gov/international](http://www.bea.gov/international).

**Annex table 2a. United States: sectorial distribution of outward FDI flows, 2000 – 2011, (% of total)**

<b>All Countries Total</b>	100	100	100	100	100	100	100	100	100	100	100	100
<b>Services</b>	64	66	68	74	76	-230	75	82	83	80	82	78
Wholesale trade	8	13	2	9	6	87	7	3	10	5	4	6
Retail trade	1	2	2	2	1	-1	-0.1	2	2	1	2	1
Information	12	-2	-1	3	-0.1	20	2	2	3	3	3	3
Depository institutions	-1	8	-1	1	-1	-33	-3	3	1	-6	-1	-2
Finance	15	2	28	16	17	87	12	21	19	18	8	9
Real estate	-1	1	5	-2	3	60	5	5	1	2	3	3
Professional services	4	3	-1	2	4	-14	4	3	3	2	3	2
Transportation	0.3	1	2	1	1	20	0.5	1	1	2	1	1
Holding companies	21	36	34	39	40	-443	44	39	39	53	58	52
Other services	3	2	-2	3	4	-11	4	3	4	1	3	3
<b>Manufacturing</b>	30	21	24	24	21	187	19	18	12	15	15	15
Food	1	2	2	2	0.3	7	1	3	1	1	2	1
Beverages and tobacco	0.2	0.3	5	3	2	40	2	1	1	1	1	1
Textiles, apparel, & leather	0.3	0.2	-0.04	0.3	0.2	5	0.3	0.3	0.1	0.1	0.2	0.2
Wood products	-0.03	0.3	0.5	0.1	0.1	-2	-0.2	-0.1	-0.1	-0.1	-0.1	0.0
Paper	1	2	1	-0.1	0.3	-0.3	0.2	0.3	0.1	0.1	0.1	0.1
Printing	0.1	-0.2	0.04	-0.02	1	7	-0.1	0.01	-0.1	0.01	0.3	0.00
Petroleum and coal	1	2	2	0.03	-0.1	20	1	1	0.3	3	-1	-1
Chemicals	3	8	6	5	4	27	3	3	5	5	5	4
Plastics and rubber	0.05	1	1	1	0.3	7	-0.02	1	1	0.2	0.3	0.2
Nonmetallic minerals	0.3	1	1	0.5	1	1	0.4	1	0.3	0.4	1	1
Primary & fabricated metals	1	0.2	1	-0.2	1	-5	1	1	1	0.3	0.3	1
Machinery	2	-1	0.2	2	1	13	2	2	2	1	2	2
Computers & electronics	12	3	-1	2	4	27	6	2	1	-1	3	2
Electrical equipment	1	1	1	0.2	0.2	13	1	1	1	-0.1	1	0.00
Transportation equipment	6	2	4	2	1	-2	1	3	-4	1	-0.02	2
Furniture and related	n.a.	2	0.1	0.1	0.03	-1	0.00	-0.02	-0.01	0.00	0.02	0.04
Other manufacturing	1	0.2	1	5	5	33	0.4	2	1	2	2	2
<b>Other industries</b>	6	13	8	2	2	143	7	0	6	5	3	7
Mining	2	12	5	3	6	80	10	5	8	5	4	6
Utilities	2	2	-1	-0.3	-1	32	0.1	-1	0.1	0.2	0.5	1
Other	3	-2	4	-0.5	-3	31	-3	-4	-3	0.3	-2	-1

Source: United States Department of Commerce, Bureau of Economic Analysis, FDI database, available at [www.bea.gov/international](http://www.bea.gov/international).

**Annex 3. Table 5. U.S. top 25 multinational corporations (MNCs), ranked by revenue, 2011 (billions US\$)**

<b>Rank 2011</b>	<b>Rank 2010</b>	<b>Rank 2000</b>	<b>MNC Name</b>	<b>Industry</b>	<b>Revenue US \$ billion</b>	<b>Profits US \$ billion</b>
1	2	3	Exxon Mobil	Petroleum Refining	<b>453</b>	41
2	1	2	Wal-Mart Stores	General Merchandisers	<b>447</b>	16
3	3	35	Chevron	Petroleum Refining	<b>246</b>	27
4	4	74	ConocoPhillips	Petroleum Refining	<b>237</b>	12
5	8	1	General Motors	Motor Vehicles and Parts	<b>150</b>	9
6	6	5	General Electric	Diversified Financials	<b>148</b>	14
7	7	64	Berkshire Hathaway	Insurance	<b>144</b>	10
8	10	4	Ford Motor	Motor Vehicles and Parts	<b>136</b>	20
9	11	13	Hewlett-Packard	Computers	<b>127</b>	7
10	12	8	AT&T	Telecommunications	<b>126</b>	4
11	24	229	Valero Energy	Petroleum Refining	<b>125</b>	2
12	9	11	Bank of America	Commercial Banks	<b>115</b>	1.4
13	15	38	McKesson	Health Care	<b>112</b>	1.2
14	16	-	Verizon	Telecommunications	<b>111</b>	2.4
15	13	92	J.P. Morgan Chase & Co	Commercial Banks	<b>110</b>	19
16	35	285	Apple	Computers	<b>108</b>	26
17	18	6	International Business Machines	Information Technology Services	<b>106</b>	16
18	14	7	Citigroup	Commercial Banks	<b>103</b>	11
19	19	59	Cardinal Health	Health Care	<b>102</b>	0.9
20	22	86	UnitedHealth Group	Health Care (Insurance)	<b>101</b>	5
21	28	44	Costco Wholesale	Specialty Retailers	<b>89</b>	1
22	23	68	Wells Fargo	Commercial Banks	<b>88</b>	16
23	26	23	Procter & Gamble	Household	<b>83</b>	12
24	39	120	Archer Daniels Midland	Food Production	<b>81</b>	2
25	51	-	INTL FC Stone	Diversified Financials	<b>75</b>	0.04

Source: Fortune magazine, available at: <http://money.cnn.com/magazines/fortune/fortune500/2012/snapshots/387.html>



**Annex 4. United States: Top 20 non-financial TNCs, ranked by foreign assets, 2011**  
**U.S. Dollars at current prices and current exchange rates in billions**

<b>Rank 2011</b>	<b>MNC Name</b>	<b>Industry</b>	<b>Foreign Assets (US \$ billion)</b>	<b>Foreign Sales (US \$ billion)</b>
1	General Electric Co	Electrical & electronic equipment	<b>502.6</b>	77.5
2	Exxon Mobil Corporation	Petroleum	<b>214.2</b>	316.7
3	Chevron Corporation	Petroleum	<b>139.8</b>	139.3
4	Pfizer Inc	Pharmaceuticals	<b>100.4</b>	40.5
5	ConocoPhillips	Petroleum	<b>82.7</b>	85.7
6	General Motors Co	Motor vehicles	<b>77.1</b>	69.1
7	Ford Motor Company	Motor vehicles	<b>76.9</b>	65.1
8	Wal-Mart Stores Inc	Retail & Trade	<b>74.7</b>	109.2
9	Procter & Gamble Co	Diversified	<b>68.1</b>	48.7
10	Hewlett-Packard Co	Electrical & electronic equipment	<b>64.9</b>	83.1
11	Johnson & Johnson	Pharmaceuticals	<b>58.2</b>	36.1
12	International Business Machines Corporation	Electrical & electronic equipment	<b>57.8</b>	69.9
13	Kraft Foods Inc	Food, beverages and tobacco	<b>54.4</b>	32.4
14	Caterpillar Inc	Construction	<b>39.6</b>	38.4
15	The Coca-Cola Company	Food, beverages and tobacco	<b>36.9</b>	27.8
16	Merck & Co	Pharmaceuticals	<b>36.5</b>	27.6
17	Liberty Global Inc	Telecommunications	<b>35.9</b>	9.4
18	Dow Chemical Company	Chemicals	<b>34.6</b>	40.6
19	Schlumberger Ltd	Other consumer services	<b>34.5</b>	26.8
20	Abbott Laboratories	Pharmaceuticals	<b>34.1</b>	22.8

*Source: UNCTAD/Erasmus University database; [www.unctad.org/wir](http://www.unctad.org/wir) or [www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)*

**Annex 5. Table 7. United States: Top 20 non-financial TNCs, ranked by number of employees, 2011**

<b>Rank 2011</b>	<b>MNC Name</b>	<b>Industry</b>	<b>Foreign Employment (number of employees)</b>
1	Wal-Mart Stores Inc	Retail & Trade	800,000
2	International Business Machines Corporation	Electrical & electronic equipment	308,287
3	Hewlett-Packard Co	Electrical & electronic equipment	228,392
4	General Electric Co	Electrical & electronic equipment	170,000
5	General Motors Co	Motor vehicles	106,000
6	Procter & Gamble Co	Diversified	94,618
7	Kraft Foods Inc	Food, beverages and tobacco	90,000
8	Ford Motor Company	Motor vehicles	85,000
9	The Coca-Cola Company	Food, beverages and tobacco	78,800
10	Caterpillar Inc	Construction	71,863
11	Schlumberger Ltd	Other consumer services	70,609
12	Johnson & Johnson	Pharmaceuticals	69,230
13	Pfizer Inc	Pharmaceuticals	64,420
14	Merck & Co	Pharmaceuticals	52,900
15	Abbott Laboratories	Pharmaceuticals	51,450
16	Exxon Mobil Corporation	Petroleum	49,496
17	Chevron Corporation	Petroleum	31,000
18	Dow Chemical Company	Chemicals	25,705
19	Liberty Global Inc	Telecommunications	12,951
20	ConocoPhillips	Petroleum	8,529

Source: UNCTAD/Erasmus University database; [www.unctad.org/wir](http://www.unctad.org/wir) or [www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)

# The Main Portuguese SAD's

## Comparative Study between the Economic and Financial Viability and the Success of their Sports Clubs

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**Abstract** - The object of this paper is to assess the profitability of the four leading Portuguese *Sociedades Anónimas Desportivas (SADs)*<sup>1</sup> by comparing the economic and financial data of each SAD with the respective sports results of the clubs attached to these SADs. The methodology followed the various steps inherent to this type of paper, all the while adopting both a qualitative and quantitative approach, i.e. a hybrid approach. Initially, we took on an interpretative paradigm, as the elements necessary for research arise from the observation and analysis of data. We began by increasing our scientific knowledge on the subject of analysis: SADs, sports results and balanced financial structures. This was followed by a characterisation of the sector and a thorough analysis of both the accounts and the sports results of the SADs and the clubs. Thereafter, we crossed the data from these two analyses and completed the project with a number of key measures to achieve both financial and sporting success. Finally, it was possible to conclude that a *Sociedade Anónima Desportiva* can, in fact, achieve satisfactory economic, financial and sporting levels if a number of guiding principles are adopted. Principles that, when interconnected through a virtuous cycle, generate greater revenue and consequently profits, contributing to a balanced financial structure, conducive to more victories and naturally titles, which in turn provide increased revenue, thereby bestowing coherence to the virtuous cycle.

**Keywords:** *Sociedade Anónima Desportiva, sporting success, balanced financial structure*

### 1. Introduction

#### 1.1. Thematic Context

<sup>1</sup> A *Sociedade Anónima Desportiva (SAD)* is a limited liability company operating in the sports industry.

Europe currently lives a fairly sharp economic and social crisis. These times are of containment at European, national and regional level. It seems a consensus that, for the time being, the core of the sovereign debt crisis, which sprouted after the financial crisis started September 15, 2008 with the bankruptcy of U.S. Investment Bank Lehman Brothers, being basically geographically concentrated in part of the periphery of the Euro Zone, where Portugal is included.

Portugal is, for the time being, dependent on its creditors and is now a country forced to austerity plans, which are a condition of foreign aid for its survival. Then, in this national and European context, it is urgent the creation of policies that contribute simultaneously to the increase of competitiveness and to the reduction of the external account imbalance.

As we can see in the portrait of country's situation, the situation of the clubs and SAD's is very dependent on external revenues and exports. In other words, the weight that the sale of players and bonuses from UEFA has in the accounts of SAD's is massive. These, in order to get these recipes, can not in any way detract from the sporting results aimed and reached.

Therefore, the theme proposed for this article consists on the research about the profitability of the main national SAD's, comparing this profitability with the success of their sports clubs. We will investigate if there is the possibility of simultaneous achieving sports success and being cost-effective.

#### 1.2. Characterization of the Sector

The recent evolution of sport in Portugal can be qualified as fairly satisfactory. Combined with the sports scores, positively significant at European level, the number of federated practitioners increased annually. In 2011 there are 523,168

federated athletes (Figure No. 18). This has been another positive aspect for the development of sport in Portugal, as well as the development of infrastructures, like the new stadiums built for the Euro 2004 or the high performance centres built strategically on the national territory; not forgetting the passion and enthusiasm that the sport generates in the majority of the Portuguese population, as a key factor in the development of the national sport.

After this brief general characterization of the sports sector, we now characterize particularly the domain area of this article, namely, the football sector.

As we know, football is the most popular sport in Portugal and also the one with the largest number of federated athletes. According to numbers from the database Pordata in 2011 there were already more than 150.000 federated athletes in football in Portugal, while in 2006 there were nearly 136.000 (Figure No. 19). This increase, which has been gradual over the last five years, appears at the same time that the sports scores of the major Portuguese clubs across borders have improved. In the last ten seasons (2002/2012) the Portuguese teams won for once the Champions League (FC Porto in 2003/2004), two to the Europa League (FC Porto in 2002/2003 and 2010/2011), having been still present in two finals of the Europa League (Sporting CP in 2004/2005 and S.C.Braga in 2010/2011), two quarter-finals of the Champions League (SL Benfica in 2005/2006 and 2011/2012) and three semi-finals of the Europa League (Boavista FC in 2002/2003, SL Benfica in 2010/2011 and Sporting CP in 2011/2012). These are notable facts, not forgetting, of course, the fact that, for many people, Portugal is the country of origin of the best player and the best coach in the world today, namely Jose Mourinho and Cristiano Ronaldo. However, these facts do not guarantee economic and financial health for the Portuguese SAD's. And that is the main subject on which will focus our research in this article.

## 2. Research problem definition and general and specific objectives

In order to develop further this study and after the selection of the theme, we have, since then, exposed the problem of research by a question where we explain strictly what we want to know. The research question that we defined appears to be crucial to understand if it is plausible to a sporting institution to achieve successful results in sports and business at the same time.

➤ Is it possible to a SAD to have both sport success and to be economically profitable?

In order to guide the research and development of this project in a focused and competent way, it is

essential to identify the objectives that we want to achieve on our approach to the subject.

### General objective:

a) The main objective of this study is to understand the financial structures of the SAD's combining the interpretation of these structures with the sports scores obtained by the respective clubs, drawing conclusions.

### Specific objectives:

- Understand what a SAD is and how it acts on the market.
- Understand clearly which characteristics define a balanced financial structure.
- Interpret in a clear and concise manner the accounts published by the SAD's.
- Analyze the results of sports clubs and confront them with their budgets.
- Propose solutions and measures to be taken for a profitable SAD and provide at the same time sports scores positively significant.

## 3. Methodology

Concerning the quantification of the study, we can consider adopting a hybrid method, that is, quantitative, particularly when they are addressed issues related to the accounts of SAD's, where reality is objective and independent. But it is also qualitative, because the analysis of sports scores has a subjective component as it is, a historical analysis of certain events held qualitatively.

The methodology of this project went through various stages and methods of research. At an early stage, we had the choice of topic and the definition of the objectives that we set ourselves to achieve. Later we did a literature search on the topic under discussion, which allowed us to "*find, analyze, synthesize and interpret prior research related to the study area. The literature review is an indispensable role in the project, as it allows you to define the research problem under study, such as having a clear idea about the current level of knowledge about the subject*" Bento (2012). We have also a characterization of the sector, followed by the analysis of the accounts and of the sports results of SAD's. Finishing with a reflection on the key measures to achieve success in both parameters.

With regard to information gathering, it was made by primary sources, namely, books and articles relevant to the study, Annual reports; and also by secondary sources, such as summaries or encyclopedias, whether they are written by authors

who interpret the works of other authors and that demonstrate relevance by agglomerating, filtering and compiling knowledge from various primary sources.

## 4. Review of Literature

### 4.1. SAD'S

At this stage of our project, we started to understand the concepts that support a SAD. A SAD, according to the website [www.portaldaempresa.pt](http://www.portaldaempresa.pt) is generally, a privately held company consisting of shareholders, whose purpose is to participate in sports competitions, as well as the promotion and organization of sports shows and/or development of activities related to professional sports.

It is relevant to point out that the creation of Anonymous Sports Societies (SADs) was imposed by law, in order to maintain the equity in tax terms, between the procedures due to sports clubs and citizens in general. Until then all sports business passed on the margins of social contributions, since most players' salaries were not declared and, consequently, also there were no discounts for social security.

### 4.2. Sport Success

The concept of sport success is intrinsically linked to the objectives outlined by each institution/club within the framework of its activity. This concept is measured by sports results obtained. Succeed is having satisfactory results, that is, having victories in games, and competitions. Surely to achieve this success work, dedication, talent and capital cannot be missed. However the victories and titles are desired by all major institutions, then we need to find competitive advantages so that clubs will be able to overcome their rivals.

Having said that, we understand that to achieve sporting success, it is essential to have the ability to get the most out of each resource and for this to happen, it is of course imperative that the club has a highly competent leadership. According to Jack Welch (2005: 65), *"leaders constantly improve the level of his team, making each encounter an opportunity to evaluate, guide and build self-confidence. Evaluate, in order to ensure that the right people have the appropriate functions; Guide, criticizing and helping employees to improve their performance in the best possible way and building self-confidence, encouraging, giving attention and appreciation"*. In this way, the leaders are respected within the club or company, generate trust and transmitting positive energy and optimism that will take the club or the company to glory.

As Crespo de Carvalho (2004: 23), *"the company works based on three fronts: the motivation of its employees; the knowledge or information that the company acquired and which can benefit; and the ability to make it happen something we want to happen"*.

### 4.3. Balanced financial structure

Generally, the main purpose of business is to maximize profits looking to increase revenues and decrease costs maintaining the stakeholder's satisfied. However, the policy pursued by the football clubs is somehow different. More than profits, responsible leaders, members and supporters want to maximize victories and titles. This line of thought is due fundamentally to the emotion that football awakens and repeatedly goes beyond rationality in the decision-making process of sports agents. In turn, the rivalry felt between clubs in the pursuit of these objectives is a critical factor and justifies the desire of people to prefer titles then profits in the "world of football".

For these reasons, the clubs are a different kind of companies and, therefore, managed by a distinct business model. Although, logically, in the clubs as in business, no one wants to lose money, and the victories and titles are also very important to generate revenue.

Not disregarding the differences highlighted between the economic models of football clubs and *tout court* companies, we will now focus on the investigation of how the financial structure of an enterprise should be addressed.

It is important to start by understanding what financial analysis is. According to Borges, Rodrigues and Morgado (2004: 294), we can define financial analysis as *"a set of techniques to raise awareness of the economic, monetary and financial situation of organizations, from accounting and financial documents. Studying information related to the financial situation, through the analysis of financial stability, solvency, debt, among others; with the economic situation through the analysis of the results and of the factors that influence, such as the productivity or cost structure and the monetary situation"*.

We start with the fundamental principle that the financial stability happens when the permanent capital is at least equal to the net, or otherwise, that the net working capital is greater than or equal to the working capital. This means that there is liquidity, soon it will be possible to meet short-term commitments. The continuity of this liquidity is ensured by a succession of positive results. That, in turn, is generating ability, that is, ability to satisfy the medium/long term commitments.

We will center our analysis in the annual reports of SAD's. We will focus mainly on understanding

financial analysis of accounting documents essential to assess the performance of the business: the balance sheet and the profit and loss account. Also in some key performance indicators as the net working capital, working capital, the treasury, the return on equity, return on assets, the solvency and financial autonomy.

According to Esperança & Matias (2009: 59-60) *"the balance sheet is the accounting document that expresses the assets and liabilities of a company on a particular date. The asset consists of the set of possessions and rights that we have, while the liabilities are characterized by the debts incurred to finance the asset"*. The asset, in SAD's consists primarily by the fixed asset, or tangible assets, such as the stadiums or training centers, intangible assets where they consider the sporting rights of players and financial investment. *"The difference between what we have (assets) and what we owe (liabilities) is called equity, representing the value of the net wealth of third party debts"* (Esperança & Matias 2009: 60).

To better understand the advantages of the use of these financial instruments, Borges, Rodrigues and Morgado (2004: 318) presents us with a set of very clear definitions of them. Indicating us that *"the net working capital expressed the difference between stable resources and lasting applications, and if the difference is positive represents a safety margin of financing on the permanent applications. Working capital reflects the impacts of regulatory aspects related to business, constituting one of the major determinants of the financial policy of the company. The treasury is the indicator of financial stability; The return on equity allows us to relate the level of net profit generated depending on the amount invested. The profitability of the asset business capacity assesses the economic results in relation to its variable costs. The solvency and financial autonomy provide indications about the company's funding structure, assessing respectively the company's ability to meet its commitments with third parties and the level of total equity funding"*.

## 5. Analysis of economic-financial results and sports scores from each of the SAD's

### 5.1. Economic and Financial Results

In this chapter we shall proceed to the economic and financial analysis of the four main Portugal SAD's, with effects on the consolidated accounts for the last five financial years, starting in season 2007/2008 and ending in 2011/2012. We will study and assess the viability, stability and profitability, including a set of instruments and methods that enable us to perform diagnostics on the financial situation of a company. In this way, we will be able

Now we have clear definitions of financial instruments which will enable us to make a coherent analysis about the annual reports, it is important to apply and compare them between each SAD's, in financial terms.

#### 4.4. Financial Fair play

As is public knowledge, the three major Portuguese football clubs are faced with the possibility of lack of control of its indebtedness. In this way, reduce the wage bill will be one of the paths to the balance, so much so that UEFA has implemented ratios of *"financial fair play"* that force the clubs to manage the wage bill indicators on operating income around 75%, so, if the clubs want to increase their wage bill also need to increase operating profits.

The concept of *"financial fair play"* unanimously approved by the UEFA Executive Committee (2009), has as main objectives:

*"- To introduce more discipline and rationality in the finances of football clubs;*

*- Encourage clubs to compete only with the values of their recipes;*

*- Encourage long-term investments in youth soccer and in infrastructure;*

*- Protect the viability of European football;*

*- Ensure that clubs address their financial problems in time"*.

In this way, the clubs feel obliged to balance their accounts and cannot repeatedly spend more than the revenue they generate. Under penalty of being punished with freezing of revenue from the performance in European competitions.

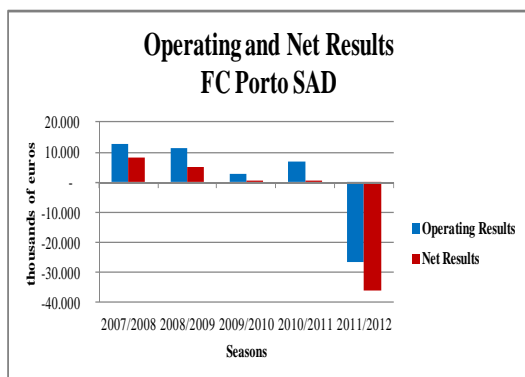
to evaluate the profitability of the business, and check if revenues exceed the investment and operating costs.

#### 5.1.1 Futebol Clube do Porto – Futebol, SAD

##### - Operating and Net Results

Analyzing the FC Porto SAD results, in 2011/2012, an atypical year in terms of net results, as it was the only one in the last five to present losses. Mainly due to the significant reduction of operating profit resulting from a cost increase and decrease revenue.

Figure n° 1 - Operating and Net Results FC Porto SAD



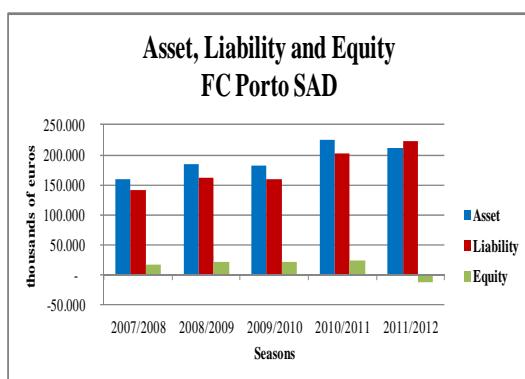
(Source: author, based on the FCP SAD Annual Report)

### - Asset, Liability and Equity

Studying the data on the asset in the last year, we observed that this decreased compared to the same period of the previous year, although there was an increase in the caption intangible assets that represents the value of the squad. There has been a decline even sharper in customers, which demonstrates that the SAD, despite having increased value in its assets, was not able or did not want to sell them at the level of the previous year and this had repercussions on the final values of the asset.

On the FC Porto SAD equity trends there was, in the last financial year, a clear reversal in the trend of increase of these values over the last four years. This deficit is the result of a significant increase in liabilities that was not accompanied by the increase in the assets.

Figure No. 2- Asset, Liability and Equity FC Porto SAD



(Source: author, based on the FCP SAD Annual Report)

### - Economic and financial indicators

Except for the last year, all economic and financial indicators analyzed are quite positive. The only exception was the return on equity in 2009/2010, offset by solvability ratios and financial autonomy

always above 11% and 10% respectively. This demonstrates that for several years there has been financial stability in the SAD. The 2011/2012 season was opposite to the four previous reasons. In 2011/2012, the FC Porto SAD presents either negative equity or net income, which consequently led to negative values for the solvency ratios and financial autonomy. However, it leads us to conclude that the economic and financial results of FC Porto SAD over the past five years are, on balance, positive.

Figure No. 3- Economic and financial indicators FC Porto SAD

Analysis of FC Porto SAD accounts					unit: k€
ITEMS	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Asset	158.800	183.600	182.901	225.323	210.727
Liability	141.100	160.800	160.072	202.009	223.385
Non-Current Liabilities	42.270	36.151	45.264	61.159	53.068
Equity	17.704	22.776	22.829	23.263	12.658
Ongoing Capitals	59.974	58.927	68.093	84.452	65.726
Fixed Assets	83.305	88.679	93.915	129.238	135.567
Working Capital	23.331	29.752	25.822	44.786	69.841
Cyclical Requirements	70.363	86.407	79.815	72.739	72.785
Cyclical Resources	27.881	33.454	33.279	42.461	51.420
Working Capital Requirements	42.482	52.953	46.536	30.278	21.365
Treasury	46.413	82.704	72.156	78.064	91.206
Operating Results	12.700	11.200	2.854	6.977	-26.441
Net Results	8.000	5.100	83	534	-35.763
Return on Equity	46%	23%	0%	2%	Return not applicable
Return on Economic Asset	10.1%	7.9%	2.0%	4.4%	-16.8%
Solvency	12.4%	14.2%	14.2%	11.2%	-5.7%
Financial Autonomy	11.0%	12.4%	12.3%	10.3%	-6.0%

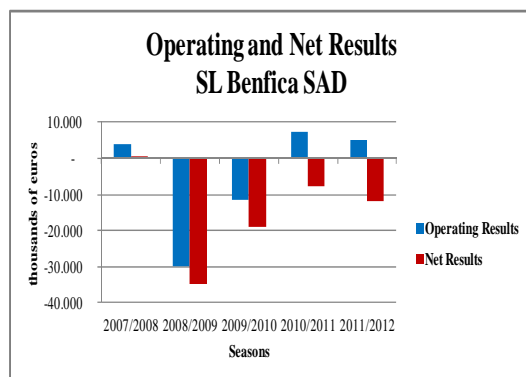
(Source: author, based on the FCP SAD Annual Report)

### Sport Lisboa e Benfica – Futebol, SAD

#### - Operating and Net Results

Analyzing the SL Benfica SAD results in the last five years, we observe that in the last four years the net results were negative. Despite being the only Portuguese club mentioned in the last three "Football Money League" reports of Deloitte consulting and audit, which evaluates the ability of clubs from major European leagues to generate revenue in day-to-day operations, such as: game tickets, television rights, awards, contests, sponsorships, merchandising and other commercial operations. SL Benfica was the club with more revenues out of those who were considered, until 2011/2012, from the five major European Leagues (England, Spain, Germany, Italy and France).

Figura nº 1 – Resultados Operacionais e Líquidos SL Benfica SAD



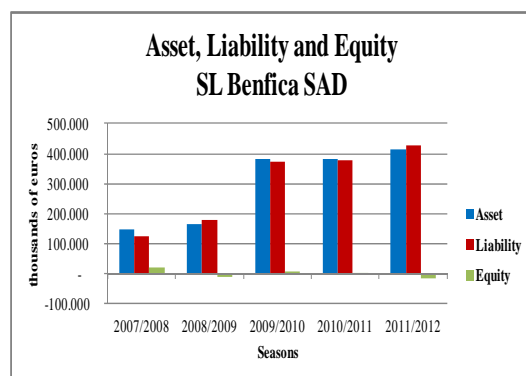
(Source: author, based on the SLB SAD Annual Report)

### - Asset, Liability and Equity

The asset values of Sport Lisboa e Benfica SAD have evolved much like the passive values, increasing from year to year. However, not always the values of the asset outweigh liabilities as recommended. It is positive that the asset values are growing, this effect is void if the liabilities grow more and we are facing negative equity.

In the SL Benfica SAD's case, this is an evolution of oscillating capital between positive and negative values in the last five years, unlike for example the great rival FC Porto, as we saw earlier.

Figure No. 5-Asset, Liability and Equity SL Benfica SAD



(Source: author, based on the SLB SAD Annual Report)

### - Economic and financial indicators

About the SL Benfica SAD's economic and financial indicators for the last five seasons, it is observed that the financial framework of the SL Benfica SAD, is not at all the best. Combined with the inability to have positive equity annually we can see, for example last season, that both the treasury or the return on own funds, the solvency or financial autonomy presents negative values. These data demonstrate that the SAD may not be able to meet all its commitments with third parties. However, as a good example, we should pay attention to the 2007/2008 season where all the ratios and indicators were positive, something that won't happen again since then. It is noted that the SL Benfica has not been able to present a positive return on equity over the past four years. It has been quite negative although being able, as a rule, to sell its assets at good prices, like in the summer of 2012 with Axel Witsel and Javi Garcia whose only capital gains will be reflected in the next financial year of Benfica SAD.

Figure No. 6 – Economic and financial indicators SL Benfica SAD

Analysis of SL Benfica SAD accounts					unit: €C
ITEMS	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Asset	148.082	166.846	381.232	382.079	411.921
Liability	125.051	178.636	373.793	379.629	426.073
Non-Current Liabilities	53.975	36.058	204.461	210.993	167.398
Equity	23.031	11.823	7.439	2.480	14.152
Operating Capital	77.006	24.231	211.900	213.443	153.246
Fixed Assets	100.013	102.424	306.553	309.885	315.497
Working Capital	23.007	78.191	94.653	96.442	162.251
Cyclical Requirements	37.649	40.997	50.277	46.557	78.846
Cyclical Resources	62.537	27.001	54.948	59.829	74.201
Working Capital Requirements	24.888	13.996	4.671	13.272	4.645
Treasury	1.881	92.107	89.982	83.170	166.500
Operating Results	3.996	29.911	11.304	7.317	5.125
Net Results	116	34.856	18.998	7.663	11.690
Return on Equity	1%	Ratio not applicable	-25%	-21%	Ratio not applicable
Return on Economic Asset	5.3%	-25.7%	-3.1%	2.5%	1.6%
Solvency	18.4%	-6.0%	2.0%	0.6%	-5.3%
Financial Autonomy	15.6%	-11.0%	2.0%	0.6%	-3.4%

(Source: author, based on the SLB SAD Annual Report)

### Sporting Clube de Braga – Futebol, SAD

#### - Operating and Net Results

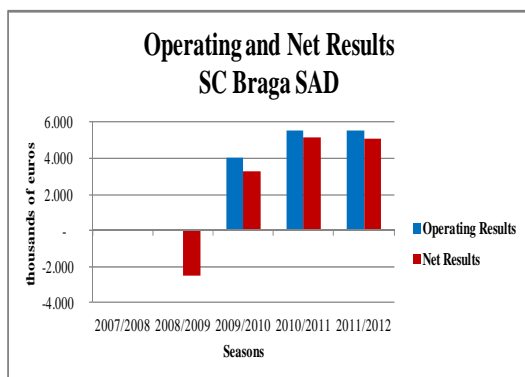
Before starting the analysis to the accounts of SC Braga SAD, it is relevant to say that in some cases it has not been possible to establish economic and financial data relating to the seasons of 2007/2008 and 2008/2009 for not having been published annual reports of Sporting Clube de Braga SAD in this period.

So, we found that, of all the SAD's analyzed, just SC Braga SAD managed to have positive net results in the last financial year, and there are three seasons



in positive ground. This fact is supported by the increased sales in game tickets and by the UEFA revenues, as well as by the results with athletes whose passes transactions last year, for example, generated a net gain of 13.65 million Euros and in 2009/2010 of approximately 9 million Euros (Figure No. 20).

Figure No. 7 - Operating and Net Results SC Braga SAD



(Source: author, based on the SCB SAD Annual Report)

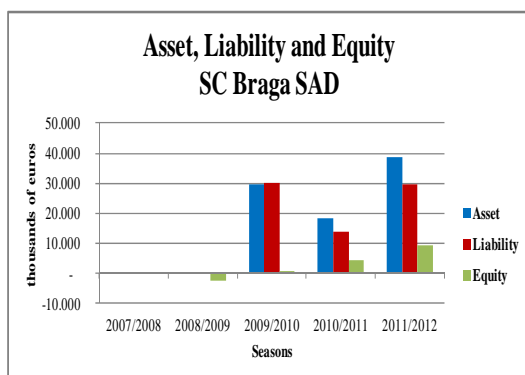
#### - Asset, Liability and Equity

The asset of SAD Braga reached its peak in the most recent season (2011/2012), supported at about two-thirds by "third-party debts" that correspond to the amounts receivable as a result of the sale of sports rights of certain athletes.

In relation to liabilities, there was a doubling of the previous financial year to the latest, explained by a need to ask for bank credit.

The SAD of SC Braga presents itself as the only SAD of the four main Portuguese clubs to show a positive development and increasing equity over the past three years. For such an occurrence, contributed the excellent net results achieved in the last three seasons, which put the SC Braga on a very promising growth cycle at the economic and financial level.

Figure n° 8-Asset, Liability and Equity SC Braga SAD



(Source: author, based on the SCB SAD Annual Report)

#### - Economic and financial indicators

As for other economic and financial indicators, the SC Braga, in seasons where we have data to analyze, presents positive results that translate into a return on equity of above 50% always, economic assets up 19% and solvency ratios which in the last two seasons were around 30% and 24% respectively. A true example of success in what concerns to economic and financial policy in this area of activity.

Concluding, SC Braga holds the SAD with the highest growth tendency, showing a significant economic and financial stability.

Figure No. 9 – Economic and financial indicators SC Braga SAD

ITEMS	Analysis of SC Braga SAD accounts				unit.:€€
	2007/2008	2008/2009	2009/2010	2010/2011	
Asset			23.510	18.529	38.752
Liability			29.937	14.051	29.546
Non-Current Liabilities			4.250	1.573	1.981
Equity		2.300	600	4.478	9.206
Ongoing Capitals			4.850	6.051	11.187
Fixed Assets			9.900	10.889	12.575
Working Capital			5.050	4.838	1.388
Cyclical Requirements			14.422	6.575	10.629
Cyclical Resources			3.168	2.978	3.282
Working Capital Requirements			11.254	3.597	7.347
Treasury			16.304	8.435	8.735
Operating Results			4.036	5.561	5.566
Net Results		2.500	3.300	5.191	5.089
Return on Equity		Ratio on previous year	550%	116%	55%
Return on Economic Asset			19.1%	38.4%	27.9%
Solvency			2%	32%	24%
Financial Autonomy			2%	24%	24%

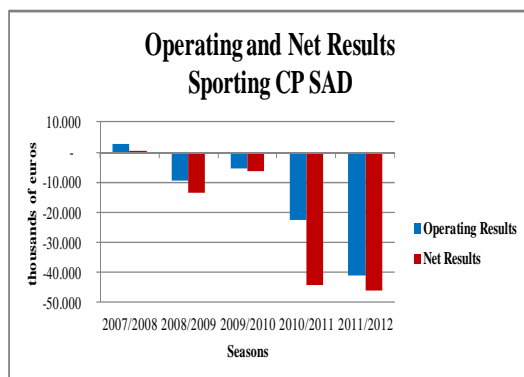
(Source: author, based on the SCB SAD Annual Report)

#### Sporting Clube de Portugal – Futebol, SAD

##### - Operating and Net Results

Sporting CP SAD's has been accumulating negative net results for four consecutive years. In the last two years it has accumulated almost 90 million Euros of losses. Something that essentially is justified by the low values that the Sporting CP SAD has received regarding prizes for the participation and performance in European competitions on a par with the personnel costs that are too high for the structure and for the sporting results achieved by Sporting CP SAD.

Figure No. 10-Operating and Net Results Sporting CP SAD



(Source: author, based on the SCP SAD Annual Report)

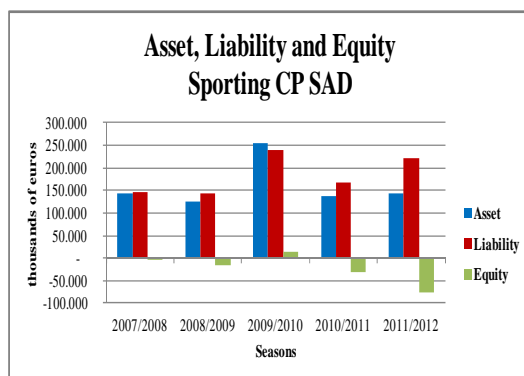
### - Asset, Liability and Equity

With regards to the assets, we find that the values were not able to approach or exceed the liabilities, with the exception of the 2009/2010 singular season where the value of the asset more than doubled, compared to the previous season. This happened mainly due to an abnormally high value in the item of property, plant and equipment justified by insertion of Sporting Academy in this account, that season.

Already the liabilities of SAD has been over the past five years, between 140 and 240 million Euros, justified by financial debt, including amongst others, bank loans and bondholders, necessary to meet the policy outlined by the top managers, investing in players through investment partnerships for the negotiation of the sporting rights of athletes.

Watching the evolution of the equity resulting from the comparison between assets and liabilities, we note that in the last five seasons, only the already mentioned and atypical 2009/2010 season produced positive equity. Moreover, in the most recent year, the SAD exceeded the negative record in recent years, reaching almost 76 million Euros, a result of accumulating negative net results in previous years.

Figure No. 11 – Asset, liability and Equity Sporting CP SAD



(Source: author, based on the SCP SAD Annual Report)

### - Economic and financial indicators

With regard to the remaining economic and financial indicators analyzed, we can see that: the return on equity, economic assets, solvency and financial independence reflected mainly negative values. The only indicator that has been typically positive is the treasury. This is justified by the fact that the SAD has moved short-term debt to long-term debt, renegotiating payment periods and thus relieving the treasury.

In this way, we can conclude that the Sporting CP denotes be going through a period of enormous economic and financial difficulties with the worst-ever results in the history of the SAD in terms of net profits, operational, capital and reserves, solvency and financial autonomy. Nowadays, it becomes crucial to Sporting CP to review its economic and financial policy in order to be able to present positive results on a regular basis.

Figure No. 12 – Economic and financial indicators Sporting CP SAD

ITEMS	Analysis of Sporting CP SAD accounts				tot. ±€
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
Asset	143.421	126.462	254.040	136.492	144.408
Liability	146.016	142.443	238.792	166.138	220.001
Non-Current Liabilities	97.617	119.729	225.641	53.382	124.316
Equity	2.595	15.981	15.248	29.646	75.593
Ongoing Capitals	95.022	103.748	240.889	23.736	48.723
Fixed Assets	29.037	26.713	181.799	166.179	62.917
Working Capital	65.985	77.035	59.090	142.443	14.194
Cyclical Requirements	11.964	2.927	530	20.587	15.121
Cyclical Resources	5.814	6.806	1.562	30.454	30.952
Working Capital Requirements	6.150	3.879	1.032	9.867	15.831
Treasury	59.835	80.914	60.122	112.576	1.637
Operating Results	2.563	9.391	5.515	22.528	41.113
Net Results	597	13.349	6.258	43.991	45.947
Return on Equity	-23%	Rate not applicable	-4%	Rate not applicable	Rate not applicable
Return on Economic Asset	7.3%	-41.1%	-3.1%	-14.4%	-87.3%
Solvency	-1.6%	-11.2%	0%	-16%	-24%
Financial Autonomy	-1.8%	-12.0%	0%	-22%	-52%

(Source: author, based on the SCP SAD Annual Report)

## 5.2. Sporting Results

In the next stage of our project, we will scrutinize the sporting results of the clubs, associated to the SAD's, in the last five seasons. So, in the next chapter of our paper we will be able to draw up a response to our research problem placed initially, crossing the financial aspects with the sports. In this chapter, we begin by clarifying the objectives outlined by the clubs. Below is an analysis of the results achieved in the last five seasons and the comparison with the objectives initially placed.

### 5.2.1 Objectives outlined at the beginning of the seasons

As we know, the objectives outlined by the clubs for their sporting seasons suffer constant changes throughout the season, according to the results they are achieving. Due to this condition and taking into consideration that there are significant differences in

the nature of the four clubs, we considered that the most appropriate and fair way to setting these objectives would consider them from messages of Presidents published in the annual report of each SAD.

In this way, Jorge Nuno Pinto da Costa<sup>2</sup> mentions the objective of "*making FC Porto, collect more trophies*" and Luis Filipe Vieira<sup>3</sup> says will keep investing in football because "*it is crucial to stay among the elite of European football (...) and achieve success at the national level*".

As for the Sporting CP, Luis Godinho Lopes<sup>4</sup> in the latest annual report indicates that the club "*made a substantial strengthening in football team (...) with the conviction to obtain results suitable with the history of the club*". What means that Sporting CP at the beginning of the season wanted to win the Portuguese league.

For SC Braga, António Salvador<sup>5</sup> is quite clear in the definition of the objectives of the club. He said that: "*we will seek a sport increasingly efficient management that consolidate us more and more in national and international sporting scene and, therefore, be placed in competitions with the best european clubs*". It follows then that the SC Braga aspires to achieve one of the top three places in the table.

### 5.2.2 Results achieved by club

We will now present a summary analysis of the evolution of sporting results achieved by each club. This procedure will allow the comparison between the sports and financial economic results of each SAD. Such comparison will be addressed in the next chapter. Thus we have:

#### a) FC Porto

As we can see in figure No. 13, FC Porto won four of the last five national championships, having won three times the cup of Portugal, joining four Portuguese Super Cups, which is not represented in this figure due to the fact that it is a one match trophy. These twelve national trophies still managed to join a European conquest, the Europa League, in 2010/2011, when FC Porto won four of the five trophies up for grabs, including the Portuguese Super Cup.

Then, it is easy to conclude that the sports scores of FC Porto in the last five years have been globally positive. Justified by internal and financial stability and right choices about of managers and players.

<sup>2</sup> FC Porto President

<sup>3</sup> SL Benfica President

<sup>4</sup> Sporting CP President

<sup>5</sup> SC Braga President

Figure No. 13 - FC Porto sporting Results (last five seasons)

FC Porto	Portuguese League	Portuguese Cup	League Cup	Champions League	Europa League
2007/2008	1st Place	Runner-Up	3rd Round	Last 16	-
2008/2009	1st Place	Winner	Semi-Finalist	Quarter-Finalist	-
2009/2010	3rd Place	Winner	Runner-Up	Last 16	-
2010/2011	1st Place	Winner	2nd Group Stage	-	Winner
2011/2012	1st Place	Last 32	Semi-Finalist	Group Stage	Last 32

(Source: author, based on data from the site [www.zerozero.pt](http://www.zerozero.pt))

#### b) SL Benfica

Studying the past five years of SL Benfica it is inevitable to make a link between the improvement of sports results of the club and the hiring of Jorge Jesus to manage the football team in season 2009/2010. Nevertheless, the club failed to have financial stability over the past five years and has often missed the chance to win trophies in crucial moments. So, globally, the SL Benfica has not managed to overtake its main rival, the FC Porto in sporting terms over the past five years.

In conclusion, it is clear that the sports results of SL Benfica were not a success, not when the main objective is only achieved once out of five possibilities. But they were also not a total failure and the prospects (clearly improvement the past three seasons) are positive. Still, we will have to sort the sporting results achieved as negative, especially when compared, in a similar criteria, to FC Porto.

Figure nº 14 –SL Benfica sporting Results (last five seasons)

SL Benfica	Portuguese League	Portuguese Cup	League Cup	Champions League	Europa League
2007/2008	4th Place	Semi-Finalist	4th Round	Group Stage	Last 16
2008/2009	3rd Place	Last 16	Winner	-	Group Stage
2009/2010	1st Place	Last 32	Winner	-	Quarter-Finalist
2010/2011	2nd Place	Semi-Finalist	Winner	Group Stage	Semi-Finalist
2011/2012	2nd Place	Last 16	Winner	Quarter-Finalist	-

(Source: author, based on data from the site [www.zerozero.pt](http://www.zerozero.pt))

### c) SC Braga

The case of SC Braga has important characteristics that should be noted compared to the previously analyzed clubs, but also in relation to Sporting CP. This singular characteristic is simple enough to emphasize: the SC Braga, never in its history began the season aiming the title in the Portuguese League. Something that does not prevent us from being able to analyze the results achieved by SC Braga, even comparing them in certain parameters with the other clubs.

As we saw earlier, the objective of the SC Braga is to achieve one of the top three places in the league table at the end of the season. From 2007 to 2010 the club progressed from seventh to second place of the league table of the Portuguese League. And subsequently to very positive sports scores in 2009/2010, the Club was able to give continuity to the progress they wanted, playing even the Champions League in 2010/2011, and the final of Europa League in the same year, losing to FC Porto.

In this way, the whole of sporting results achieved by SC Braga in the five most recent seasons are clearly positive. The club appears to be in a solid phase of sports growth being even able to rival the top clubs of Portuguese League that have considerably higher budgets. For example, for the season 2011/2012, the budget of SC Braga corresponded to about 15% of the budget of FC Porto, 21% of the SL Benfica and 50% of the Sporting CP.

Figure n° 2 – SC Braga sporting Results (last five seasons)

SC Braga	Portuguese League	Portuguese Cup	League Cup	Champions League	Europa League
2007/2008	7th Place	Last 32	3rd Round	-	Last 32
2008/2009	5th Place	Last 32	1st Group Stage	-	Last 16
2009/2010	2nd Place	Quarter-Finalist	2nd Group Stage	-	-
2010/2011	4th Place	Last 32	2nd Group Stage	Group Stage	Runner-Up
2011/2012	3rd Place	Last 32	Semi-Finalist	-	Last 32

(Source: author, based on data from the site [www.zerozero.pt](http://www.zerozero.pt))

### d) Sporting CP

With regard to Sporting CP, there is a fact that clarifies their sports production in the past five years.

They only won one title (Portugal Cup 2007/2008). Their results in Portuguese League have been negative and the European “routes” have not been convincing.

The explanation for these less successful sports scores will possibly be related to the poor choice of sports agents. As usual the club has been living with administrative instability. The club associates have chosen on March 23, 2013 the fourth President in the past four years. Managers have already been nine during this period and this may have contributed greatly to this failure at the sports level in the last three seasons.

Figure n° 16 – Sporting CP sporting Results (last five seasons)

Sporting CP	Portuguese League	Portuguese Cup	League Cup	Champions League	Europa League
2007/2008	2nd Place	Winner	Runner-Up	Group Stage	Quarter-Finalist
2008/2009	2nd Place	Last 32	Runner-Up	Last 16	-
2009/2010	4th Place	Quarter-Finalist	Semi-Finalist	-	Last 16
2010/2011	3rd Place	Last 16	Semi-Finalist	-	Last 32
2011/2012	4th Place	Runner-Up	2nd Group Stage	-	Semi-Finalist

(Source: author, based on data from the site [www.zerozero.pt](http://www.zerozero.pt))

## 6. Cross-study of economic-financial results with the sports results of each of the SAD's and conclusions

### 6.1. Comparison between economic and financial results and sports results of SAD's

#### 6.1.1 Futebol Clube do Porto – Futebol, SAD

Starting this analysis by FC Porto SAD, who achieved positive financial results all seasons under scrutiny, with the exception of the last. This season (2011/2012) was characterized by the weaker European club performance in the last five years. In its worst season under analysis (2009/2010), the SAD was able to achieve positive net results, even by a minimum margin, as well as keep the equity also positives. In the other three seasons, FC Porto won the national title, even with two achievements of the Portuguese Cup, a Europa League and two

qualifications for the second phase of the Champions League.

We can thus conclude that the FC Porto SAD was able to match sports success with business success in three of the five seasons.

### 6.1.2 Sport Lisboa e Benfica – Futebol, SAD

The SL Benfica, unlike FC Porto, obtained irregular sports scores in the last five years. Example of this is that, in five national championships, SL Benfica final standings were in four different places (1st, 2nd, 3rd and 4th). As a fact, the club managed only one season of sports success, 2009/2010. It was a season without positive net results, due to the large investment and consequent bank indebtedness. Curiously, or perhaps not, the season with more satisfactory economic and financial results was the one that had worse sporting performance, 2007/2008. This is the paradigm that made us raise interest in the theme of this research; find the justification for a SAD, in this case we have the example of SL Benfica, that does not have been successful in business but has success in sports or vice-versa, always exploring the factors behind these events and suggest measures or explain examples to achieve the success in both areas, as we will do in the following chapter. However, we can say that the SL Benfica SAD could not get together, sporting, economic and financial positive results in any of the last five years.

### 6.1.3 Sporting Clube de Braga – Futebol, SAD

The 2009/2010 season was a milestone of change in SC Braga, at all levels. The club reached a very positive sports performance as well as net profit and equity. It was found to be a success case and a positive answer to our research problem. However, it is necessary to ensure that we are not in the presence of a sporadic case. As a fact, in the two following seasons, SC Braga consolidated these sports and business results. In addition, the SAD has brought economic financial results always positive in the last three seasons, resulting from a strong increase in revenues, either through capital gains on the sale of players, stadium revenues (fees, tickets) or advertising and merchandising revenue and obviously, premiums (see figures no. 20-24), all this without dismantling the team's competitiveness and ability to achieve its sporting objectives.

### 6.1.4 Sporting Clube de Portugal – Futebol, SAD

Sporting CP is currently experiencing one of the most troubled period in its history, at all levels that are being investigated in this study. Far more serious than the problems in sports, were Sporting CP does not reach the aim of winning the Portuguese League for 11 seasons, are the economic and financial

difficulties that result in negative net results for four consecutive seasons. In addition, the creditors of the club, want to proceed to a special revitalization plan that, in accordance with the UEFA's financial fair play rules, would remove the club from the European competitions, which would be absolutely catastrophic in sporting terms. So, we can see that the Sporting CP in the last years, especially the last three, has been a true model of sports and financial failure.

## 6.2. Key measures to achieve both economic, financial and sporting success and their conclusions about the research problem

For a SAD to be economically viable and reach at the same time sports success there are a number of guiding principles that should be followed. Amaral (2012) tells us that "*managing a football club implies taking correct financial and sporting decisions over many years*" and is about six key measures that we will focus in this subchapter, being that some of them are, of course, intertwined.

### 1) Streamline the personnel costs

Streamline means making more efficient, and that is what we should focus on a SAD when focuses on its personnel costs. It stands to reason that it is not good to have a too big structure, where often the roles that employees play overlap each other. The framework should be simple and developers should be very knowledgeable and well paid, if this is in line with their productivity. Between two employees with similar skills, certainly the one that feels more motivated, better paid and an active part of the future of the institution, will be more efficient. For example, as Amaral (2012) noted, in the past 11 years, the club which won the Portuguese League was the one that paid higher wages in its structure, something that is symptomatic of what should be the practice to be applied in the management of human resources of each SAD: avoid waste with high wages of low productivity and pay well the existing talent that is always present in the decision-making process.

### 2) Supporters with the project

For better sporting, economic and financial results it is essential that everyone around the project were dedicated and focused on success. As we examine, SAD's have sports clubs as a base, so we can never forget about the supporters and especially the members.

The importance of members and supporters is massive, both in financial or emotional terms. Surely a team will play more motivated with a stadium full of support than otherwise and, certainly, that the

finances of the SAD will “appreciate” all the members and supporters contribution to the revenue increase. In this way, it is truly important to aggregate the supporters to the project. Something that is conquered with sports success. That will be an incentive to increase the revenues of merchandising or game tickets. These revenues were responsible for at least one third of operating profits of the three major Portuguese SAD’s in the last financial year.

### 3) Promotion of capital gains on the transaction of players

Generate capital gains on the transaction of players has been, in combination with the prizes from participation in European competitions, one of the most relevant revenues of the Portuguese SAD’s in the last five years. As we can see in Figure No. 20, FC Porto and SL Benfica have led in this regard. They even had a strong international relevance, transferring players to some of the best clubs in the world and getting important sums for them. Cases of Falcão (Atletico Madrid) and Hulk (Zenit St. Petersburg) both by 40 M € each, Lisandro Lopez (OL.Lyon) by 24 M € or Bruno Alves (Zenit St. Petersburg) by 22 M €, these were the higher values received in FC Porto’s case. As for SL Benfica we have the examples of Witsel (Zenit St. Petersburg), by 40 M €, Fábio Coentrão (Real Madrid) 30 M €, David Luiz (Chelsea) and Di Maria (Real Madrid) by 25 M € each, Ramires (Chelsea) by 22 M € and Javi Garcia (Man. City) by 20 M €.

As we have seen, these are impressive values for a secondary national league at European level, such as the Portuguese, which constitute a real help to the accounts of the SAD’s. Here comes the importance of buying well (cheap players, but with margin of progression), upgrade and then sell them, if possible for top clubs in order to enhance the brand and the reputation of the club.

### 4) Investment in development of players

The players upgrade attributes, when competently executed, is one of the most important measures for the sustainability of the economic and financial structure of a SAD. As we can see in the study of Reilly, Cabri & Araújo (2005: 181) “*football throws up every time to a higher level. In more recent times, it is faster, athletic, physical and tactical than once*” and so, we need to “shape” the athletes from very young to have capital gains in the future. As is easy to understand, it is also quite cheaper to boost a young player, than buying a player with 24 or 25 years to be part of that squad. This without considering the affective, emotional or psychological components of a player formed in the club. It should not be forgotten that, in case of sale of the athlete, the

capital gains will be far superior to the SAD because of the fact that the cost of acquisition was very low.

In this context, a number of measures have been taken to encourage the development of young players, as is the case for example of the recent creation and placement of “B teams” of top clubs to compete in the national championship of the 2nd League. This leads to a significant boost in the development of young athletes, who have a solid competitive basis for progress in their skills. At European level, UEFA has also entered standards in the regulation of entry of athletes in competitions that require each club to sign up at least 8 players formed in the club.

Briefly, the clubs and their SAD’s must have a structure capable of generating great talents or, alternatively, discover them quite young in appealing markets so as to avoid spending large amounts on the purchase. In this way, clubs can follow the evolution of the athletes, preparing them technical, physical and mentally to play an important role in the future of the club.

### 5) Careful selection of staff and hiring

The selection of the technical team and the signings of the players for the main football team is one of the most important sporting factors to be taken into account by a SAD when you want to succeed. The members of the technical team needs to have technical, physical, mental and tactical knowledge that was crucial to be competent. And then, they must know how to lead a team, they will have to be leaders.

As Welch (2005: 63) “*before being a leader, the success has to do with personal growth, when it becomes a leader, the success has to do with the growth of others*”. A leader, or a manager, has to know how to make others grow, overcome in the pursuit of achieving the objectives. A set of good players are unlikely to succeed if they do not work as a team, if we don’t have someone really competent to guide them. In addition, currently, according to Hughes (2010), “*it is expected that managers will have an important role in a wide range of functions in the clubs, from the recruitment and human resources, to the training and financial matters*”.

With regard to the composition of the squad, for example, we note that some of the players hired by the four SAD’s under review in the past five years pose significant damage, with regard to their cost of acquisition, earnings and productivity. It is precisely the case of Prediguer (3.5 M €), Cristian Rodriguez (7 M €), Stepanov (3.5 M €) from FC Porto; Edcarlos (2 M €), Balboa (4 M €) or Emerson (2.5 M €) in SL Benfica or Sinama-Pongolle (6 M €) on Sporting CP, just to name a few players who no longer are part of



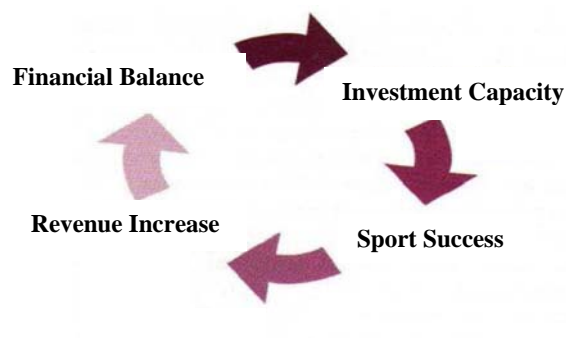
the clubs and therefore no longer have a chance to improve in them. It is precisely examples like these that we must avoid. Examples without the minimum investment return and that contrast with the good practices of capital gains on transfers of players, generated by SAD's, that wish to achieve sporting, economic and financial success.

#### 6) Raise the competitiveness of the team

Last but not least, it is essential to develop sustainable competitive teams year after year. The revenues of the main Portuguese SAD's are also very dependent on prizes from participation in European competitions and to ensure the place in these competitions is strictly indispensable to have a competitive team. For the four SAD's in study, the participation in the Champions League represents a strongly positive cash flow. However, there is no place for all and even once it is necessary to be able to compete with the top teams of the main European Leagues in order to gain even more revenues and prestige that helps to enhance the club's image all over the World.

#### In summary:

Figure No. 17 - Cycle to achieve both economic, financial and sporting success a SAD



(Source: SLB SAD Annual Report 2004/2005, pg.17)

It is simple to understand, in this phase of our project, the economic, financial and sports aspects are closely linked in a SAD. As such, we can see that a SAD financially balanced has investment capacity which, in turn, applied correctly, really increases the chances of reaching sport success, whose inherent revenues increase strengthens the financial stability of the SAD. This model certainly served as an example for what FC Porto and SC Braga have done in recent years, in what about the strategy of SAD's concerns. In this way, they were able to demonstrate that it is realistic and plausible for a sporting institution to achieve successful results in sports and, at the same time, in the economic and financial aspects.

## 7. Conclusion

At the present time, we are faced with a complex socio-economic context, where it is increasingly crucial for organizations to be extremely strict and follow a set of fundamental standards for its proper application. This context in which we live highlights, by itself, the importance of a study like this where you can demonstrate how organizations, including sport (SAD's), can not only survive, but more than that, have success.

We started the project with the definition of objectives to be achieved. The main one is to understand if it is possible to achieve sporting, economical and financial success together. Then have a process of assimilation of essential concepts in the review of literature, so we could have a solid basis for the development of research, such as: SAD, sports success or balanced financial structure. After that, we looked at the Annual Reports of the SAD's and respective sports scores, to analyze the economic, financial and sporting activity, which translated in the following conclusions:

In accordance with a number of basic criteria in the management of SAD's, it is possible to achieve success in the three fields mentioned above. Taking as an example, the strategy followed by the FC Porto and SC Braga SAD's. In particular due to the establishment of competitive football teams, able to get positive sports performances and financial return, for example through the prizes for performances in competitions where they participated, or development of players who subsequently generate more capital gains when they are sold, citing only two examples of the most significant revenue.

Following this conclusion, we were able to achieve all the objectives set for this project that were: in addition to the answer to the question of research, by understanding what is a SAD and how it operates in the market, as well as interpret clearly and concisely the accounts published by those. It was also relevant to analyze the sports scores of clubs and confront them with their budgets, in order to clearly define a balanced financial structure. It was also necessary to investigate what are the objectives of sports clubs to be able to assess their sporting performance and, finally, we have proposed solutions and measures to be taken for a SAD if it wants to be sustainable and to provide, at the same time, positive sports results.

### 7.1. Clues to further research

As clues to further research within the framework of the study that we developed, we can suggest the implementation of a study, covering not only the main national sports organizations, but also in an international horizon, which would take the

application of the Simple Linear regression model. So we would have the possibility to have a broader perspective on the reality of professional football in Portugal and abroad, under the sporting, economical and financial perspectives.

In another point of view, could be an expansion of the investigation to other kind of sports. In this way, it would be possible to have a broader view on the possibility of joint existence of economic, financial and sporting success in the sport in Portugal.

Another aspect that would be attractive to address, as a complement to this analysis, would be the ability to investigate and study scientifically, through the Multiple Linear regression model, all factors that influence sporting results achieved by SAD's, checking the existence of correlations between these variables in order to find statistically descriptive factors for the sporting results achieved.

Finally, we also suggest a research project idea that relates the sporting success of the Portuguese teams in international competitions with the "Portugal Brand". And, in addition, to understand how it could contribute to a further increase in exports, in order to help in obtaining *superavits* on balance of payments, an essential factor for the reduction of the foreign debt of Portugal.

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**c) The form used for the calculation of economic and financial indicators:**

Ongoing Capital = Non-Current Liabilities + Equity

Working capital = Ongoing Capital - Fixed Assets

Cyclical Requirements = Clients + Inventories

Cyclical Resources = Suppliers + State

Working Capital requirements = Cyclical Requirements - Cyclical Resources

Treasury = Working Capital - Working Capital Requirements

Return on Equity = Net results / Equity

Economic asset = Fixed assets + Working capital requirements

Return on Economic asset = operating results / Economic Asset

Solvency = Equity / Liabilities

Financial Autonomy = Equity / Assets

**d) Tables concerning revenues from four SAD's in analysis:**

**9. Attachments**

- a) Table showing the evolution of the number of federated athletes per year in total:

Figure No. 18 - Total number of practitioners

NÚMERO TOTAL DE PRACTICANTES, POR FEDERAÇÃO DESPORTIVA (1996-2011)																
Associação	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
TOTAL	25404	25477	26883	26584	26721	25426	25289	25774	40151	42451	44966	44809	48209	51258	51683	52942

(Source: Pordata)

- b) Table showing the evolution of the number of federated athletes per year in soccer:

Figure No. 19 - Total number of practitioners (football)

NÚMERO TOTAL DE PRACTICANTES, POR FEDERAÇÃO DESPORTIVA (1996-2011)																
Federações	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Futebol	95746	97252	106051	110822	113895	115283	120053	128471	133511	131835	133360	136387	141958	144106	148106	151572

(Source: Pordata)

Figure No. 20 – Capital Gains Resulting from the Sale of Sporting Rights of Players (in Millions €)

Capital Gains Resulting from the Sale of Sporting Rights of Players (in Millions €)						
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	
FC Porto	38,6	40	35,3	31,8	29,1	
SL Benfica	13,7	7	25,6	37,1	30,6	
SC Braga		3,5	8,8	-0,8	13,7	
Sporting CP	2,4	-0,5	0,3	18,1	5,6	

(Fonte: Amaral, D. 2012. *Porque é que o fc porto é campeão e o benfica só ganha taças da liga?*)

Figure No. 21 – Direct Revenues from the Stadium (in Millions €)

Direct Revenues from the Stadium (in Millions €)					
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
FC Porto	14,5	15,4	12,3	11,6	11,6
SL Benfica	18,2	16,6	29,8	32,4	31,8
SC Braga			5	6,3	5,3
Sporting CP	16,4	14,6	12,8	10,6	11,4

(Fonte: Amaral, D. 2012. *Porque é que o fc porto é campeão e o benfica só ganha taças da liga?*)

Figure No. 22 - Revenues from UEFA (in Millions €)

Revenues from UEFA (in Millions €)					
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
FC Porto	11,6	16,2	11,6	18,3	14,1
SL Benfica	7,8	0,3	2,9	13,9	22,4
SC Braga			0,2	18,7	4,1
Sporting CP	7,2	10	3,9	2	3,3

(Fonte: Amaral, D. 2012. *Porque é que o fc porto é campeão e o benfica só ganha taças da liga?*)

Figure No. 23- Advertising and Merchandising Revenues (in Millions €)

Advertising and Merchandising Revenues (in Millions €)					
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
FC Porto	9,1	11,1	10,4	11,2	16,4
SL Benfica	12,1	14,2	17,4	17,3	20,4
SC Braga			3,8	4,5	4,2
Sporting CP	7,2	6,1	6,5	8,7	8,9

(Fonte: Amaral, D. 2012. *Porque é que o fc porto é campeão e o benfica só ganha taças da liga?*)

Figure No. 24- Television Rights (in Millions €)

Television Rights (in Millions €)					
	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012
FC Porto	7,1	8,3	8,4	11,4	12,3
SL Benfica	8,4	10	8,8	8,4	8,4
SC Braga			4,7	3,1	3,2
Sporting CP	11,2	10,7	9,6	11,1	12,5

(Fonte: Amaral, D. 2012. *Porque é que o fc porto é campeão e o benfica só ganha taças da liga?*)

# Small Tea Cultivation in the Process of Self-Employment: A study on the Indigenous people of Assam (India)

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**Abstract** - The tea industry of India has had a long trip since the 18<sup>th</sup> century. In spite of having a strong base as manufactured product, it allows a bigger gain for the country as agricultural output. Among the tea producing states of India, Assam is well known internationally since a long time ago. The state dominates the country's tea map by producing almost half (50 per cent) of the total tea production. In the recent years, Indian tea industry has witnessed many structural changes such as the replacement of small tea plantations by large plantation, the emergence of Bought Leaf Factories (BLFs), for example. Cultivation of tea on smallholding has gained considerable momentum amongst the youth. Being a labour intensive industry, it is the source of employment for the Assam's indigenous people. It has the potentiality for making a positive economic impact ensuring new employment opportunities, proper utilisation of local resources and as a source of revenue. It is estimated that there are nearly 90,000 Small Tea Growers (STGs) in Assam creating employment for around 1.5 lakh people apart from producing innumerable rural entrepreneurs with the potentiality of transforming the socio economic condition of rural Assam. This paper highlights the prospects of small tea cultivation as a source of self-employment in Assam.

**Key Words:** BLFs, Employment, Entrepreneurs, STGs.

## 1. Introduction

Tea is the ancient beverage and the most popular drink in the world. The tea industry of India is one of the oldest and perhaps the most efficiently organized agricultural enterprises in India (Borborah & Gogoi, 2007). In India, tea has grown in an area of 5.10 lakh<sup>1</sup> hectares producing 23 per cent of the global tea production (in 2010). Since the introduction of tea in India (in 1823), the industry has contributed immensely towards the socio-economic development

<sup>1</sup> A lakh is a unit in the South Asian numbering system equal to one hundred thousand (100,000).

of the tea growing regions. Indian has sixteen tea growing states, of which Assam, West Bengal, TamilNadu and Kerala account for about 95 per cent of the country's total tea production. Among these states, Assam produces almost 50 per cent (480.286 million kg) of the total production (966.403 million kg) of India (TBI, 2010).

**Table 1:** Production of Tea in India (million kg)

Year	Small Growers (Area up to 10.12 hectares)	Big Plantation (Area above 10.12 hectares)	Total Production
2007	257.46	728.97	986.43
2008	257.46	723.36	980.82

Source: Tea Board of India

According to NABARD, Tea is a big agricultural enterprise also having some characteristics of industry. It involves both agricultural (cultivation, menuring, irrigation etc.) and industrial operations (processing and manufacturing). The production of tea in India takes place in both large plantation and small gardens. Small Tea Growers (STGs) are defined, as a person or group having plantation area up to 10.12 hectares (TBI). In Assam there are 3767 registered STGs (Statistical Handbook, 2009), where as the actual number is estimated to be 90,000 (approx). According to All Assam Small Tea Growers Association, the STGs contribute with 29 per cent of the state's total tea production and with 14 per cent of country's overall production.

## 2. Statement of the Problem

Tea industry may be directly responsible for the economic development of a country, and it surely is in a country like India. It is a revenue generator as well as employment provider to large number of people both directly and indirectly.

In many empirical researches, it has been observed that small-scale tea cultivation was widely recognized as an integral part of economic development for many countries in the world. This is true for Japan, Sri Lanka, Singapore or other developed or developing countries. Also in Assam, tea cultivation has immense potential for both employment and income generation. It can be a lucrative business venture and can play an important role in improving socio-economic condition of the rural people of Assam. The advent of STGs represents a new development for the tea industry of Assam; most of these people are young educated and unemployed youth taking tea cultivation as their profession. However, the young growers are facing many problems related to the availability of finance, low price of green leaf, processing of leaves etc. Hence, considering the above aspects, following objectives will be highlighted in this paper:

1. To identify prospects of tea plantation in smallholding in the process of self-employment in Assam.
2. To identify the constraints faced by the existing STGs of Assam.

### 3. Small Tea Plantation

Traditionally tea is best known as plantation crop. Tea plantation is often called tea estates/gardens. Plantation comprises a large area, producing a single agricultural product as a commercial venture. This model (plantation) was introduced in India during the colonial period by the planters (mostly from UK) and until 1950's it was thought to be the only way to produce tea on commercial basis where cultivation as well as processing were done by the planters.

#### 3.1 Emergence of Small Tea Cultivation

The concept of small tea cultivation came into existence when Kenya (1950's) had decided to produce tea for export. The experiment taken by Kenya (1950's) succeeded and a modern trend of small tea holders or growers arose in developing and developed countries to produce cash crop like tea. Since then there has been a steady shift in tea cultivation from big plantation to small holdings (CDPA, 2008). Today in most of the tea producing

countries like Indonesia, Kenya, Bangladesh, Nepal, Sri Lanka, or Vietnam small tea cultivation significantly contributes to the country's total tea production along with the large estates. In many ways tea cultivation is very attractive – as tea provides long and sustainable income for a long period with comparatively less investment, moreover it uses unutilised and underutilised lands, gives long time employment opportunities etc.

#### 3.2 Small Tea Growers (STGs) in India

The emergence of STGs is a recent concept in India. Most of the suitable land for tea plantation was already occupied by the large tea plantation (Hannan, 2008). Tea cultivation on small holding was initiated (1930's) beyond the traditional tracts of cultivation in Nilgiris of Tamil Nadu (Chai Time, 2007). It was only in the late 1980's or early 1990's that the cultivation spread to the other tea producing states of India like Assam and West Bengal. The Tea board of India (TBI) formally adopted the concept of STGs during the eight five year plan (Hannan, 2008). In recent years non traditional tea cultivating states like Arunachal Pradesh, Nagaland, Meghalaya, Sikkim have also taken some efforts to introduce tea gardens in these regions (Saikia, 2011).

As per the membership of various small tea growers association in different states the number of small holders currently stands at 126256 (TBI, 2006) and producing nearly 35 per cent of total tea production of the country. The number of STGs has registered stupendous growth particularly in Tamil Nadu. Around 53.9 per cent STGs are concentrated in South India. Out of the total tea produced by the STGs, the North India posses the highest share (54 per cent).

**Table 2:** Distribution of Small Tea Growers in India

State	Number of STGs	Area(in ha)
Assam	42,492	41,249
West Bengal	8,398	9,500
Tamil Nadu	61,985	43,157
Kerala	5,999	4,810
Other states	7,382	8,032
Total	126,256	106,748

Source: Tea Board of India, 2005 Kolkata

### 3.3 Small Tea Growers (STGs) of Assam

Though the tea industry of Assam is more than 180 years old, the concept of tea cultivation on smallholding is comparatively recent development. Earlier tea cultivation was colonial in nature without the involvement of local/native people. This was limited within the influential classes and not permissible to common people (Gogoi, 2011).

The situation was also the same after the independence (when British free India); the indigenous people of Assam were deprived from this outstanding entrepreneurship because of some legislation (Saikia, 2008). Finally, in the year 1978, the Government of India as well as the Government of Assam allowed the local people to cultivate tea on small holdings, abolishing all the barriers. These growers have taken the advantages of congenial weather for tea cultivation, available suitable land and other infrastructural facilities that were readily available in Assam. So far as the published data, the first commercial tea plantation in a small plot of land was started in Golaghat district of Assam during 1978.

According to a survey by the State Government (Assam) and tea Board of India, the major concentration of STGs is found in upper Assam districts like Tinsukia, Dibrugarh, Sivsagar, Golaghat and Jorhat. It has been found that there are 68,465 STGs in Assam and nearly 5 lakh families are associated with this phenomenon.

**Table 3:** Growth rate of STGs in Assam

District/year	1993	1998	2003	2007
Tinsukia	528	2153	8438	15561
Dibrugarh	1635	5856	11625	16972
Sivsagar	1005	2232	4258	12436
Jorhat	639	2502	5150	4962
Golaghat	837	1881	4774	11392
Other	134	1023	4148	4144
Total Assam	4778	15647	38393	65466

Source: All Assam Small Tea Growers Association

In Assam, tea cultivation occupies nearly 2.4 lakh hectares, out of which 56871 hectares (23 per cent) are occupied by STGs (2003).

## 4. Prospects of Cultivation of Tea on Smallholding (in Assam)

Small tea cultivation is one of the most significant developments towards the end of last century. There are various reasons for the phenomenal growth in the number of STGs. These tea growers have shared the benefits of favourable soil and climate, readymade infrastructures like technology, labour, market, government support etc. for cultivating tea. More over farmers have opted for tea because it has limited risk for the factors like crop failure, climate change, dearth of market etc. As Assam is a traditional player in tea plantation (Taporita, 2011).

### 4.1 Strength of Small Tea Cultivation

#### 4.1.1 Scope for entrepreneurship

Cultivation of tea in small scale is said to be the outcome of the entrepreneurial ability of a group of local youth in the latter part of 1970's (Goswami, 2006). The private initiatives taken up by small tea growers shall cultivate the spirit of entrepreneurship. Encouraging the youths in taking up small/ medium level tea cultivation would strengthen the backbone of the rural economy as well as curb social unrest in the economy (Barker, 2007). Tea growing in any scale either big or small is an enterprise, since it encompasses all elements required for an enterprise viz. Land labour, capital and organization.

#### 4.1.2 Source of Income and employment to the rural mass

Small tea cultivation provides ample avenue for self-employment for the rural educated unemployed youths besides engaging family labours (Baruah, 2007). The cultivation itself creates many employment opportunities in the field of manufacturing, supply of garden implements, transportation of green leaf and retailed outlets of agro chemical and manures etc. Today, the rural unemployment has almost ended in most of the upper Assam district as tea cultivation on small holding gave the people avenue to earn livelihood. In the last 25 years, around 65000 small tea gardens are established by the local people. In every garden, 1or 2 people are self-employed and 4 or 5 people are employed by the grower in their garden and other related activities (Saikia, 2008).

Other than the unemployed youths many ex-tea garden employees, service personnel's and government employees also taken up small tea cultivation because of their personal satisfaction and as a source of steady income in future.

#### 4.1.3 *Incentives provided by the Tea Board of India*

A registered grower is eligible for the benefits given by the TBI. For an individual grower the benefits are:

- Subsidised loan for plantation of tea
- Price subsidy if the price of green leaf falls below a certain level
- Free training etc.

For STGs society

- Subsidies in purchasing transport vehicle
- Setting up leaf collection shed
- Supply of input as fertilizer, plant protection chemical, sprayer, pruning etc.

#### 4.1.4 *Utilization of land*

Most of the land used by the STGs may be considered as second grade land for growing tea. Some of them grow tea in ceiling surplus land, waste land, grazing land or government lands which were either underutilized or unutilized. The STGs of Assam has successfully utilized 20 million hectare waste land (Khanikar, 2006).

#### 4.1.5 *Establishment of Bought Leaf Factory (BLF)*

BLF is an arrangement to manufacture tea bought from only STGs within a tea cluster. It is a welcoming feature as it creates the marketing point for green leaf produced by the STGs. There are 220 BLFs (2009 statistics) which produces 130 million kg of tea that accounts for 25 per cent of the total tea production of Assam.

The urbanized outlook of tea cultivation, the glamour associated with it, the living standard of the managers of the big tea gardens and facilities enjoyed by them, attracted the new generation of Assam towards tea cultivation. Hence, the cultivation of tea on small holding is the green revolution of Assam which empowering many people for the first time and rejuvenating the state's economy. These growers dot the landscape as more and more people of rural Assam turn their backyard into mini plantation.

#### 4.1.6 *Major constraints of small tea plantations*

Presently going through different reports and Small Tea Growers Association views, this sector is facing some internal and external hurdles.

- **Low Price of green Leaf**

In present scenario, the most important problem of the STGs of Assam is the absence of fair price for the green leaves produced by the growers. The STGs do not possess their own processing unit; and have to sell their produce to the big estates or BLFs where price is entirely decided by the BLF or big grower. More over tea is a perishable product therefore the STGs compel to take the price whatever offer by the factory owners.

- **Land ownership problems**

Most of the growers are growing tea in government lands, ceiling lands without any valid land right in Assam. The land Act of Assam restricts the transfer of ownership right to the tea growers. It is a great concern for the small tea growers of Assam. It may be mentioned that Indian states like Arunachal Pradesh, Tamil Nadu were given the right for settlement of land.

- **Financial Problems**

Whatever growth the small tea cultivation has, it entirely depends upon private initiative of individual growers. Institutional finance to this sector is very less (2 per cent only). This problem is due to lack of ownership of land, non-registration of tea gardens etc. Lack of these documents, the institutional finance and help from Tea Board of India are not enjoyed by the small tea growers, which hinder the growth of this sector.

- **Marketing of Green Leaf**

Green leaf is a perishable product which needs to be processed within twelve hours of plucking. In the absence of proper marketing channel of green leaf, the small tea sector has to depend on the buyers, like big tea garden owners, BLFs, etc. Recently, some agents are coming as new intermediary between tea growers and factory owners. Lack of market information, absence of proper storage facilities, transportation problem etc. ultimately bring down the price of green leaf.

- **Lack of Technical Knowhow of the Growers**

It is found that most of the small tea growers are not technically sound or lack of proper knowledge in the field of tea cultivation. These unskilled cultivators are facing problem in certain areas like- pest management, manuring, drainage etc. that is most essential knowledge for the growth and development of this sector.

- **Lack of Co-ordination between Producer and the Buyers of Green Leaf**

As small tea growers are scattered and the amount of production also heterogeneous in quality. It becomes very difficult to set up a common price for the produce of small tea gardens.

- **Taxes**

In Assam, instead of supporting the growth of small tea growers, (which has been taken up by the new generation local Assamese people), instead of rewarding them, the small growers have been asked to pay additional 20 paisa per kilogram of leaf as green leaf cess; though an existing land cess of Rs 22 per bighas is there. Other than, this they have to pay a fine of Rs 200 per bighas if they put the tea under government fellow land.

- **Unregulated Growth of Small Tea Growers**

Unregulated growth of this sector in Assam has given rise the problem of price fluctuation of green leaf in the market. Without going through the marketing and economic holding etc. many small tea growers started cultivation of tea in the remote areas of Assam; which ultimately leads to the uneven development of this sector.

## 5. Policy Recommendations

The small tea growers of Assam are a major economic force within the tea industry. From the above discussion, it is clear that this industry may rebuild the socio-economic structure of the indigenous people. The problems which are highlighted like land ownership problem; can be shorted out by the Government taking example from other states like Arunachal Pradesh, Tamil Nadu, West Bengal etc. The only thing needed here is the sincere effort from the Government side and look this small tea gardens a new development initiative for the state.

- If we can solve the land ownership problem in Assam, we can also minimize the problem of finance to some extent of this sector; which is one of the most important factors for the growth of an industry. The institutional finance and financial assistance from Tea Board of India is totally based on land ownership of the cultivator in Assam.
- In case of marketing, the All Assam Small Tea Growers Association (AASTGA) can

set up co-operative form of cultivation and a standard for production of green leaf and their price before every tea-growing season. For proper price, Government can come to rescue the small tea grower with a minimum support price concept, which is applicable with other agricultural products.

- Looking into the technical problems of the small tea growers, the Tea Board of India, Tea Research Authority and corporate tea producers should take the responsibility to train different aspect of tea cultivation to the small tea growers. This will improve the technical knowhow of the cultivators.
- To restrict the unregulated growth of small tea gardens, Tea Board of India or the Government of India should set up a regulatory authority to look into the matter to restrict the uneven growth of this sector. In a liberal economy, a regulator is must for the proper development of a particular sector, who will guide the development process.

## 6. Conclusion

The private initiatives taken up by small tea growers shall cultivate the spirit of entrepreneurship in Assam it is very important for the development of the state. Entrepreneurs are the backbone of a nation. Establishment of small units of production would provide youth of the state their fruitful opportunities for self expression and increasing their material wellbeing. In Assam younger generation feel frustrated because they do not have assurance that their education and other skill and talent would be fully utilized. Therefore encouraging these youths in taking up small/ medium level tea cultivation would strengthen the backbone of the rural economy and will also curb social unrest in the economy. This first generation entrepreneur will be the role model for the next generation. Economic benefits from the tea industry enjoyed by the British before independence and people from outside the state (Assam) after independence. Native people did not get their due share from the development of tea industry. Tea industry of Assam can be termed as oasis in a desert. The first generation cultivators who have taken up commercial cropping of tea are a radical step towards a new social system in Assam. This will empower the people of Assam with dignity. This silent economic revolution by small tea growers in the rural areas across Assam has helped to tackle unemployment problem apart from using unproductive land in an environment friendly manner. There for support

should come from every quarter to sustain this socio economic revolution.

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# A New Innovative Model Using RFID: A System Design and Its Implementation

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**Abstract** – In this study an innovative RFID model is presented. This is a very innovative concept, pursuing a new way of looking at current systems as well as their potential. This model includes the necessary equipment, includes also the current systems and the different business areas in which the company operates. The aim of this study is to bring together the existing processes and technologies, providing a different solution, organizing a different way of operating and offering a more efficient approach. The aim is also, by offering certain products and services, to become part of a project embraced by a company, with an interest in developing it given that it has the capacity for its implementation. In this particular case an essay of the network model was presented to Brisa Inovação e Tecnologia, MARL - Mercado Abastecedor da Região de Lisboa and Frigoservice. This model can be applied to individuals or to the services they may need, such as the anticipation of compact traffic on a lane, thanks to the real-time information of passage speeds in certain frames. Is also shown in this study the equipment that permits the model that is presented to become possible (the OBUi equipment).

**Keywords** - Networks, interoperability, processes, technology, RFID, OBUi

## 1. Introduction

This work was developed from the idea of trying to find union points between a set of existing technologies, already implemented and in current use by the Portuguese company Brisa Auto Estradas de Portugal, SA for toll collection (as the Via Verde Portuguese Electronic Toll Collection system), and a set of processes nowadays more and more used by Logistics.

The activity of the company Brisa Inovação aims to ensure the skills and activities related to research, design, development, production, installation, support

and maintenance of all the equipments, systems and intelligent transportation services that support the operation and exploitation of motorways. For this new project, the company intended to compile the necessary elements to enable the design of a new innovative RFID model, which main objective would be to determine which services are actually required by the logistic operators, and how to link them to the technologies used by the company for its actual core business of Electronic Toll Collection (ETC) based on 5.8GHz DSRC (Dedicated Short Range Communication) technology.

Presently there is a new scenario in Portugal concerning toll collection. There is the disappearance of roads previously without direct cost for the user (and without toll) called SCUT, and now there is also the appearance of a new equipment to be installed on board vehicles for toll payment purposes called DE (electronic device), commonly known as OBU (On Board Unit). Consequently there is now a new competitor in this area. Brisa has no longer the monopoly of this kind of technology in the market in Portugal.

Moreover, at the wider level of the European region there are also important changes, as a reflex of the White Paper of Goteborg signed in 2001 (COM, 2001), and mostly because of the European Commission's Directive known as Eurovignette (Viegas, 2005; Borgnolo and Rothengatter 2005; Nash and Matthews, 2005). This new environment came to accelerate the implementation of several changes, which will largely affect all the motorway concessionaires in the UE, and also their toll collection systems.

The White Paper concerning Transport European Politics (COM, 2001) contains clear objectives on security and road traffic flow which, in conjunction with the growing mobility of people and goods using roads in the European Union space, makes essential

to safeguard the transport infrastructure's quality, as well as the effectiveness of the means used. This warranty is increasingly dependent on the use of toll schemes and the progressive generalization of electronic systems for its collection.

The Portuguese Law number 60/2008, published in September 16th 2008, authorizes the Government to legislate on the mandatory installation of a license plate electronic device in all vehicles authorized to circulate on the high-ways or similar roads.

Therefore, there is a business opportunity for the companies that possess more know-how and means in respect to these toll systems, as it is the case of Brisa. Anyway, considering precisely these systems (i.e. identification and electronic tolls), it can be said that they are mandatory, either in terms of recent Portuguese laws (DL n. ° 111/2011 and 112/2009, Portarias n. ° 314-B/2010 e 1033-C/2010) or in terms of the Eurovignette Directive in UE (European Parliament and Council of the UE, 2006). These systems are exactly the ones used by the company Via Verde (held by the Brisa holding), which has the control of these systems in Portugal, covering all the existing motorway concessionaires (and not just the concessionaire Brisa, the company which owns Via Verde).

The main objective of this work is to obtain a new set of processes and collaborative networks through the existing technologies that by themselves can not evolve in the same way. To achieve this central objective, a new model is built.

The mentioned model is an innovative model that can be applied to any company that already uses RFID technology. It allows, with a minimal investment, to take advantage of this technology and to let companies become more competitive. On this particular case, considering this project, the model was presented to the companies Brisa Inovação e Tecnologia, MARL – Mercado Abastecedor da Região de Lisboa and Frigoservice. All the involved companies play an important role either in the installation or in the advice on the use of leading technologies. Moreover this role is important where interoperability is a strategic advantage for all the entities involved.

After this introduction, a review follows of relevant literature about collaborative networks, interoperability and decision analysis. Afterwards, the methodology used will be explained and finally,

just before the final notes, the new innovative RFID model will be presented.

## 2. Literature Review

### 2.1. Collaborative Networks and Interoperability

Over the last decades there was a huge technological evolution at all levels, but a big concern exists now: the problem with interoperability. Nowadays we have a gap between processes and technologies (figure 1).

Simultaneously - and trying to make the connection between them - countless systems of Organizations Systems Information (OSI) were born and are trying to subsist. Due to the high pace of technological changes and process needs they subsist (but for short periods), and in the end they are like "small islands" in this immense "ocean" that is the referred gap (figure 1).



**Figure 1.** Gap between processes and technologies

These information systems are also known as subsystems (automation islands).

According to Osório et al. (2010), collaborative networks are essential for the modern and future design in order that technological platforms could be supported by the leverage of numerous disconnected processes and because of a more and more disordered and not integrated technological growth evolution that often gets eventually lost. And consequently so is the platform that could have assimilated it.

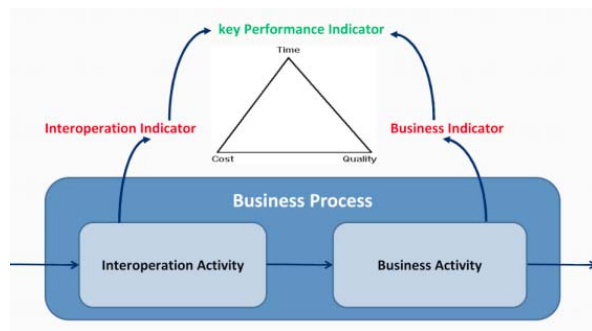
Interoperability is the ability of two or more systems or components to exchange information and to use the shared information without having to make any considerable effort on any one of the systems.

While the business activities are those that create value in the business process, the interoperation activities are non-added value activities. They represent the efforts of interoperability in the information exchange among the different partners.

Despite this, recent studies (Osório et al., 2010; Camara et al., 2010; Ertico ITS, 2008) show that it is possible not only to apply a methodology for the

analysis of interoperability, but also that interoperability can be represented and measured.

Camara *et al.*, 2010 developed an evaluation framework, which permits to quantify interoperability, providing an estimation of the improvement in the performance of a particular process and permitting to understand the benefits to be expected in consequence of the achievement of objectives. The study proposes a framework and methodology for assessing the impact of interoperability in a supply chain. The result is an excellent contribution to the defense and affirmation of the collaborative network, showing that the use of business process models can serve not only to situate the activities of inter-operation and interoperability barriers, but also to measure their own interoperability (figure 2).



**Figure 2.** Interoperability representation and measurement (Camara *et al.*, 2010)

According to Capó-Vicedo *et al.* (2011), Askarany *et al.* (2010), Bayraktar *et al.* (2008) and Bonfill *et al.* (2008) an effective Supply Chain Management (SCM) implies:

- Efficient integration of suppliers, manufacturers, warehouses, and stores.
- To reduce cost, increase service level, reduce the bullwhip effect, make better use of resources, and effectively respond to changes in the market place (Sucky, 2009; Bayraktar *et al.*, 2008).

It is critical to implement effective distribution strategies, regardless of the total level of supply chain integration (Parment, 2008; Chopra, 2003).

There are two main Distribution Strategies:

- **Direct Shipment:** items can be directly shipped from the supplier or manufacturer to the retail stores or end customer

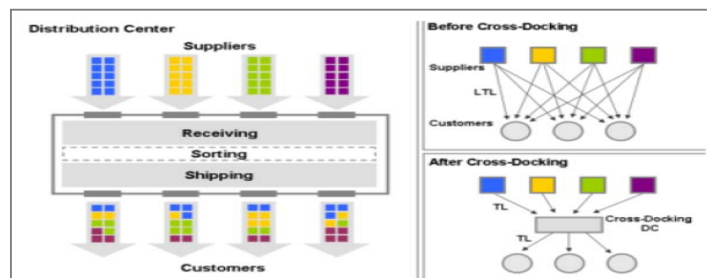
- **Intermediate Inventory:** it uses intermediate inventory storage points, Warehouses or Distribution Centers (DC)

In accordance with Alpan *et al.* (2011), Tang and Yan (2010) and Egbelu and Yu (2008) Cross Docking (CD) avoids inventory and maintenance costs, and was initially popularized by Wal-Mart. CD choice implies a significant start-up investment and is very difficult to manage (Ma *et al.*, 2011). For that reason, Supply Chain partners must be linked with advanced information systems for coordination, and a fast and responsive transportation system is necessary (Arabani *et al.*, 2011; Boysen and Flidner, 2010; Vis and Roodbergen, 2008), in order to achieve that:

Warehouses function as inventory coordination points rather than as inventory storage points

- Goods arriving at warehouses from the manufacturer:
  - are transferred to vehicles serving the retailers
  - are delivered to the retailers as rapidly as possible
- Goods spend very little time in storage at the warehouse:
  - Often less than 12 hours
  - Limits inventory costs and decreases lead times

This allows them to ship goods from warehouses to stores in less than 48 hours and to replenish stores twice a week on average. In figure 3 we can see the main scheme of a Cross Docking (CD) system, and also the difference when the CD does not exist.



**Figure 3.** Cross-Docking Scheme (courtesy of Relvas, S., 2010, DEG - IST)

According to Ubeda *et al.* (2011) and Xuezhong *et al.* (2011), here are some flash images on Green Logistics, concerning the subject of this project:

- 25% of trucks km in EU countries run empty, rising up to 37% in Ireland (Eurostat, 2007)
- In the UK food supply chain, only about 52% of the available space in laden trips (trips with load) is actually occupied by a load
- Horizontal Integration ==> Backhauling ==> Can achieve 20-40% savings in transportation costs

The evolution of Intermodal Combinations (Ishfaq and Sox, 2010; Macharis *et al.*, 2010; Ricci and Black, 2005), in particular the case of Piggyback (TOFC/COFC), and also third parties (Jayaram and Tan, 2010; Carbone and Stone, 2005; Ying and Dayong, 2005), will be surely relevant in the medium and long term basis:

- Intermodal Marketing Companies act like shippers' associations or cooperatives
- Third-party Logistics Service Providers:
  - Sector with high growth ratio in the EU
  - Advantages: management of information by the 3PL, freeing the company from day-to-day contact with carriers
  - Main activities are freight payment and dedicated contract carriage

### 3. Methodology

#### 3.1 DSRC and CN/GNSS Technologies

This study will be confined to the recovery technologies that fit into the context of use on vehicles, particularly in the collection of tolls in motorways and roads, on accessing venues that require payment of fees (e.g. parking lots), and of all / any service forming a working scheme requiring identification or requiring that vehicles pay for its use, as in the case of purchasing products at a petrol station or convenience store, for instance.

The first step in identifying technologies for charging is to determine the functional requirements, and the second is to translate them into technological options.

There are three main approaches for charging, each comprising a cluster of the technology, considering the following building blocks: DSRC, CN/GNSS and ANPR. DSRC and GPS have evolved in parallel from very different origins, and both were conceived as tangible technology in the mid 1970's. Both went through several generations, both are available in mass-market products, and both are well supported

by an internationally competitive industry. But they perform completely different functions (communications and positioning, respectively).

The importance of usage is directly related to the business case. To use the highest is "better", with greater degrees of automation in order to capture the benefits of economies of scale and a reduction in transaction costs (figure 4).

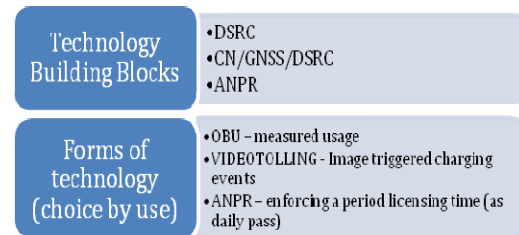


Figure 4. Technologies (availability and/or need)

A scheme designer, making decisions on charging technology choices, will also need to consider the degree of automation, influenced by several factors, including the numbers of charging events, vehicles and accounts, as can be seen in figure 5.

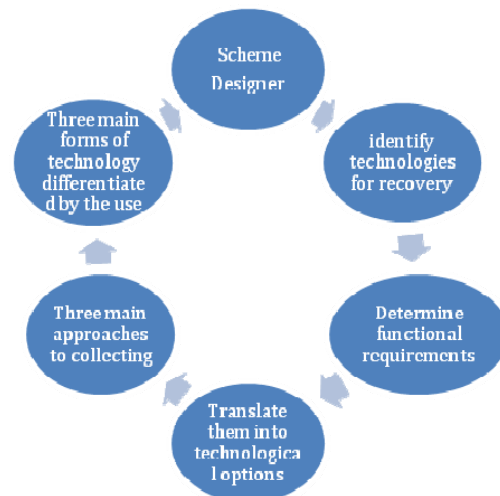
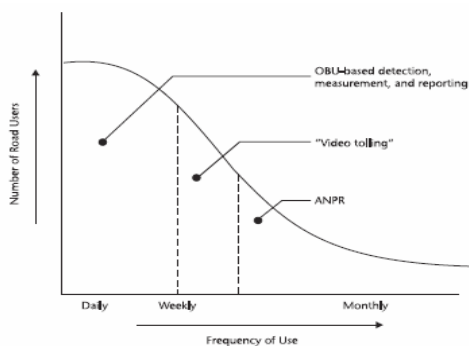


Figure 5. Relationship of functional requirements identification and choice of technology

Figure 6 shows the relationship between three technology forms, differentiated by usage:



**Figure 6.** Technology choice and usage (Persad *et al.*, 2007)

### 3.2 MCDA – Multicriteria Decision Analysis

In accordance with Sanchez and Bana, (2009), Bana Consulting (2005) and Lourenço (2002), there are several kind of decision analysis multicriteria models, that can be split in two large groups: the compensatory and the non compensatory.

From all these models, because of being probably the most widely used of all multicriteria models, stands out a compensatory model: the simple aggregation additive model.

For this work is considered the hierarchic additive model in order to obtain some of its parameters – criteria weight coefficients – that would help us in the decisions on choosing what services are best fit to purpose.

The MCDA recommended methodology (Sanchez and Bana, 2009) was followed, with the following steps:

1. Decision context analysis and decision support process organization
2. Organization of evaluation elements
3. Development of evaluation multicriteria model
4. Sensitivity and robustness analysis, and preparation of recommendations

## 4. Technological Development

### 4.1 DSRC – Dedicated Short Range Communications

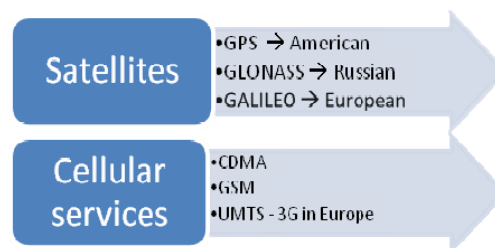
According to Jaber *et al.* (2011), Rezaei *et al.* (2010), Coronado *et al.* (2009) and Kim and Kang (2004) DSRC is a localized, bidirectional, high-data-rate channel that is established between a fixed roadside system and a mobile device installed inside a vehicle. The most widely used frequency bands for DSRC are

902 to 928 MHz (mainly in North America); 5.8 GHz (mainly in Europe, South America and Southeast Asia) or 5.9 GHz, depending on locally applicable standards; plus infrared frequencies (mainly in Southeast Asia).

The most common applications of DSRC are ETC at toll plazas Lee *et al.* (2008) and localized communications for enforcement as part of GNSS solutions (e.g. German truck tolling scheme), Doll and Link (2007).

### 4.2 CN/GNSS – Cellular Networks/Global Navigation Satellite System

As Fernández (2010), Urschl *et al.* (2007) and Dow *et al.* (2007) presented in their papers, GNSS technology within an OBU estimates position by combining measurements of signals from a constellation of orbiting satellites, typically GPS or GLONASS. CN refers to the bidirectional communication between an OBU and a fixed network of terrestrial transmitters, usually commercial cellular devices (figure 7). The positioning function needs to be specified, and the reporting strategy also needs to consider that cellular network coverage is not always possible. Alternative methods of reporting may need to be considered.



**Figure 7.** Satellites (GNSS) and Cellular Networks (CN) in a CN/GNSS system

### 4.3 ANPR – Automatic Number Plate Recognition

The dataset used in our empirical analysis consists of seven daily stock price series representing the G7 countries: US, Canada, Japan, UK, Germany, According to De Palma and Lindsey (2011) the ANPR - Automatic Number Plate Recognition, is the only one of three technologies mentioned in the building blocks that do not need any equipment or device installed inside or outside the vehicle. For this reason, it is most suitable for occasional users.

In its evolution, this technology, which took the first steps in the eighties, has undergone several changes in its type of use. In the 80's of the twentieth century



it was used to control access for closed user groups. In the 90's, it was used as support to enforcement procedures of manually paid parking. And since entering this millennium, its use has been wider, both with ANPR cameras to match vehicles with their OBUS and to be used in the enforcement of urban charging schemes (e.g. London Congestion Charging).

#### 4.4 A New Innovative RFID Model: System Design and Implementation

An innovative RFID model is presented in this work. It allows seeing the mode of operation of the actual RFID models applied to Logistics, with new assumptions. Instead of using RFID tags in all products, then in boxes, and in pallets, and also in containers...and to have a set of expensive readers spread at all steps we need to take, first inside factories, then in supply chain warehouses, followed by the loading docks, and again, until the final installations: hypermarkets and stores, all of this makes this process too complex and too expensive.

Instead of all of the above mentioned, the new model proposes to take advantage of a net supported on the DSRC system, already implemented and until now being used for other purposes, at "no cost".

Therefore, with only some arrangements in the equipment's On-Board Unit (OBU) that will be installed inside the vehicles and in system interfaces, we can implement an RFID Model applied to logistics in a much simpler way, while being a much less expensive one.

For this purpose, a research on the market of this kind of equipment has been done. It was found that the required OBU already exists. It is a patented on-board unit, resulting from research and development made by a Portuguese company, in partnership with three Portuguese Universities and also the Brisa Inovação Company.

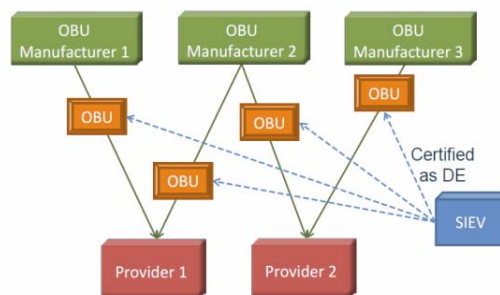
It is called OBUi, and integrates both DSRC and CN/GNSS technologies (Figure 8). The "i" means interoperability, which was precisely what was intended with this model. In this case, the interoperability is between the two electronic toll collection (ETC) systems most used currently, and therefore it was thought out to function also with the CN/GNSS system. For that reason, this OBUi equipment has an incorporated GPS device, and also a GSM/GPRS Cellular Network access chip for establishing mobile communications. The DSRC is

MDR (Medium Data Rate), therefore it has both the desired capacity and SIEV's certification requirement fulfilled. And obviously, it is prepared for being used in all of the UE countries (most countries function in MDR, and as Via Verde was a first mover in this technology, until last year only functioned in LDR mode - low data rate, and it was not possible to operate outside Portugal, neither to accept foreign OBU-MDR). Nowadays, the migration from LDR to MDR was completed (2011) in all RSE (road side equipment), and all OBUs sold nowadays are MDR.



**Figure 8.** Picture of the OBUi (courtesy of Osório *et al.*, 2010 (GIATSI-ISEL))

A provider is identified in Portuguese regulations as a toll collection issuer or provider. The provider is responsible for supplying the OBUs to the market (directly or through distribution agents authorized by SIEV, SA). Via Verde Portugal is already a provider under the DE framework authorized by SIEV (figure 9), therefore when Brisa Inovação will be able to certify the new OBUi, the new equipment will be operative for the new services and activities of Via Verde, as a provider of the private Via Verde OBUi DSRC-MDR scheme (but now also with an incorporated GSM/GPRS permitting to work in a CN/GNSS scheme).

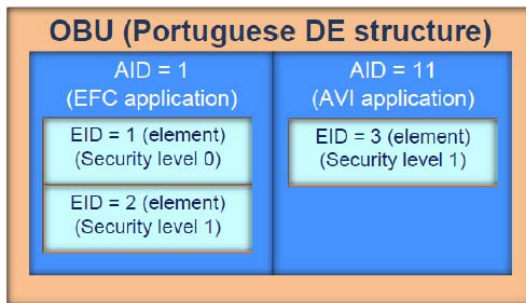


**Figure 9.** Suppliers and Providers of OBUs (SIEV-Sistema de Identificação Electrónica de Veículos, S.A, 2010)

The two applications adopted by SIEV, SA for the implementation of DE system are Automatic Vehicle Identification (AVI) and Electronic Fee Collection (EFC).

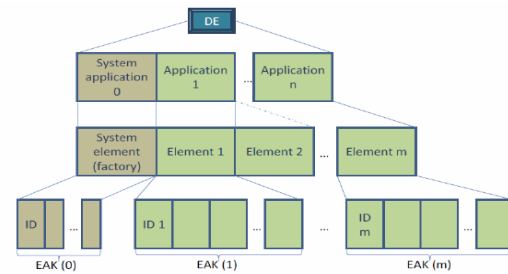
The DE AVI application for Portugal is based on three attributes: Manufacturer ID, CS1 Issuer Serial Number and Private1 (vehicle toll class), from the unique associated element. The DE AVI application consists on a subset of the already defined attributes and a set of private ones. This application will be exclusively accessed by authorities (police and other authorized entities) under security, level 1, as it guarantees authentication of both OBU and RSE. This application is for future use only, so that presently adopted OBUs are able to comply with eventual future requirements, namely if decided at European level (figure 10).

The EFC application is currently used for tolling, parking and gas station payment, and can therefore be used for other electronic collection services, in line with the current uses of Via Verde OBU DSRC-LDR services already offered.



**Figure 10.** DE information structure example (CEN-Technical Board resolutions, 2007)

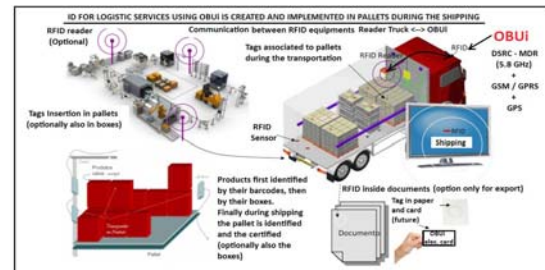
According to the ISO-14906 DSRC standard, OBU's information structure is organized in applications with an associated unique identification (AID). Each application must have at least one element with an associated unique identifier (EID). Each element is organized in a number of attributes, each one complying to specific application requirements. The OBUi structure should also include a system application with a single system element, with specific attributes that are of manufacturer's responsibility (figure 11).



**Figure 11.** DE information structure (SIEV SIEV-Sistema de Identificação Electrónica de Veículos, S.A., 2010)

For the personalization process, each element is secured through an EAK (Element Access Key) or a similar security method. This is a critical point in the Model building, because it is in this certification that lies the key success factor of the whole model: the opportunity for certifying new applications which ensure the new functionalities of the new OBU, that will itself also be certified.

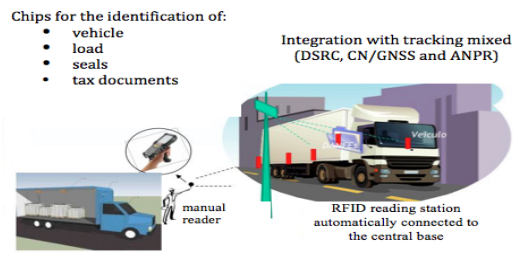
In figure 12, the complete scenario scheme of the Innovative RFID Model operation can be observed, which serves as the basis for the Brisa Inovação project, the subject of the present case study.



**Figure 12.** Complete scenario scheme of the Innovative RFID Model operation

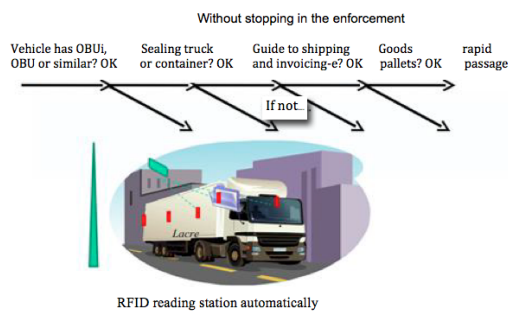
#### 4.4.1 Scenarios for Automated or Semi Automated Inspections

In the case of operations by the Stop Tax Brigades, the layout of the scenario will be the semi-automated surveillance. This control can be done using handheld terminals for a mixed reading system (bar code and RFID), for the case of roving surveillance that takes into account site visits (reading terminals, more portable players) as can be seen at the left of figure 13.



**Figure 13.** Scenarios for automated or semi-automated inspections (stop police operations)

In the case of fixed police control points, such as in certain country border areas which are crossed by passing output freight for Europe, or in the access of very large ports with higher flow of containers, or even at strategic points in the access of logistics parks or industrial cluster areas, a setting scheme of automated inspection may be chosen, as can be seen in the right part of figure 13, and in more detail in figure 14.



**Figure 14.** Scenario for automatic inspection ports and control lanes (future application)

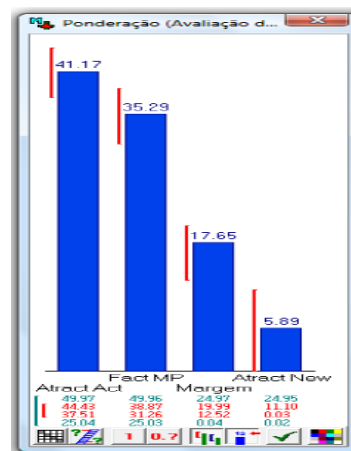
#### 4.5 Decision Analysis

For a better use of Multicriteria Decision Analysis (MCDA), it became very useful to rely on the MACBETH Method (Bana et al., 2011; Sanchez-Lopez and Bana, 2009; Berrah and Clivillé, 2007), that was used resorting to the M-MACBETH Software (Bana Consulting, 2005) which is the

Decision Support system that implements by computer the MACBETH Method. The evaluation multicriteria model was directly developed, using the M-Macbeth software, with four decision criteria:

1. The attractiveness that new services could have in future for the actual clients;
2. The attractiveness of those same new services for new possible clients;
3. How much can these new services affect (positively) the global company volume of turnover at the medium-term;
4. How much can these new services help to increase the total margin of the company (either by costs reduction or sales of high margin services – higher value added).

A judgments' matrix was made taking into account the weights, now included among the four criteria from each other. It was then obtained the representation of the Weight's Matrix Macbeth scale (figure 15).

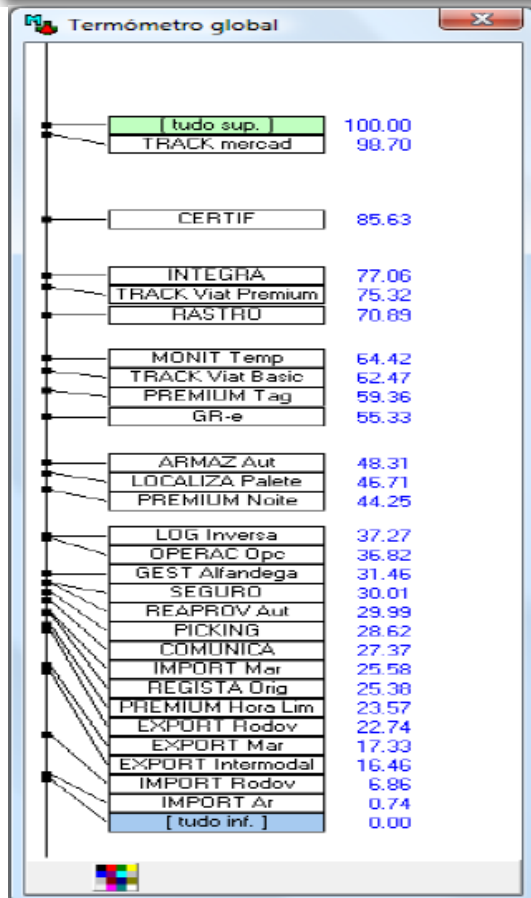


**Figure 15.** Weight's Matrix Macbeth scale



Finally, it was possible to obtain the Scores Table (figure 16a), This table can also be transformed in a graphic scale, called Global Thermometer (figure 16b)

Opções	Global	Atract Act	Atract New	Fact MP	Margem
[ tudo sup. ]	100.00	100.00	100.00	100.00	100.00
TRACK mercad	99.70	99.09	99.40	99.79	99.26
CERTIF	85.63	84.44	95.45	81.01	94.38
INTEGRA	77.06	53.33	75.76	93.67	99.61
TRACK Viat Premium	75.32	71.11	90.91	69.62	91.33
RASTRO	70.89	60.00	83.33	70.89	92.15
MONIT Temp	64.42	56.67	80.30	63.29	79.46
TRACK Viat Basic	62.47	69.33	86.36	49.37	70.69
PREMIUM Tag	59.36	73.33	92.42	35.44	63.57
GR-e	55.33	97.79	96.97	0.00	76.26
ARMAZ Aut	48.31	24.44	53.03	60.76	77.52
LOCALIZA Palete	46.71	27.78	62.12	50.63	77.91
PREMIUM Noite	44.25	24.44	50.00	51.90	73.26
LOG Inversa	37.27	0.00	77.27	55.70	74.03
OPERAC Opc	36.82	21.11	48.48	36.71	69.77
GEST Alfandega	31.46	14.44	25.76	35.44	65.12
SEGURO	30.01	97.79	71.21	0.00	60.14
REAPROV Aut	29.99	36.67	68.18	0.00	61.63
PICKING	28.62	21.11	46.97	13.92	69.38
COMUNICA	27.37	24.44	57.58	39.24	0.39
IMPORT Mar	25.58	11.11	15.15	24.05	65.89
REGISTA Orig	25.38	28.89	65.15	0.00	54.65
PREMIUM Hora Lim	23.57	0.00	42.42	40.51	38.37
EXPORT Rodov	22.74	14.44	24.24	26.58	33.91
EXPORT Mar	17.33	17.78	33.33	3.90	37.99
EXPORT Intermodal	16.46	0.00	30.30	22.78	37.60
IMPORT Rodov	6.86	3.33	10.61	5.06	17.44
IMPORT Ar	0.74	0.00	1.52	1.27	1.16
[ tudo inf. ]	0.00	0.00	0.00	0.00	0.00
Pesos :		0.4117	0.0589	0.3529	0.1755



**Figure 16 a)** Table of final Scores and **b)** Global Thermometer Scale

It is evident that there are two sets of services, from the 27 previously selected, a first set with 12 services, which punctuation (preference) overpasses 44%, and another set, consisting of 15 services, which punctuation is lower than 37%, from which 2 services, can be excluded from the start (IMPORTar and IMPORTrodov).

Finally, we can understand by the selected services set (first one with 12 services), and by the actual interview itself with our decision-maker, that the preferred strategy by the company Frigoservice (MARL's warehouse with Cross Docking), is Strategy B, which "heavy" weights are those we can see in a simple way in figure 17.



Figure 17 – Choice strategy balance

## 5. Technical Challenges

From assessment of needs, with regard to equipment and technologies for the implementation of the proposed model, we detected several types of equipment not now found in the Portuguese market, at least in a direct manner, and this will be one of the technical challenges to explore:

- Seals (mechanical, printed seals with a chip) to lock loads, pallets & packaging, and authentication of documents (future application for export);
- Chips shipped placed in pallets, specially designed for this purpose;
- Security electronic seal (890-920MHz) device, with engine encryption and security keys for recording, and operation seals and other special-purpose versions (can only be designed and manufactured in Portugal), future application mixed with WAVE (Wireless access for vehicular environment) Xiang et al. (2008)

- Approval and certification of equipment.

As for equipment on the market, it is important to note some of the technical specifications, so they can function in both CN / GNSS, such as DSRC, which are considered most relevant:

- Readers / Writers (890-920MHz, 4.8-5.9GHz);
- OBUs should have minimum storage capacity of 1024 bits;
- OBUs must permit their attachment into the vehicle so that they become physically inoperative when removed from the original location;
- OBUs must have recording features that prevent data change.

It is crucial to get the clearance of restrictions on certain equipment and technologies and to evaluate the stability of tags (temperature, washing, etc.), because for example in the case of freezing, they must withstand temperatures in the range of negative 22 degrees Celsius, and often water and ice.

And as a final note it is important to say that the Back-Office is a critical part of the model. This support structure should consist of an architecture independent server system, and should secure the integration of the data for identification, tracking and authenticity of goods, which must be connected to the core infrastructure in major firms, as well as to key customers.

## 6. Summary

Regarding the integration of key elements of the model (essentially OBUi equipment, short range RFID readers and systems gantry with DSRC), a survey was made of a series of interfaces that should be needed:

- Interface for mobile devices (mobile phones and similar), for Brisa and system users, stratified by controlled access;
- Interface for migration of data between two systems present in vehicles;
- Web interface for managing the logistics of interest to users;
- Web interface for the automation of taxation within the participating companies, to interface with other related systems, such as electronic billing and other services that may be available;
- Web interface for the Departments and the Ministry of Finance, as well as, if possible, for the system that

manages Citizen Shops, with the information and automation of these departments, automatically correlating with other systems of relevance to the tax agencies, with versions for tax brigades and portable devices.

Therefore, and finally, it will also need a system capable of integrating the referred software interfaces.

In the perspective view of future users of the OBUi and their engaged services, the following expected gains for the clients should be noted:

- Administrative costs reduction
- More efficient cost control
- Reduction/Change of fixed costs in relation to variable costs
- More efficient Cross-docking
- Better management of incidences / complaints
- Differentiation
- Brand / company image
- Less bureaucracy
- Better performance of logistic processes
- Reduction of goods thefts in all the Supply Chain Management (SCM)
- Better vehicle flow control in distribution centers (DC) and Logistic Parks
- Concordance in flow and tracking of goods: Goods / Documents / Hauler
- Increased transportation and information Safety

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# A Note on “Anticommons” on Aquaculture Projects Approval

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**Abstract** – A set of texts on the theory of anti-commons have been published in the last decades concerning the study of property rights. When “anti-commons” emerge resources are prone to be underused because there are too many rights of exclusion. This may be seen in many areas, either social or economic. In Portugal, the processes of aquaculture projects approval depend on too many people (and institutions) decisions. This dependence in the approval process of too many people leads to the sub-utilization of the resources that promoters aim to exploit, because the time used for its approval becomes too long and the project implementation would be too late.

**Keywords** - *Anti-commons, Anti-commons Tragedy, Property Rights, Exclusion Rights.*

## 1. Introduction.

Last decades have shown many problems arisen from the emergence of commons mismanagement and under-defined property rights (see, for example, Filipe, 2006 and Filipe *et al*, 2006). This lack of definition and the way commons have been exploited have brought many tragedies around the world. Hardin (1968) tried to explain problems about human overpopulation, about the overexploitation of species and about species extinction and yet about air pollution.

As people do not have incentives to preserve the commons, they overuse the resources. A resource is prone to be overused when too many people have the privilege to use it and no one has the right to exclude others from the use of the resource.

In the 80s, another problem has been posed by Michelman (1982) about the excessive fragmentation of property rights. Michelman has created the concept of “anticommons” to explain “a type of property in which everyone always has rights respecting the

objects in the regime, and no one, consequently, is ever privileged to use any of them except as particularly authorized by others”.

For Heller (1998), “anticommons” is seen as a property regime in which multiple owners hold effective rights of exclusion in a scarce resource. So, the coexistence of multiple exclusion rights creates conditions for suboptimal use of the common resource. Actually, property rights are often under-defined in many situations and in what anticommons concerns, the undefined limits for property rights generate several problems that are expressed by the under-use of the resources and by loss of value, as well.

We can become aware of anticommons as producing tragedies seen as the mirror effect when they are compared with the tragedies of the commons. When multiple agents have the right to exclude others from the use of a scarce resource and no one of them has an effective privilege to use it, we are in presence of a “tragedy of the anticommons”.

When several agents may take decisions about how to use a specific resource, jointly hold by all of them, and when one of them may impose his/her own decision to the others, imposing his/her veto power, we are in presence of this kind of anticommons problem. In this situation, all the agents have to agree about the utilization that they have to give to the resource they hold together. If not, the resource simply may be not used or may be underused.

A possible solution for the emergence of an “anticommons” is to convert the resource in such a way that all the property rights are convertible to a usable private property. Anyway, often this seems to

be too slow and complex.

The “tragedy of the anticommons” happens when resources remain idle even in the economic region of positive marginal productivity. Acting under conditions of individualistic competition, exclusion rights will be exercised even when the use of the common resource by one party could yield net social benefits.

## 2. An Example of Anti-commons Emergence

Considering that it is interesting to present a case in which an anti-commons may occur, let's see a following mathematical approach of an anticommons problem, which illustrates the following case.

Let's consider  $V_i(x_i, x_j)$  as the value of the common resource to agent  $i$  and let's consider the typical anti-commons situation (for simplification) in which two agents (co-owners) hold exclusion rights that limit each other's to use the common property<sup>1</sup>. No one agent may use the resource without the consent of the other agent. Agent  $i$  grants agent  $j$  the right to use the common resource. Agent  $j$  owns a complementary right to exclude agent  $i$  from the use of the common resource. The two agents may independently grant each other some limited right of use the common resource. So, the respective grants will be denoted as  $x_i$  and  $x_j$ . The profit that agent  $i$  derives from this joint project is  $V_i(x_i, x_j)$  and the positive externality that agent  $j$  exerts on  $i$ 's value can be modeled as

$$\frac{\partial V_i}{\partial x_j}(x_i, x_j) > 0$$

If we consider now the case of exclusion rights exercised simultaneously and independently by the various right holders, we'll for this anti-commons situation where multiple owners exercise their veto on equal terms and symmetrically. So,

$$V_i(x_i, x_j) = V_j(x_j, x_i)$$

There will be uncoordinated choices and the Nash equilibrium will be given by

$$\frac{\partial V_1}{\partial x_1}(x_1, x_2) = 0$$

and

$$\frac{\partial V_2}{\partial x_2}(x_2, x_1) = 0$$

It is natural to assume that  $V_i$  is concave in  $x_i$ . We should expect a symmetric equilibrium, as a consequence of the symmetry assumption, in the form  $x_1 = x^c = x_2$ .

Comparing with the efficient choices of  $x_i$ , those that maximize  $V_1 + V_2$ , we'll have the first order conditions:

$$\frac{\partial V_1}{\partial x_1}(x_1, x_2) + \frac{\partial V_2}{\partial x_1}(x_2, x_1) = 0$$

and

$$\frac{\partial V_2}{\partial x_2}(x_2, x_1) + \frac{\partial V_1}{\partial x_2}(x_1, x_2) = 0$$

As well, it is natural to assume that  $V_1 + V_2$  is concave and that this admits a symmetric solution  $x_1 = x^s = x_2$ .

We can show that  $x^s > x^c$ . This means that the uncoordinated choices of two agents lead to underutilization of the common resource. So, the uncoordinated exercise of exclusion rights leads to underutilization of a common resource.

Anyway, if authorities determine themselves that resources must have quotes to be used and the quotes must be kept in lower levels than the optimum, the direct effect is virtually the same. In fact, there are exclusion rights that some agents (regulators) use to restrict the use of a resource exploited by others.

## 3. Projects Approval in Aquaculture: Final Notes

The problem of anticommons may be studied for projects in aquaculture area (let's consider the case of Portugal). We can see that there are too many entities, to whom it is necessary to require their approval for the project and that all the administrative procedures motivate a situation of late global authorization (see Filipe *et al*, 2006). We conclude that interesting projects, profitable and friends of fishing, possible and viable, simply will not begin to be exploited, just because there are too many rights to exclude, too many entities to which is required the permission to exploit the project. There is an agent that wants to exploit a resource with important economic, biological and social consequences, and administrative procedures simply make the project unviable.

<sup>1</sup> As proposed by Parisi, Schulz & Depoorter (2005).

We conclude that there is an important loss of value. In fact, this process has destroyed value because the presented project has required financial resources and there is no created value because project had a too late approval. The agent who supported the project loses an important period of time to implement the project and he loses money because there is an important period without producing. In many situations, projects are not implemented because the favourable and the appropriate time has simply gone.

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